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Federal Emergency Management Agency

Washington, D.C. 20472

December 19, 2000

Mr. Steven Baggett
Project Manager
Spent Fuel Office
Office of Nuclear Material
Safety and Safeguards
Nuclear Regulatory Commission
Washington, DC 20555-0001

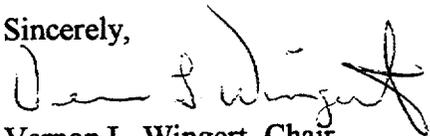
Dear Mr. Baggett:

This responds to your request to the Federal Emergency Management Agency (FEMA) to provide a Safety Analysis and Environmental Report (SA&ER) to the Nuclear Regulatory Commission (NRC) to support the Agency's formal request for an exemption to ship CDV-794 calibrators. The Environmental Report conforms to the regulatory requirements of 10 CFR §51.30 and 10 CFR §51.60.

As part of this report, other public health and safety issues are identified, discussed and documented including the following: (1) Budgetary and staff constraints of state organizations currently controlling and supervising the storage of CDV-794 calibrators (see enclosure 2 to the SA&ER entitled "State Letters"); (2) FEMA budgetary constraints arising from the need to request and obtain Congressional appropriations within a two-year budget cycle; (3) impact of delays if the Agency is not able to proceed soon with the shipment of the calibrators in non-Type B packaging and disposal of calibrators on our USDOT exemption and our International Atomic Energy Agency Certification of Competent Authority both of which expire in 2002; and (4) the impact on any further delays on state organizations currently controlling the licensed sources. The attached SA&ER document supercedes all previous correspondence concerning the request for NRC exemption.

The SA&ER addresses the shipment of one CDV-794 calibrator in Hawaii and the shipment of nine calibrators within the Continental United States (CONUS). The U.S. Army is especially anxious to obtain the calibrator located in Hawaii since it is an important part of its infrastructure to support preparedness for terrorist incidents involving weapons of mass destruction.

If you have any questions regarding this matter, please contact me at (202) 646-2872.

Sincerely,

Vernon L. Wingert, Chair
FEMA Radiation Control Committee

Enclosure: Safety Analysis and Environmental Report

NMSS24

FEDERAL EMERGENCY MANAGEMENT AGENCY

SAFETY ANALYSIS AND ENVIRONMENTAL REPORT

December 19, 2000

A. PURPOSE:

The Federal Emergency Management Agency (FEMA) is requesting that the Nuclear Regulatory Commission (NRC) provide an exemption to the Agency from the free drop and puncture tests in 10 CFR §71.73 Hypothetical Accident, and requests authorization for the use of a non-Type B package for a one-time shipment of 10 FEMA-owned CDV-794 calibrators. In support of this application, FEMA proposes additional operational controls to minimize the possibility of any radiological exposure to the public for any postulated transport accident.

FEMA is seeking this exemption from the Commission to consolidate and properly dispose of calibrators containing radioactive sources to assure adequate protection of public health and safety of FEMA-owned calibrators currently in the possession of state organizations that no longer need and do not want to retain these sources.

In the aftermath of FEMA's termination of its Radiological Defense (RADEF) Program, many states followed FEMA's lead and terminated their own state RADEF programs. The states contacted FEMA and requested removal of FEMA-owned calibrators as quickly as possible because of state funding shortfalls, retirement and re-assignment of state radiological safety personnel and related difficulties in meeting licensing requirements (see enclosure 2, "State Letters"). FEMA needs an exemption from the NRC to expedite consolidation of calibrators scattered across the country in various state organizations to assure adequate control and maintain supervision of the calibrators by appropriate radiological safety personnel and assure continued protection of the public health and safety.

FEMA needs this exemption to maintain control of radioactive sources in the face of intervening budgetary and regulatory obstacles. The Agency's funding cycle requires submission of funding requirements to the Office of Management and Budget at least two years prior to the anticipated use of the funds. The Congress has now authorized and appropriated sufficient FY01 funding to ship and dispose of all of the remaining FEMA-owned sources using non-Type B packaging for the CDV-794 calibrators; however, this FY01 funding level was established prior to the Commission's decision and notice to FEMA in July 1999 that our 10 remaining shipments would require an exemption from the NRC. Thus, when FEMA submitted its budget request for the disposition of these calibrators, it did so on the premise that its budget request was adequate to cover the cost for the shipment, consolidation and disassembly of calibrators. (See Option A of the Safety Analysis and Environmental Report)

If the NRC does not grant this exemption, FEMA must use Type-B packaging. This would create a severe funding shortfall which may require yet another two-year process to obtain additional appropriations to complete this task. In addition to delaying the consolidation and

control of the calibrators in the eight states, it could pose a potential regulatory problem for FEMA because our USDOT exemption expires on June 30, 2002, and our International Atomic Energy Agency (IAEA) Certificate of Competent Authority for the CDV-794 calibrators expires on August 31, 2002. (See Attachment 1, "Procedures for the Preparation of the CDV-794 Calibrator for Shipment," or "Procedures" on pages 62f and 83 respectively for copies of the USDOT exemption and the IAEA Certification documents.) More importantly, further delays in expediting the removal and shipment of the calibrators located with state organizations would compound the public health and safety concerns mentioned above (see Attachment 2, "State Letters"). Accordingly, a positive response by the Commission to our exemption request would enable the Agency to quickly remove, ship and dispose of the calibrators and, thus, preclude budgetary and regulatory problems.

B. SAFETY ANALYSIS:

1. Purpose:

FEMA submits this Safety Analysis to the Nuclear Regulatory Commission (NRC) to provide information and data in support of this request for a NRC exemption from the free and puncture drop test requirements in 10 CFR §71.73, Hypothetical Accident, (free drop and puncture tests) in order to use a non-Type B package for the shipment of the FEMA CDV-794, Cs-137, calibrator. Each calibrator is packaged in a custom-designed wooden overpack that meets the other tests in the hypothetical accident conditions.

2. Background:

The FEMA CDV-794, Model No 2, Cs-137 Calibrator was manufactured by Technical Operations Inc., Radiation Products Division, Burlington, MA, under contract OCD-PS-66-149, June 1966. (NR-283-D-105S, NRC Registry of Radioactive Sealed Sources and Devices, July 28, 1983.)

3. Calibrator Design and Construction:

A detailed discussion of the calibrator design, construction and labeling and shipping procedures is provided in Attachment 1, "Procedures".

a. Sealed Source - The radioactive source was constructed and tested by Oak Ridge National Laboratory in 1982. The radioisotope is in the form of cesium chloride as a pressed pellet 3.9 inches (10 cm) in diameter by 7.9 inches (20 cm) long. The pellet is doubly encapsulated in type 316 stainless steel (SS), hermetically sealed via heliarc welding. One end of the outer capsule is fabricated of type 410 magnetic SS. The radioactive source was approximately 130 curies (4.8 TBq) $\pm 10\%$ Cs-137, containing less than 0.5% Cs-134 by activity. The current activity of the source (November 2000) is approximately 85 curies (3.2 TBq). The source, ORNL DWG DSK-2384, meets the requirement of special form. (IAEA Certificate of Competent Authority Special Form Radioactive Materials Certificate Number USA 10531/s, Rev. O. Expiration August 31, 2002. ORNL Special form test No. 39, October 1982.) The source capsule is contained in a tungsten alloy loading plug, which is bolted and sealed into position in the primary DU shield.

The melting point of tungsten is 6,196°F (~3410°C) and the melting point of SS is 2713°F (~1475°C). See Figure 1-5 in Procedures page 18.

b. Primary Shield Assembly - The primary shield, fabricated by National Lead Co., consists of a main shield, an attenuator wheel, and a collimator, all fabricated from depleted uranium (DU). The hemispherical main DU shield forms the real part of the shield assembly that is bored to receive the radioactive source loading plug. The attenuator wheel, which serves as the face of the shield, rotates in front of the radioactive source and provides five different attenuation thicknesses. This attenuator wheel is rotatable by a coaxially mounted control wheel. See Figure 1-2 and 1-4 in Procedures pages 14 and 18.

The collimator restricts the beam of radiation traversing the attenuator to an included angle of 28°. The primary shield assembly is designed to provide a minimum of 3.25 inches (~8.26 cm) DU thickness in all directions. Each DU component is protected by nickel plating and three coats of epoxy paint to minimize corrosion, and all points of wear are bushed so that contact of DU metal with any moving surface is not possible. The total weight of DU is 180 pounds (~82 kg). The melting point of DU is 2095°F (~1132°C). Brazing material melting point is 1100°F (~593°C).

c. Calibration Chamber - The radiation beam from the source traverses an 8 inch (~20.3 cm) path across a totally enclosed, aluminum-lined steel chamber. See Figure 1-6 in Procedures page 19. The beam is 3 inches (~7.6 cm) wide at the point of entrance, 5 inches (~12.7 cm) wide at a reference plane bisecting the calibration chamber, and 7 inches (~17.8 cm) wide where the beam is intercepted by a 4 inch (~10.2 cm) thick lead beam stopper. The reference plane is 10 inches (~25.4 cm) from the center of the radioactive source and 4 inches (~10.2 cm) from the inner face of the chamber nearest the radioactive source. The calibration chamber internal dimensions are:

Width	8 inches (~20.3 cm)
Height	14 inches (~35.6 cm)
Depth	11 inches (~27.9 cm)

The melting point of steel is 2713° F (~1475° C). The melting point of aluminum is 1256°F (~660°C). The chamber door consists of a bronze casting filled with 1 inch (~2.54 cm) of lead. The melting point of lead is 646°F (~327°C). The door also includes a 5 inch (~12.7 cm) x 8 inch (~20.3 cm) leaded glass viewing window 2 inches (~5.1 cm) thick, which is equivalent to 1 inch (~2.54 cm) lead. The melting point of leaded silica glass is 2460° F (~1350° C).

d. Calibrator Design - The primary shield assembly and the calibration chamber are enclosed in a rectangular steel cabinet mounted on a tubular steel stand. See Figure 1-3 in Procedures page 16. A steel plate divides the cabinet into two compartments and also serves as a mounting plate to support the DU primary shield. The entire cabinet may be closed with two horizontally hinged metal covers, the lower of which opens into a horizontal position to serve as a desk. The upper cover includes a stop that prevents the cabinet from being closed unless the sliding calibration chamber door is open. This ensures that the radioactive source is locked when the cabinet is closed. This cabinet is supported by a stand consisting of tubular steel oval A-shaped frames on both ends joined by tubular cross-members.

e. Safety Interlock - A simple and rugged mechanical interlock is provided that positively prevents the radioactive source from being exposed unless the calibration chamber door is closed; and positively prevents the calibration chamber door from opening unless the attenuator is in its fully shielded position. The covers are key locked to prevent unauthorized use of the calibrator. See Figure 1-7 in "Procedures" page 20.

4. Environmental Testing of the CDV-794 Calibrator:

The CDV-794, Model 2 calibrator was designed to meet the requirements of 49 CFR §78.250, Specification 55. The following tests were conducted by Technical Operations Inc. in 1966. The results of the tests are as follows:

a. Temperature - There are no observable effects on operation of the calibrator as a result of exposure to 0° F to 125° F (~17.9° C to ~51.7° C). The calibrator operates properly at room temperature after 24 hours exposure at -30° F (~-50° C) or 72 hours at 160° F (~72.8° C).

b. Humidity Cycling - The following procedure was conducted in a 95% relative humidity.

- (1). Room temperature to 140° F (~60.5° C) in 1.5 hours.
- (2). Hold at 140° F (~60.5° C) for 16 hours.
- (3). Return to room temperature in 1.5 hours.
- (4). Hold at room temperature for 5 hours.
- (5). At the end of 5 cycles, hold at room temperature and 50% relative humidity for 24 hours.

At the end of the humidity cycle there was no corrosion and the calibrator operated properly.

c. Shock and Vibration - Acceptable with respect to reliability, safety, ruggedness, and operability.

d. Salt Water Spray - The calibrator withstood 136 hours of exposure to the salt-water spray prior to failure.

5. External Radiation Exposure Levels:

The CDV-794 calibrator is designed so that the radiation exposure levels or exposure rates at every accessible surface of the cabinet (with the exception of the beam path) are <2mR/hour (<0.02 mSv/hour).

6. Hypothetical Accident Conditions (10 CFR §71.73):

a. Free Drop Test - Based on the design and construction of the CDV-794 calibrator, it is anticipated that it would fail a 30 foot (~9m) free drop test. This free drop would result in a force of about 5,400 foot-pounds (756 kg-m) to the DU shield (180 lbs x 30 ft). However, the CDV-794 calibrator would withstand a 10 foot (~3m) free drop which is about twice the height of a normal loading dock. This would result in a force of about 1800 foot-pounds (180 lbs x 10 ft) (or 252 kg-m).

b. Crush Test - Based on the design and construction of the CDV-794, this test is not required because the total mass is 1080 pounds (~490 kg) which is less than 1100 pounds (500 kg).

c. Puncture Test - Based on the design and construction of the CDV-794 calibrator, it is anticipated that it would fail this test. The force would be about 5,000 foot-pounds (1500 lbs x 3.33 ft) (or 700 kg-m). This force would cause penetration of the package.

d. Thermal Impact - Based on the melting point for the SS source capsule, 2713° F (~1475° C) and the melting point of the DU shield, 2095° F (~1132° C), the calibrator can withstand exposure to a full flame temperature that reaches 1678° F (~900° C) for 30 minutes.

e. Immersion Test - Based on the design and construction of the CDV-794 calibrator, it is anticipated that it would pass the immersion test.

6. Mitigation of Hypothetical Accident Consequences:

FEMA proposes to use the NRC exemption and the DOT exemption to ship the CDV-794 in Hawaii and the 9 CONUS-based CDV-794s in non-Type B packaging, a custom-designed wooden overpack. U.S. Army radiation specialists from the Communications and Electronic Command (CECOM) located at Fort Monmouth, New Jersey under contract with FEMA will transport the calibrators by vehicle and provide escort services. These specialists have extensive experience with shipments of this type of calibrator and other FEMA-owned low- and high-level radioactive sources. This exemption is critical to the Agency for expeditious consolidation and disposal of 10 CDV-794 calibrators. Since these 10 calibrators constitute the remaining scattered inventory of FEMA-owned CDV-794 calibrators, our use of the NRC exemption would be limited to these 10 CDV-794 calibrators.

The CECOM personnel will follow the requirements in the "Procedures" document for all of the above shipments and direct all aspects of this operation including preparations for shipment, the shipment itself and follow-up activities after the shipment arrives at FEMA's MWEAC. The specifics of these functions are as follows:

(1). Prior to the actual shipment of the calibrator, CECOM personnel would perform wipe tests on the calibrator to check for both external contamination and source leakage and prepare shipping papers in accordance with applicable Federal requirements.

(2). Prior to the shipment, FEMA would advise appropriate State and local government authorities of the shipment and provide information to assist them if a response be required during the actual shipment.

(3). The calibrator would be carefully loaded with the source intact within the custom-designed, reinforced wooden package (as identified with specifications for the Commission) and loaded and secured on an exclusive use vehicle in conformance with USDOT and USNRC requirements.

(4). The CECOM personnel would escort the shipment from the departure location to the destinations in a separate vehicle. The CECOM personnel will carry radiological monitoring and other response equipment during the transport. One copy of the shipping papers would be carried in the transport vehicle and CECOM personnel will have another copy of the shipping papers in their escort vehicle.

(5). Once the vehicle arrived at its final destination, the CECOM personnel will supervise the unloading of the shipment package from the truck and the removal of the calibrator unit from its packaging.

(6). Finally, the CECOM personnel will again survey each calibrator and perform wipe tests to assure that the calibrator is not externally contaminated and that its radioactive source is not leaking.

7. Estimated Exposure Rates:

The current activity of the Cs-137 source is approximately 85 curies (~3.2 TBq) for one calibrator. The maximum activity reflected in Option A of this report for shipments of the CDV-794s with an NRC-approved exemption is one shipment of 4 calibrators which would be 340 curies ($4 \times 85 = 340$).

If there is a loss of source control (containment), the estimated exposure rate (R/hr) at 1 meter from an unshielded 85 curie (3.2 TBq) Cs-137 sealed source is about 28.1 R/hr (28.1 cGy/hr). ($0.33 \text{ R/hr per curie at 1 meter} \times (85 \text{ curies}) = 28.1 \text{ R/hr at 1 meter}$).

The exposure rate at 1 foot for an unshielded 85 curie (3.2 TBq) Cs-137 sealed source is about 338 R/hr (338 cGy/hr).

$$\text{R/hr at 1 ft} = 6 \text{ C E N}$$

Where:

6 is a constant

C = activity in curies

E = photon energy in Mev

N = number of photons per nuclear transformation

$$\begin{aligned} \text{R/hr at 1 ft} &= 6 \text{ C E N} \\ &= 6 \times 85 \times 0.662 \times 1 \\ &= 338 \pm 20\% \text{ (at 1 ft) or 338 cGy at 1 ft} \end{aligned}$$

8. Additional Operational Controls and Compensatory Measures:

FEMA proposes the following operational controls and compensatory measures to minimize environmental impact of an accident and minimize any exposure to the public and safeguard public health:

- (1). A CECOM radiation specialist familiar with the cesium source, shielding and the calibrator will escort all shipments with applicable monitoring and response equipment;
- (2). Radiation specialists and vehicle drivers will be provided with communication equipment;
- (3). FEMA/CECOM will notify State and local government (and US Army Schofield personnel for the shipment in Hawaii) prior to the shipment of this calibrator and provide appropriate information regarding the shipment and emergency measures; and
- (4). The driver of the vehicles used in transport will be carefully selected to ensure that he/she is well qualified as a driver, that he/she is familiar with the shipment route and that he/she can operate communications equipment inside the vehicle to contact US Army and other governmental response personnel if necessary. All of these compensatory measures would be utilized to respond to and control the consequences of any potential incident or accident in order to prevent or minimize radiological impact to the environment and the public during an emergency situation.

9. Incident-free History of FEMA Shipments of the CDV-794 Model 2, Cs-137 Calibrators:

The first two Model 2, CDV-794 calibrators were shipped 15 February 1968. From February 1968 through December of 1969, a total of 67 each CDV-794, Model 2 calibrators were shipped to States or agencies authorized and licensed to possess and use the calibrators.

Between 1981 and 1999, FEMA has requested and received 11 exemptions (DOT-E-8667) from USDOT regulations 49 CFR §173.416 and 49 CFR §175.3 for the use of our custom-designed overpack to ship the CDV-794. The current exemption expires 6/30/2002.

FEMA and its predecessor Federal Agency (Office of Civil Defense) have made more than 240 shipments of the CDV-794, Model 2 calibrator in non-type B packaging since 1981 through July 1999 without incident, accident and without any violations of USDOT regulatory requirements.

10. Conclusion:

FEMA concludes that the CDV-794 calibrator would be expected to maintain its containment integrity for the specified conditions of transport and accidents. Additional operational controls including an escort vehicle, communications equipment and radiologically trained personnel to accompany every shipment would provide adequate assurance that public health and safety will not be compromised.

C. ENVIRONMENTAL REPORT:

1. Purpose:

FEMA provides this Environmental Report (ER) to the Nuclear Regulatory Commission (NRC) in response to the Commission's request. The purpose of the ER is to provide information and data pursuant to 10 CFR §51.30(a)(1)(2) and 10 CFR §51.60, to assist the NRC in developing its

environmental assessment and considering FEMA's request for an exemption to ship 10 CDV-794 calibrators in non-Type B packaging.

2. Background:

FEMA is responsible for 26 CDV-794 calibrators. Each calibrator contains a one cesium-137 radioactive source of about 85 curies (~3.2 TBq) and a Depleted Uranium (DU) shield. These calibrators were manufactured for use in calibrating civil defense radiological instruments. The calibrators have been on loan to several States, the U.S. Army and the U.S. Department of Energy (USDOE) Brookhaven Laboratory. FEMA intends to "dispose" of these 26 calibrators and their cesium sources as they are no longer needed by the Agency or these other organizations.

Under Option A, described below, disposal of the 26 CDV-794 calibrators requires the shipping of 10 calibrators currently located with 7 states for consolidation at FEMA's Mt. Weather facility for disassembly and disposal.

3. Technical Information and Data on Shipment Instructions:

A copy of the FEMA "Procedures" document is attached. FEMA prepared these procedures to support the shipment of the CDV-794 calibrators and assure compliance with USDOT and USNRC regulations. This document provides all required information and data for shipment of the CDV-794 calibrators to include the specifications of the custom-designed overpack developed by FEMA in consultation with the USDOT for shipping the CDV-794s.

4. 10 CFR §51.30 (a)(1): Identification of the Proposed Action (Description, Need, Alternatives and Environmental Impacts):

Three options are described below for shipping and "disposing" of these sources: (A) FEMA proposed action using non-Type B packaging with additional operational controls and mitigating measures; (B) use of an NRC-approved Type B packaging to transport only the Cesium sources; and (C) use of an NRC-approved Type B Overpack to ship the calibrators with the Cesium sources intact within the calibrators.

Option A - FEMA Proposed Action Using Non-Type B Packaging:

There are 10 CDV-794 calibrators in the possession of other parties at the following nine (9) locations: Georgia (1), Hawaii (1), Kentucky (1); Montana (1), North Carolina (1); New York (1); Ohio (2); USDOE Brookhaven Laboratory (1); the U.S. Army Communications-Electronics Command (CECOM), Fort Monmouth, New Jersey (1). FEMA proposes to consolidate all the calibrators in one location for disassembly and disposal of their components.

One CDV-794 calibrator would be shipped from a State facility in Honolulu, Hawaii to the US Army Schofield Barracks base in Honolulu, a distance of about 25 miles over major highways in central Honolulu over flat and dry terrain. Possession and title to the CDV-794 calibrator in Hawaii would be transferred to the US Army Schofield Barracks under its license.

Upon its arrival at FEMA's MWEAC, FEMA will transfer title to the 9 CONUS-based calibrators and the 16 calibrators already stored a MWEAC to a private firm based in the Los Angeles, California area under its license; the DU shields would be shipped to Envirocare in Salt Lake City, Utah for recycling.

FEMA and its predecessor Federal agency (Office of Civil Defense) have made many shipments of this calibrator in non-Type B packaging without incident or accident. FEMA has had a U.S. Department of Transportation (USDOT) exemption (DOT-E-8667) to ship the CDV-794 calibrators in non-Type B packaging since 1981.. The current USDOT exemption expires on June 30, 2002.

Sixteen (16) of the 26 FEMA-owned calibrators are currently stored at FEMA's Mount Weather Emergency Assistance Center (MWEAC) located at 19844 Blue Ridge Mountain Rd., Bluemont, Virginia and do not require transport.

The 10 remaining calibrators would be transported in the following manner:

- (a). The one (1) calibrator in Hawaii would be transported from a State facility in Honolulu to the U.S. Army Schofield Barracks in Honolulu in a commercial vehicle 25 miles on major highways.
- (b). The other nine (9) calibrators within CONUS would be shipped from their present locations to FEMA's MWEAC on three major routes.

Once these shipments are completed, these nine calibrators would be consolidated with the 16 calibrators that are already located at the MWEAC for a total of 25 CDV-794 calibrators for final disposition/dismantling and disposal of component parts.

A description of the three CONUS shipment routes for the shipment of nine (9) calibrators follows.

Route # 1 - CECOM personnel, trained in the response and mitigation of radiation accidents, under contract with FEMA, would escort the transport of three (3) calibrators to FEMA's MWEAC using the following proposed route. Starting in Albany, New York, CECOM personnel would pick up one (1) calibrator at a State facility in Albany and transport it to the USDOE Brookhaven Laboratory on Long Island. At the Brookhaven Lab, CECOM personnel would pick up a second calibrator and transport both calibrators to the CECOM, Ft. Monmouth, New Jersey. At CECOM, a third calibrator would be loaded into the same vehicle, and all three (3) calibrators transported to FEMA's MWEAC for a total distance of about 590 miles.

Route #2 - CECOM personnel, trained in the response and mitigation of radiation accidents, under contract with FEMA, would escort the transport of two (2) calibrators to FEMA's MWEAC using the following proposed route. Starting in Atlanta, Georgia, CECOM personnel would pick up one (1) calibrator at a State facility and transport it to a State facility in Raleigh,

North Carolina. In Raleigh, CECOM personnel would pick up a second calibrator and transport both calibrators to FEMA's MWEAC for a total distance of about 690 miles.

Route #3 - CECOM personnel, trained in the response and mitigation of radiation accidents, under contract with FEMA, would escort the transport of four (4) calibrators to FEMA's MWEAC using the following proposed route. Starting in Helena, Montana, CECOM personnel would pick up one (1) calibrator at a State facility and transport it to a State facility in Frankfort, Kentucky. At Frankfort, an additional calibrator would be loaded on the vehicle with the one from Montana and both calibrators transported to a State facility in Columbus, Ohio. In Columbus, CECOM would pick up additional two (2) calibrators and load them with the other two calibrators. Thus, four calibrators would be shipped from Columbus, Ohio to FEMA's MWEAC for a total distance of about 2,430 miles.

Summary – Under the preferred option, CECOM personnel will transfer the calibrator by motor vehicle 25 miles on the Island of Oahu. When the transfer is completed, the US Army will take title to this calibrator and the cesium source would be transferred to the Army's NRC license. The other nine (9) CONUS-based calibrators would be shipped from their present locations to the MWEAC by motor vehicle on three shipment routes for a total distance of about 3,710 miles.

All shipments of the CDV-794 calibrators will be carried out in accordance with USDOT and USNRC regulatory requirements. All of these requirements along with specific information about the calibrator itself and radioactive materials (cesium-137 source and a DU shield) are addressed in the attached FEMA "Procedures" document dated November 2000. FEMA proposes additional operational controls and mitigating measures to supplement its normal procedures for shipments under this requested NRC exemption.

The 9 CONUS-based calibrators would be consolidated at FEMA's MWEAC in a facility specifically designed for the handling, storage and use of high-level radioactive sources. This secure FEMA facility that will adequately support the handling, temporary storage, removal of high-level sources, removal of DU shields, packaging for shipments and loading off and on vehicles.

A private firm based near Los Angeles (licensed by the NRC to remove and transport high-level sources) would travel to the MWEAC, take title to the 25 cesium sources under its license, remove the sources from the calibrators and ship the sources to its facility in California.

Once the cesium sources are removed, CECOM personnel would remove the DU shields from the calibrators, and prepare the DU shields for shipment. A total of 25 shields (one per calibrator) would be shipped by a commercial trucking firm from the MWEAC to Envirocare in Utah. CECOM personnel will re-inspect the calibrators (now without their cesium sources and DU shields) to assure that the calibrator housing is not externally or internally contaminated. Once this action is completed and the housings are determined not to be contaminated and hence freed for unrestricted use, FEMA will dispose of the calibrator housings as scrap metal.

The total estimated cost for this approach as specified above is approximately \$505,000 as follows: (1) \$400,000 for US Army services; (2) \$30,000 for services provided by the private

California-based firm; and (3) \$75,000 for the shipment and disposal of 25 DU shields through Envirocare.

Alternatives: There are two alternatives to this proposed action: (B) separate shipment of the Cesium source in a Type B package and (C) shipment of the calibrator with the Cesium source intact within a large, steel Type-B Overpack. These alternatives are addressed below along with a specification of total estimated costs. If the NRC denies FEMA's exemption, we would be compelled to select another option and delay completion of the project for two or three more years with an extension of the public health and safety concerns.

Option B - Separate Shipment of the Cesium Source in a NRC-Approved Type B Package:

This approach would require the travel of CECOM personnel, a California-based private firm licensed to remove and transport high-level radioactive sources, and FEMA staff to all locations to disassemble and dispose of the calibrators on site. The CECOM personnel would travel to each of the 10 sites (including MWEAC) to perform wipe tests on all of the 26 calibrators prior to the arrival of staff from the private firm.

For the Hawaiian site, the California-based firm would remove the cesium source and ship it in a NRC-Approved Type B packaging to the US Army Schofield Barracks in Honolulu, then after the calibrator is moved, re-insert the cesium source back into the calibrator. CECOM personnel would wipe test the source before unloading and after reloading.

For the 9 CONUS-based calibrators, the private firm would travel to each of the nine sites, remove the cesium sources and ship them from each site to its facility in California in NRC-approved Type B packaging for a total distance of about 21,420 miles. Consolidation of the dispersed calibrators in one secure location as proposed in the preferred option would reduce the travel miles for all personnel and associated costs.

The CECOM personnel, in turn, would ship these nine (9) calibrators (now without the cesium sources) through commercial transport to FEMA's MWEAC and consolidate them with the remaining 16 calibrators currently located at FEMA's MWEAC. At the MWEAC, the US Army personnel would again perform wipe tests on the calibrators shipped there as well as on the 16 calibrators currently located at the MWEAC. The private firm would also travel to the MWEAC to remove the cesium sources from the 16 calibrators currently located at MWEAC, and ship them back to its facility in California in a NRC-approved Type B package.

The US Army would remove the DU shields from all of the remaining 25 calibrators, arrange for the commercial shipment of the DU shields to Envirocare in Utah, check the calibrator housings for contamination and take steps necessary to assure that the calibrator housings can be disposed of by FEMA as scrap metal.

It would be necessary for two FEMA staff based in Washington, DC to be present at all ten (10) sites to monitor the removal of the cesium sources and to effect the disposal of the calibrator shells once the cesium sources and DU shields were removed.

The total estimated cost for this alternative is approximately \$803,400 as follows: (1) \$450,000 for US Army services; (2) \$270,000 for services of the California-based firm; (3) \$75,000 for shipment and disposal of 25 DU shields through Envirocare and (4) \$8,400 for travel and per diem of two FEMA staff. In sufficient funding FY01 funding would require additional appropriations and delay the implementation of the project by two or three years.

Option C - Shipment with the Use of an Overpack:

This approach would entail the renting and use of one (1) NRC-approved Type B Overpack (Model 1-13) from GTS Duratek (formerly Chem-Nuclear Corporation of South Carolina) and shipment of the Overpack from Barnwell, South Carolina to all nine (9) CONUS sites. The use of the Overpack permits the entire calibrator with its cesium source intact to be shipped as one unit.

The calibrator in Hawaii would be shipped in accordance with Alternative B, using a private firm to remove the cesium source, shipping both the cesium source and the calibrator separately and having the private firm re-insert the cesium source within the calibrator after the shipments arrive at the US Army Schofield Barracks in Honolulu.

CECOM personnel would effect all of the 9 CONUS-based shipments to the MWEAC using the rented overpack. Once the calibrators are consolidated at the MWEAC in Berryville, Virginia, the California-based firm would be used to remove and ship the cesium sources to its facility near Los Angeles. CECOM personnel would then remove the DU shields and effect their shipment to Envirocare in Utah. FEMA staff would be present during the removal of the sources and DU shields at the MWEAC and effect the disposal of the calibrator housing once the CECOM personnel determined that they were not contaminated.

The total transportation involved in these shipments is 5,028 miles. An additional shipment of the 25 CONUS-based sources from the MWEAC to Los Angeles, California would be required at a distance of about 2,620 miles for a total distance of about 7,140 miles. It would not be possible to consolidate shipments using this overpack.

The estimated cost for this alternative is \$920,000 as follows: (1) \$450,000 for US Army services; (2) \$35,000 for rental of the GTS Overpack (\$7,000 per week for 5 weeks); (3) \$300,000 for the shipment of this Overpack from one location to another (20 shipments at \$15,000 per shipment); (4) \$75,000 for shipment and disposal of 25 DU shields through Envirocare; and (5) \$60,000 for services provided by the private firm in Los Angeles. Since additional appropriations would be needed to implement Option C, we anticipate delays of two or three years and an accompanying extension of public health and safety concerns.

5. Summary of Findings:

A table is provided below which summarizes the total estimated mileage, costs, estimated completion dates along with an indication of public health safety benefits (+ = positive; - = negative) for the three approaches set forth above.

Options	Total Estimated Mileage with Non-Type B Packaging	Total Estimated Mileage with Type B Packaging	Total Estimated Cost	Estimated Completion Date	Public Health & Safety Benefits
A	3,710 miles	2,620 miles	\$505,000	2001	++
B	0 miles	21,420 miles	\$803,400	2002-3	-
C	0 miles	7,140 miles	\$920,000	2002-3	-

Based on FEMA's prior and extensive experience in shipping calibrators throughout the United States and some of the US Territories, the anticipated environmental impact from transportation accidents involving the use of non-Type B packaging would, we believe, be minimal. If the calibrator and FEMA-proposed packing were exposed to an accident involving severe forces, it is possible that radiological releases could occur with a loss of integrity from the DU shield and even the source capsule. Careful planning and coordination will ensure that all available response resources could be called upon and utilized for an effective response to such a postulated accident with CECOM personnel escorting each shipment to mitigate the radiological conditions associated with a vehicle accident and loss of source control (containment).

As stated above, FEMA is seeking this exemption from the Commission to consolidate and properly dispose of calibrators containing radioactive sources to assure adequate protection of public health and safety, especially those calibrators currently located in seven state facilities (see enclosure 2, "State Letters"). We have cited the Agency's concern about the status of these calibrators with respect to public health and safety issues and the need to quickly remove these calibrators from state calibrators and consolidate them in a facility designed for such purposes to assure proper control and maintain supervision of the calibrators. Also, we have highlighted potential obstacles that the Agency would face if the Commission did not grant an exemption to FEMA with respect to a two-year delay in obtaining additional funds due to the fact that our current funding level was premised on the use of the USDOT exemption. Finally, further delays may have adverse upon the Agency due to the fact that our USDOT exemption and IAEA Certificate of Competent Authority will lapse in 2002. Further delays would compound the public health and safety concerns cited with respect to the status of calibrators currently located in state facilities.

Accordingly, a positive response by the Commission to our exemption request would enable the Agency to quickly remove, ship and dispose of the calibrators and, thus, preclude budgetary and regulatory problems

6. 10 CFR §51.30 (a)(2): Listing of Agencies and Persons Consulted and Sources Used:

The following organizations and individuals were consulted with regard to this proposed shipment:

Mr. Steven Baggett (Project Manager, Spent Fuel Project Office, Nuclear Regulatory Commission).

Ms. Elaine Chan (Program Law Division, FEMA Office of General Counsel, Washington, DC).

Mr. Gordon Lodde (US Army contractor who serves as FEMA's Radiation Safety Officer).

Mr. George Meyer (US Army contractor who serves as FEMA's Alternate Radiation Safety Officer).

Mr. Steve Rogers (US Army Redstone Arsenal, Huntsville, Alabama).

Mr. Burt Cummings (CECOM official, Fort Monmouth).

Mr. Richard Sakuma (State of Hawaii, Department of Defense, Radiological Instrumentation Maintenance and Calibration Facility).

Mr. Alden Kang (State of Hawaii, Department of Defense, Radiological Instrumentation Maintenance and Calibration Facility).

Mr. J. L. Shepherd (J. L. Shepherd, Inc., San Fernando, California).

Mr. Ralph Holland (US Department of Energy contact with Envirocare, Utah).

Mr. Carl Rowland (GTS Duratek/Chem-Nuclear located in Aiken, South Carolina).

7. **Contact Information:**

Inquiries regarding this report may be referred to Mr. Vernon L. Wingert, Chair of the FEMA Radiation Control Committee, at 202-646-2872 or by email at: Vernon.Wingert@fema.gov.

D. **ATTACHMENTS:**

1. Procedures for the Preparation of the CDV-794 Calibrator for Shipment, November 2000.
2. State Letters.

PROCEDURES
FOR THE PREPARATION
OF THE CDV-794
CALIBRATOR
FOR SHIPMENT

Federal Emergency Management Agency

Washington, D.C. 20472

April 1995

Updated October 1997

Updated June 1998

Updated June 1999

Updated June 2000

Updated November 2000

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- A. CPG 4-1, Volume 8, CDV-794 Calibrators and CDV-765 Transfer Standards, Change 1, September 25, 1985. (Selected Pages Pertaining to Wipe Testing and Shipping.)
- B. FEMA CDV-794 Leak Test Data Sheet.
- C. DOT Exemption No. DOT-E-8667
- D. Supplemental Information Concerning The Transport Index
- E. Sample Shipping Paper Entry for CDV-794
- F. Radioactive Material Shipping Information Forms
- G. Special Instructions For Drivers Transporting FEMA-owned Radioactive Material in a DOT-E-8667 Container, In the Event of Fire or Accident.
- H. NRC Information Notice No. 87-31: Blocking, Bracing, and Securing of Radioactive Material Packages in Transportation, July 10, 1987.
- I. IAEA/DOT Certificate of Competent Authority Special Form Radioactive Material (Certificate No. USA/0531/5, Rev 0).
- J. Shipment of Radioactive Material under FEMA's DOT Exemption

Procedure for Preparation of the CDV-794

Calibrator for Shipment

1. GENERAL:

a. The CDV-794 Calibrator is used to calibrate high range ratemeters. The calibrator contains approximately 130 curies (4.81 TBq) of cesium-137 in a sealed source. The sealed source is contained in a depleted uranium shield to minimize the exposure of personnel handling or using the calibrator.

b. The CDV-794 Calibrators were originally owned by the Federal Emergency Management Agency (FEMA) and loaned to States, contractors and other Federal Agencies for use in calibrating high range ratemeters such as the CDV-715 and CDV-717, and dosimeters such as the CDV-742. The State or agency to whom the CDV-794 was loaned must have a Nuclear Regulatory Commission (NRC) or Agreement State license authorizing the possession and use of the CDV-794 for the purpose intended.

2. SHIPMENT:

a. Shipment of the CDV-794 calibrators must be approved by the responsible individuals.

b. National Instrument Center (NIC) will provide shipping instructions to the shipper. Transportation charges will be paid by Government Bill of Lading (GBL) or "Combined Bill of Lading and Waybill".

c. The CDV-794 calibrator shall be prepared for shipment as indicated in this document and shipped by motor freight unless an alternate method of shipment is specifically authorized.

d. The quantity of radioactive material in the CDV-794 Calibrator would normally require a Type B shipping container. The CDV-794 Calibrator in the shipping crate does not meet the requirements of a Type B container. The Federal Emergency Management Agency (FEMA) has an exemption from the Department of Transportation (DOT) that permits the

November 2000

shipment of the CDV-794 when packaged in accordance with the instructions in CPG 4-1, Volume 8. A copy of the DOT Exemption (DOT-E-8667) is attached as Appendix C.

e. This shipping exemption only applies to FEMA. Therefore, the CV-794 Calibrator must be transferred from the license of the current user to FEMA's NRC License prior to transport. A copy of a typical transfer document is attached as Appendix J.

f. Upon arrival at the destination, the CDV-794 Calibrator must be transferred from FEMA's NRC License to the recipient's license. A copy of a typical transfer document is attached as Appendix J.

3. LEAK TESTING:

a. Prior to shipment, the CDV-794 must be leak tested. The procedure for leak testing the CDV-794 is described in CPG 4-1, Volume 8, CDV-794 Calibrators and CDV-765 Transfer Standards, Change 1., Section 2, Safety and Handling Precautions, paragraph 2-4., Wipe Test Procedure. A copy of selected pertinent pages of CPG 4-1, Volume 8, Change 1 and Change 2 are attached as Appendix A.

b. The appropriate leak test data is to be recorded on the FEMA CDV-794 Leak Test Data Sheet (Appendix B) or equivalent and forwarded to the FEMA Radiation Safety Officer at the following address:

Federal Emergency Management Agency
Mount Weather Emergency Assistance Center
19844 Blueridge Mountain Road
Building 218
Bluemont, Virginia 20135

c. If any of the leak tests are positive, indicating potential leakage, the Custodian shall IMMEDIATELY contact by phone both the Regional Radiological Program Manager and the FEMA Radiation Safety Officer (Voice) (202) 646-2872 or fax (202) 646-4668

4. PACKAGING FOR SHIPMENT:

a. After the CDV-794 calibrator has been leak tested, it must be crated for shipment.

b. Preparation and crating for shipment are described in CPG 4-1, Volume 8, CDV-794 Calibrators and CDV-765 Transfer Standards, Change 1, Section 3, Shipment and Installation, (Appendix A).

c. The quantity of radioactive material in the CDV-794 Calibrator would normally require a Type B shipping container. The CDV-794 Calibrator in the shipping crate does not meet the requirements of a Type B container. The Federal Emergency Management Agency has an exemption from the Department of Transportation (DOT) that permits the shipment of the CDV-794 when packaged in accordance with the instructions in CPG 4-1, Volume 8. A copy of the DOT Exemption (DOT-E-8667) is attached as Appendix C.

5. LABELING:

a. Perform a thorough radiation survey of each CDV-794 shipping container. Radiation measurements must be taken at contact and at one meter from the top, bottom, and sides of the container. If the maximum measurement taken at contact is less than or equal to 0.5 mR/hr (0.005 mSv/hr), the measurements at one meter are not required.

b. Two appropriate "RADIOACTIVE" labels with the required information recorded on them must be applied to opposite sides of each container.

(1) If the maximum contact radiation measurement at the surface of the CDV-794 shipping container is less than or equal to 0.5 mR/hr (0.005 mSv/hr), two "RADIOACTIVE I" labels (white) must be applied. Record the contents on the labels as "cesium-137 as a solid" and the activity as 4.81 TBq (130 curies).

(2) If the maximum contact radiation measurement at the surface of the CDV-794 shipping container is greater than 0.5 mR/hr (0.005 mSv/hr), two "Radioactive II" labels (yellow) must be applied. Record the contents on the labels as "Cesium-137 as a solid" and the activity as "4.81 TBq (130 curies).

(a) The Transport Index (TI) will be entered as a dimensionless number rounded up to the first decimal place. This number represents the maximum radiation measurement taken at one meter from the surface of the container. The TI is only entered on RADIOACTIVE (YELLOW) II and III labels. It is the highest

radiation level, in [millisievert per hour (mSv/hr) multiplied by 100 equals millirem/hr (mrem/hr)], measured at one meter from any accessible external surface of the package. That is, it indicates the highest radiation exposure that can be received by a person who remains for one hour at a distance of one meter from the surface of a package.

(b) See Appendix D. for "Supplemental Information Concerning The Transport Index and extract from 49CFR 173.403.

(c) The total of the TI of all packages in any single transport vehicle or storage location generally may not exceed 50. Exceeding the 50 TI per vehicle limit is authorized only for certain specific types of shipments which are carried under the special requirements of "exclusive use" vehicles, which impose additional responsibilities on the shipper.

c. Apply the following to each CDV-794 shipping container:

(1) Two container labels, "RADIOACTIVE MATERIAL, SPECIAL FORM, N.O.S., UN2974" and "DOT-E-8667"; must be applied to opposite sides of each container (See label next page); and

(2) One address label.

6. SHIPPING DOCUMENT:

a. The following information and data must be entered on the GBL shipping document:

(1) Name and address of consignee.

(2) Name and address of consignor.

(3) Proper shipping name and hazardous material ID number: RADIOACTIVE MATERIAL, Special Form, N.O.S., UN2974, RQ.

(4) Hazard class: RADIOACTIVE MATERIAL

(5) Radionuclide: Cesium-137, Special Form

(6) Chemical & Physical Form: Cesium Chloride/solid. Cs137-Ba137m, double encapsulated in a stainless steel encapsulation, in a shielded calibrator.

(7) Radioactivity Per Package: 4.81 TBq (130 curies) in a shielded calibrator device.

(8) Total Radioactivity In The Total Shipment.

e. Place a copy of each of the following in a packing slip holder and apply to a container:

(1). Shipping Document,

(2). DOT Exemption No. DOT-E-8667 (Appendix C),

(3). SPECIAL INSTRUCTIONS FOR DRIVERS TRANSPORTING FEMA-OWNED RADIOACTIVE MATERIAL IN A DOT-E-8667 CONTAINER, IN THE EVENT OF FIRE OR ACCIDENT (Appendix G).

(4). IAEA/DOT Certification of Competent Authority Special Form Radioactive Material (Certification No. USA/0531/5, Rev 0). (Appendix I).

7. SHIPPING:

a. The container can now be shipped by commercial freight.

b. Appendix H contains information on the "Blocking, Bracing, and Securing of Radioactive Material Packages in Transportation.

c. Appendix I contains the IAEA/DOT Certificate of Competent Authority Special Form Radioactive Material (Certification No. USA/0531/S, Rev. 0).

d. When the shipment is picked up by the carrier, contact both the FEMA Regional Radiological Defense Program Manager and the FEMA Radiation Safety Officer, (Voice), (540)542-2100, immediately, by telephone, identifying the carrier and the date and time of the pick up.

RADIOACTIVE MATERIAL
SPECIAL FORM, N.O.S.,
UN2974 RQ

DOT-E-8667

APPENDIX A

CPG 4-1, Volume 8, CDV-794 Calibrators
and CDV-765 Transfer Standards,
Change 1, September 25, 1985 and Change 2, August 1997
(Selected Pages Pertaining to Wipe Testing and Shipping.)

September 25, 1985

CPG 4-1, Volume 8, Chg. 1



Repair and Maintenance Manual
for
Radiological Instruments

VOLUME 8
CD V 794 CALIBRATORS AND
CD V 765 TRANSFER STANDARDS

Federal Emergency Management Agency

WASHINGTON, D.C.

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section **1**

equipment description**1-1. GENERAL DESCRIPTION**

The CD V-794 Model No. 2 Calibrator, shown in figure 1-1, contains a gamma radiation source that provides four intensity levels for calibrating portable radiation survey instruments. Inside the calibrator, the radiation source has a fixed position relative to the survey meter* under test. The specific strength of the radiation field in the exposure chamber is controlled through a rotary attenuator. The instruments are properly positioned in the chamber with fixtures. While a survey meter is in the radiation field, it is calibrated via remote controls and meter readings observed directly through a lead-glass window in the exposure chamber door. All CD V-715 and CD V-717 survey meters are adjusted with the remote controls. Other type survey meters (see Table 4-I) are calibrated by the zero adjust method or by approximation.

The nominal accuracy of the calibrator is maintained by periodically adjusting a decay compensator. The initial radiation intensity of the source is adjusted at the manufacturer's facility.

* "Portable radiation survey instruments" and "survey meter" will be used interchangeably in this manual.

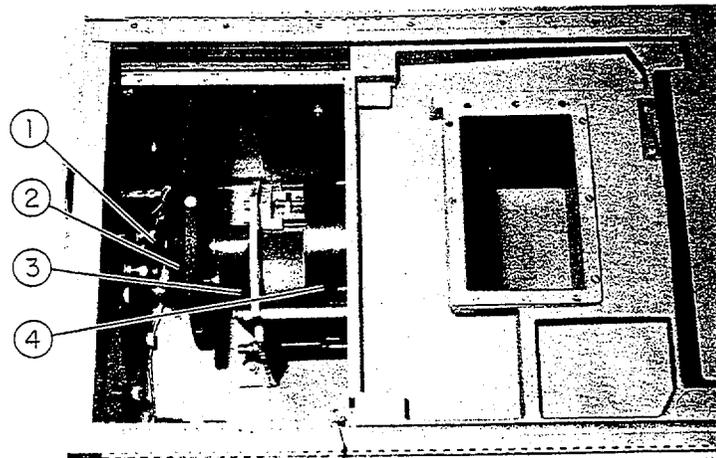
Equipment Description

1-2. FUNCTIONAL DESCRIPTION

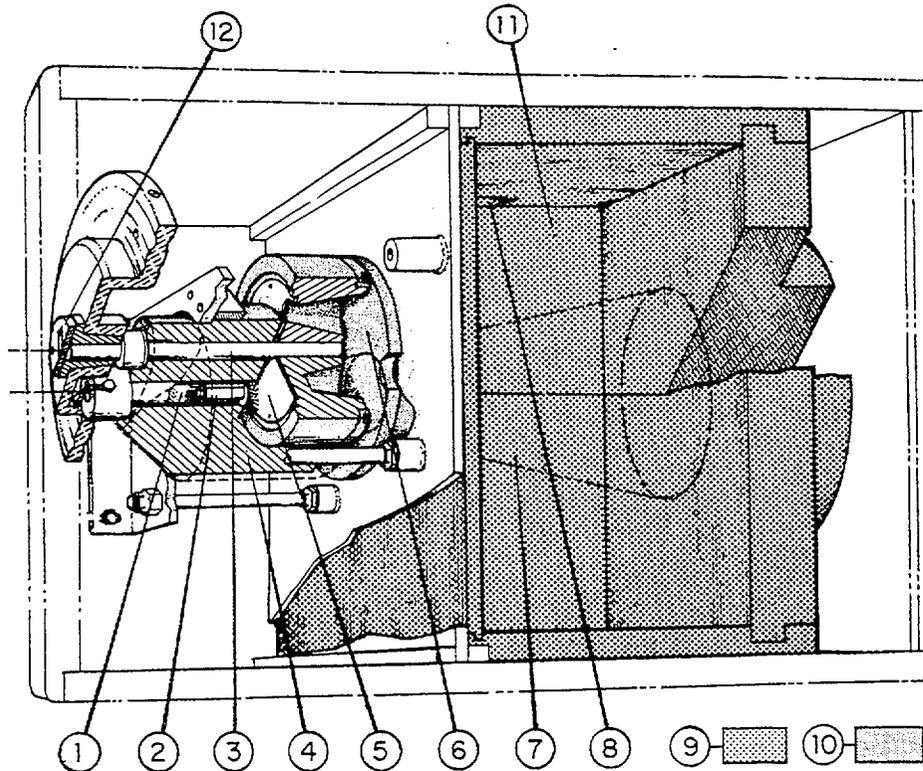
The main components of the calibrator are identified in figure 1-2. The primary shield assembly is the principal unit. It contains the source in a depleted uranium shield that attenuates radiation to a safe level when the source is unexposed, and supports the mechanical and electrical mechanisms for controlling the radiation of the source. The cesium-137 source emits radiation, beamed by the shielding design into the exposure chamber. Interposed in the radiation-beam path is the attenuator disc by means of which radiation levels of 0.4, 4, 40, and 400 R/hr are produced in the exposure chamber. When the radiation-level selector wheel is turned, it rotates the attenuator disc for a specific radiation level in the chamber, and completes the circuit to turn on the range-adjust lamp corresponding to the radiation level selected. When the wheel is in the SAFE position, the radiation-level SAFE indicator (green) is on. The radiation level in the chamber is then approximately 4 mR/hr. The decay compensator disc maintains the nominal radiation strength of the source within $\pm 2.5\%$ when adjusted every 2 years.

The exposure chamber is a special lead-shielded compartment for calibrating and testing OCD radiation survey meters. It is closed by a door with a lead-glass window that protects the operator from the radiation levels in the chamber and provides direct visual observation during instrument calibration. For access to the exposure chamber, the door is rolled to the left. A mechanical interlock prevents it from being moved unless the source is safely shielded.

Survey meters are calibrated via the control panel. The panel contains the radiation-level selector wheel, an indicator-lamp group, and the remote controls. When the selector wheel turns, the attenuator disc rotates and interposes in the radiation path an absorber that reduces the intensity of radiation to the selected level. While a survey meter is in the radiation beam, it can be adjusted by the remote controls, four of which vary the meter's potentiometers and one changes the meter's range. The indicator-lamp group lights to correspond with the radiation level beamed into the chamber.



- | | |
|-----------------------------------|----------------------------|
| 1. Wiper and Contacts | 3. Primary Shield Assembly |
| 2. Radiation Level Selector Wheel | 4. Attenuator Disc |



- | | | |
|--------------------------|---------------------------|-----------------------|
| 1. Container Plug | 5. Decay Compensator | 9. Lead Shielding |
| 2. Source | 6. Collimator | 10. Uranium Shielding |
| 3. Attenuator Disc Shaft | 7. Conical Radiation Beam | 11. Exposure Chamber |
| 4. Main Shield | 8. Cable Port | 12. Wiper |

Figure 1-2. Main Components of Calibrator and Shielding Design

Equipment Description

Electrical circuits incorporated in the calibrator provide signalling and illumination. On the left side of the cabinet, a pilot lamp glows (green) when 115 V ac power is turned on. At that time the exposure chamber is illuminated, and the green radiation-level indicator glows on the control panel if the radiation source is fully shielded (SAFE position on the selector wheel). The four other indicators glow red as the intensity is changed to 0.4, 4, 40, and 400 R/hr. Each lamp is correspondingly marked X0.1, X1, X10, and X100 and indicates which range-adjust remote control must be used to calibrate the instrument in the exposure chamber.

The alignment jig and fixtures aid calibration of various radiation survey meters. Before a survey meter is placed in the exposure chamber, the appropriate fixtures must be attached to it. The fixtures are devices for positioning the detecting volume of an instrument into the radiation reference plane, for remotely changing its range, and adjusting its potentiometers. The jig pre-aligns the 715 and 717 fixtures with the survey meter's potentiometers so that the remote-control screwdrivers will couple to them.

As shown in figure 1-2, adequate shielding is provided on all sides of the radioactive source and exposure chamber. The shielding reduces the exposure rate on external surfaces to a maximum of 2 mR/hr.

1-3. DESCRIPTION OF MAJOR COMPONENTS

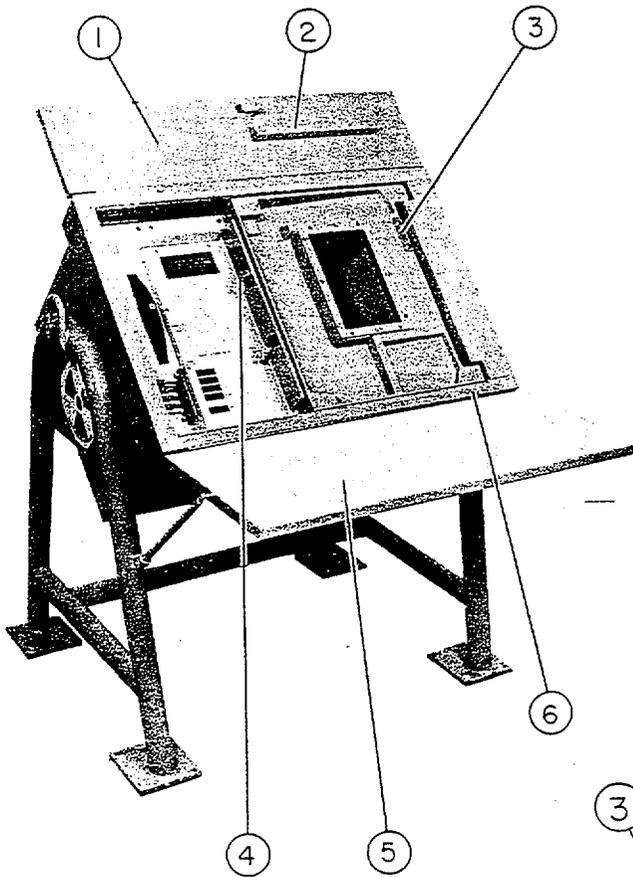
1-3.1. STAND

The stand (figure 1-3) consists of two tubular-steel, A-shaped frames joined by a tubular cross-member. The cabinet is bolted to a gusset on each A-frame to give stand rigidity. Leg spread stabilizes the calibrator, and leg pads distribute floor loading. The leg pads are drilled to accommodate casters.

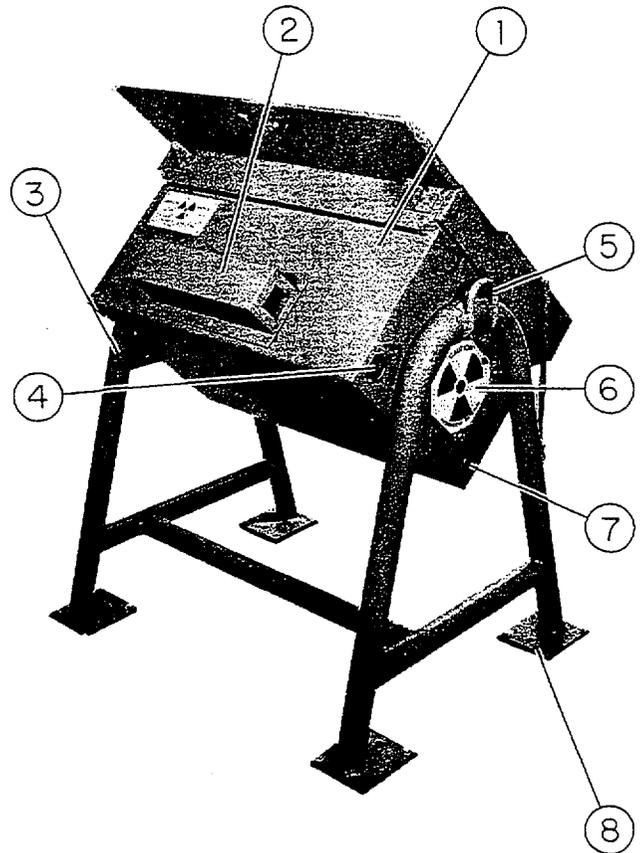
1-3.2. CABINET

The cabinet (figure 1-3), a rectangular steel box, encloses all the calibrator's basic parts and is bolted to the stand. A steel plate divides the cabinet into two compartments. The right compartment contains the exposure chamber. The left compartment contains the primary shield housing, the mechanical

Equipment Description



1. Upper Cover
2. Stay Bar
3. Lock Plate
4. Safe Secure Bolt Access
5. Lower Cover, Hinge, Writing Surface
6. Rail Assembly



1. Cabinet
2. Cable Port
3. Stand
4. Input Jack
5. Lifting Eye
6. Cabinet Access Cover
7. Main Switch
8. Leg Plate

Figure 1-3. Calibrator Parts

Equipment Description

interlock, the remote controls, the electrical circuitry, and the control panel assembly. A rail assembly is fitted flush with the top of the cabinet and encases it. Two covers, hinged to the rail assembly, join when closed. They protect the controls and the window and door of the calibrator and, when locked, prevent unauthorized use.

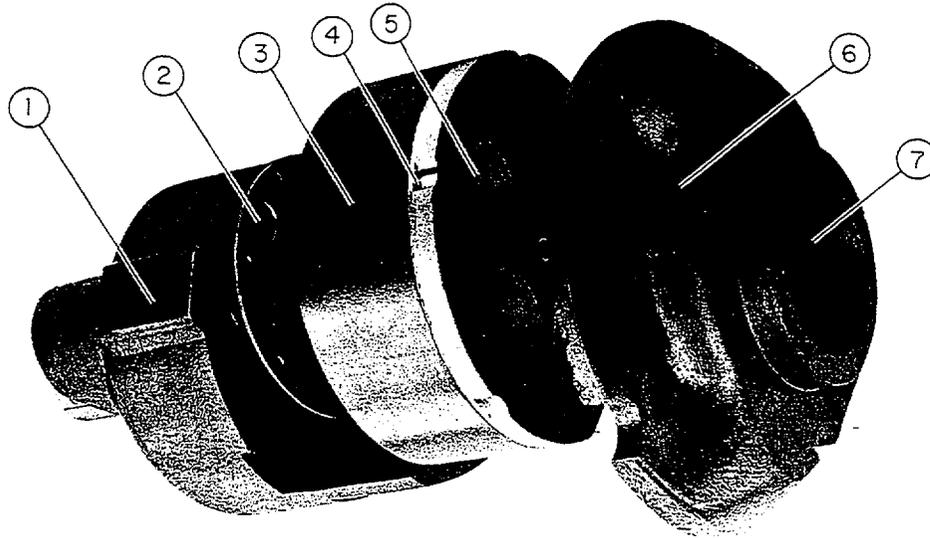
1-3.3. PRIMARY SHIELD ASSEMBLY

The primary shield assembly (figure 1-4) is depleted uranium metal cast in three parts: main shield, attenuator disc, collimator. The configuration of the housing attenuates radiation to 2 mR/hr at every normally accessible surface except the radiation path into the exposure chamber. Bored into the main shield are two parallel, cylindrical holes (figure 1-2). The attenuator-disc shaft is fitted into the upper hole and the source is confined in the lower hole.

The attenuator disc (figure 1-4) is a radiation shield set in the recess between the main shield and the collimator. The disc has five circular, equally-spaced absorption areas near its circumference. Each area is cast conically to a specific metal thickness that produces the required intensity level in the exposure chamber. The absorption areas have corresponding detents on an index ring at the circumference of the disc. The detents center the absorption areas in the radiation beam, control the exposure-chamber door lock, and actuate the attenuator switch in the indicator lamp-group circuit.

The collimator, mounted in front of the attenuator disc, has a cast conical hole that shapes the radiation beam entering the exposure chamber. The chamber side of the collimator hole has a shoulder around it that fits into a mating hole in the divider plate and in the adjacent lead shield of the exposure chamber.

The source is pelletized cesium chloride encapsulated in a double stainless steel jacket (figure 1-5). It is sealed in a cylinder-shaped tungsten plug that is inserted into a stainless steel tube within the main shield, and is then bolted and safety-wired. The source is thus rigidly positioned and is not subject to damage by outside forces.



- | | | |
|---------------------------|---------------------|----------------|
| 1. Main Shield | 3. Attenuator Disc | 6. Collimator |
| 2. Decay Compensator Disc | 4. Detent | 7. Beam Shaper |
| | 5. Absorption Areas | |

Figure 1-4. Shield Housing - Exploded View

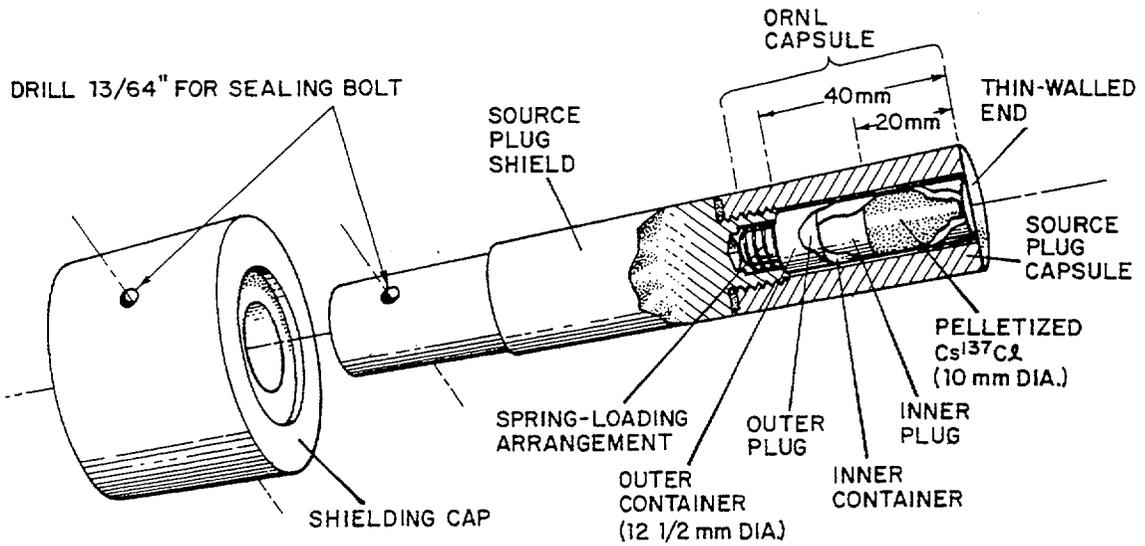


Figure 1-5. Pelletized Cs 137 Gamma Ray Source

Equipment Description

The decay compensator (figure 1-4) is a tungsten disc with seven equally-spaced absorption areas and seven locking holes near its circumference. It is mounted on the attenuator-disc shaft between the attenuator and the source, and its absorption areas are coaxial to the radiation-beam path. The absorption areas are machined to successive diminishing thicknesses, each equivalent to source decay for consecutive 2-year intervals. The compensator is rotated one locking hole every 2 years and is retained in place by a spring-loaded lock pin.

1-3.4. EXPOSURE CHAMBER

The exposure chamber (figure 1-6) is the shielded area in which the survey meters are placed for exposure to the calibrated radiation beam. The beam enters the chamber from the left through the aluminum liner. The chamber, which is completely enclosed by lead shielding, is equipped with a cable port, a fixture adapter, a lamp and lamp guard, and remote-control stations for calibrating meters.

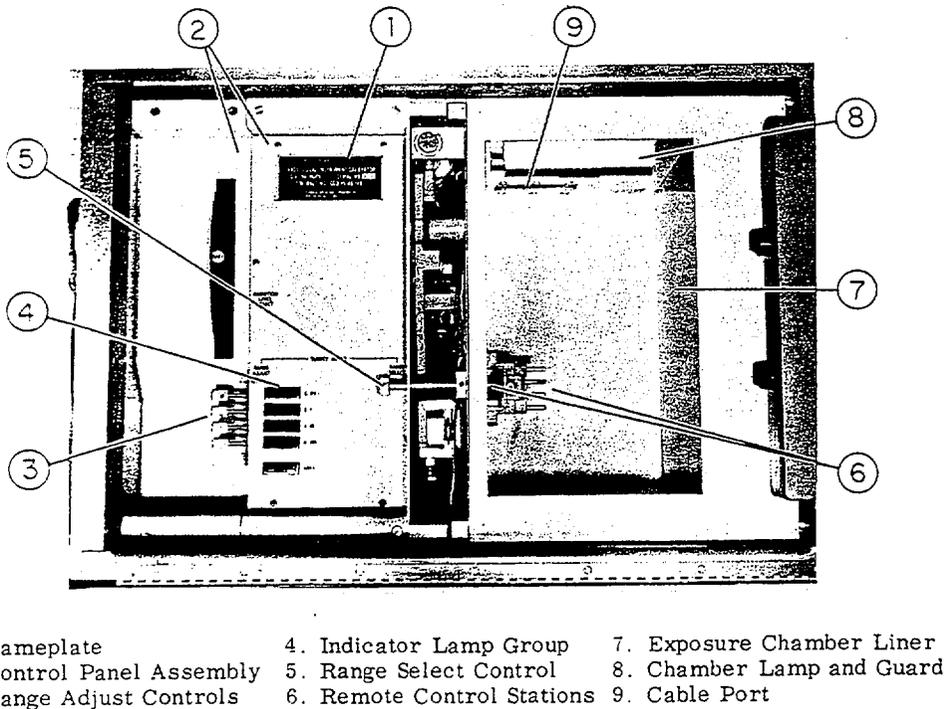
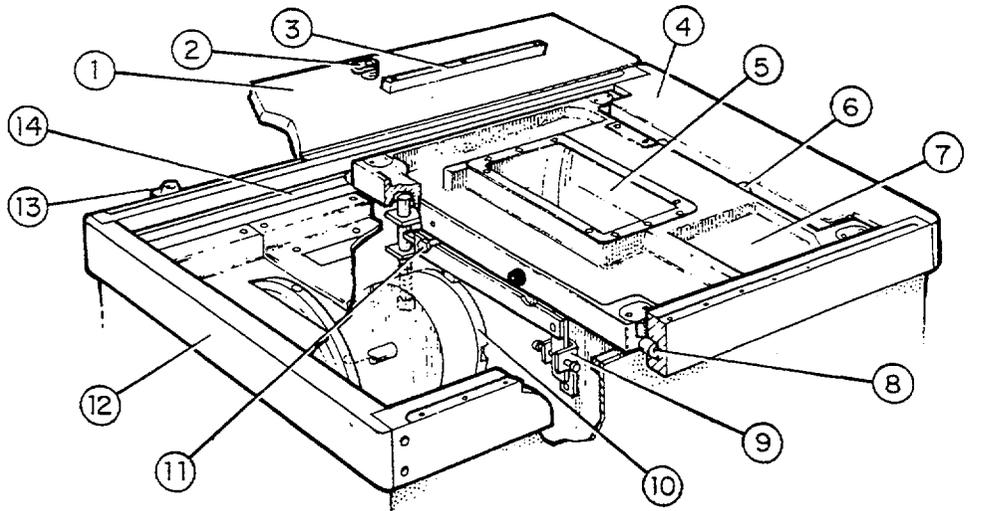


Figure 1-6. Detail of Exposure Chamber and Control Panel

The cable port, a lead-shielded passage, opens into the upper part of the chamber. Survey-meter cables may be routed through it for connection to instruments in the chamber. The chamber's fixture adapter is the range-adjust remote-control station, to which the 715 and 717 fixtures are clamped. Survey meters inserted into the special fixtures are anchored to it. The adapter houses the screwdrivers for adjusting survey-meter potentiometers. Recessed in the same left wall is the range-select remote-control station. It is a spline connector to which the flexible shaft of the range-changer fixture must be connected during calibration. A bayonet type, oblong lamp, protected by a plastic guard, is installed along the upper side of the chamber to illuminate the face of the survey meters evenly.

1-3.4.1. Door and Rail Assembly

The chamber door is cast bronze with lead shielding bonded to its panels. A 2-in. thick, lead-glass window, protected on the outer side by a plexiglass sheet, is framed in its sash. Two roller bearings at right angles at each corner (see figure 1-7) permit the door to roll in grooved, hard-coated aluminum rails



- | | | |
|--------------------------|---------------------------|-----------------------|
| 1. Upper Cover and Hinge | 6. Rubber Bumpers | 11. Safe-Secure Bolt |
| 2. Cabinet Lock | 7. Chamber Door | 12. Rail End Bar |
| 3. Door Stay Bar | 8. Door Roller Bearings | 13. Cover Stop Bumper |
| 4. Rail End Bar | 9. Lever Bar and Arm Link | 14. Rail Groove |
| 5. Lead-Glass Window | 10. Index Ring | |

Figure 1-7. Detail of Rail, Door and Door Interlock

Equipment Description

along the length of the cabinet top. A skirt on the control panel side of the door steps the door clearance to eliminate the effects of minor scatter from the chamber.

The door rails are bolted to the rail end-bars and to the cabinet, thereby encasing it. Two hinged covers for the cabinet are fastened to the rail bars. When opened, the lower cover provides a writing surface and the top cover has a card attached indicating when the decay compensator disc should be adjusted. To secure the calibrator, the top cover has a chamber-door stay bar that holds the chamber door in place over the control panel and a tumbler lock that engages a lock plate in the chamber door.

1-3.4.2. Chamber-Door Interlock

The interlock mechanism (figure 1-7) is a spring-loaded lock pin forced in and out of the door's locking hole by the lever bar as its cam roller tracks the index ring. The door is unlocked only when the cam rolls into the SAFE registration detent, the deepest notched position corresponding to maximum attenuation interposed in the beam path. The lock-pin spring constrains the cam roller in the notches. A barrier strip along the door's undersurface prevents the cam from rising out of the SAFE detent unless the door is fully closed.

Connected to the lever bar is an arm link by which the angular displacement of an absorber's center point is fine-adjusted to the axis of the radiation beam path. This is adjusted at assembly to assure proper alignment of the attenuator absorption surfaces with the radiation beam path.

1-3.5. CONTROL PANEL ASSEMBLY

The control panel assembly (figure 1-6) consists of two aluminum panel assemblies, each independently removable. The left panel is slotted for the radiation-level selector wheel. It has a recessed section for manipulating the range-adjust remote controls, and the range-adjust remote controls are attached to the panel. On the right panel are the nomenclature plate, the indicator-lamp group, the range-select control, and the access hole for the safe-secure bolt that fixes the interlock mechanism in the SAFE notch position (see figure 1-3). The control panel of the right control-panel assembly must be removed when the decay-compensator disc is adjusted.

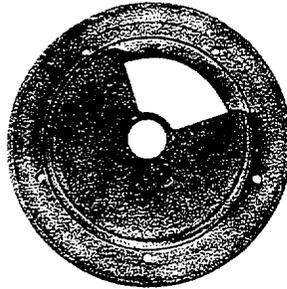


Figure 1-8. Radiation-Level Selector Wheel

The radiation-level selector wheel (see figure 1-8) is cast aluminum and protrudes through the left control-panel surface. The wheel rim is recessed and coarse-finished for sure-grip manipulation and is marked to indicate the radiation level in the chamber. Holes in the radial surface of the wheel are situated flush with the panel to permit locking the wheel at a selected radiation level. The wheel is directly coupled to the attenuator disc via the attenuator-disc shaft. A triangular opening near the wheel hub provides direct access to the source tube in the main shield.

1-3.6. REMOTE CONTROLS

The remote controls are two assemblies, the range-adjust control and the range-select control. As mechanical links between the control panel and the exposure chamber, they set the calibration potentiometers and the range switch of the survey meters while the meters are attached to the remote stations in the calibrator's radiation field.

The range-adjust control (figure 1-9) is a set of four rigid-shaft screwdrivers incorporated within the fixture adapter. Each rigid shaft has three rods connected by universal joints that provide direct and sensitive potentiometer manipulation. Long sleeve bushings contain the drive and the screwdriver rods for smooth rotation, protrusion, and retraction of the device. A knurled knob is attached to each drive rod at the left control panel.

The range-select control (see figure 1-6) is a captive rod with a control knob at the right control panel and a spline within the chamber to which the range-changer's flexible cable is mated. The rod is held in a special sleeve bearing which recesses the spline within the exposure chamber wall.

Equipment Description

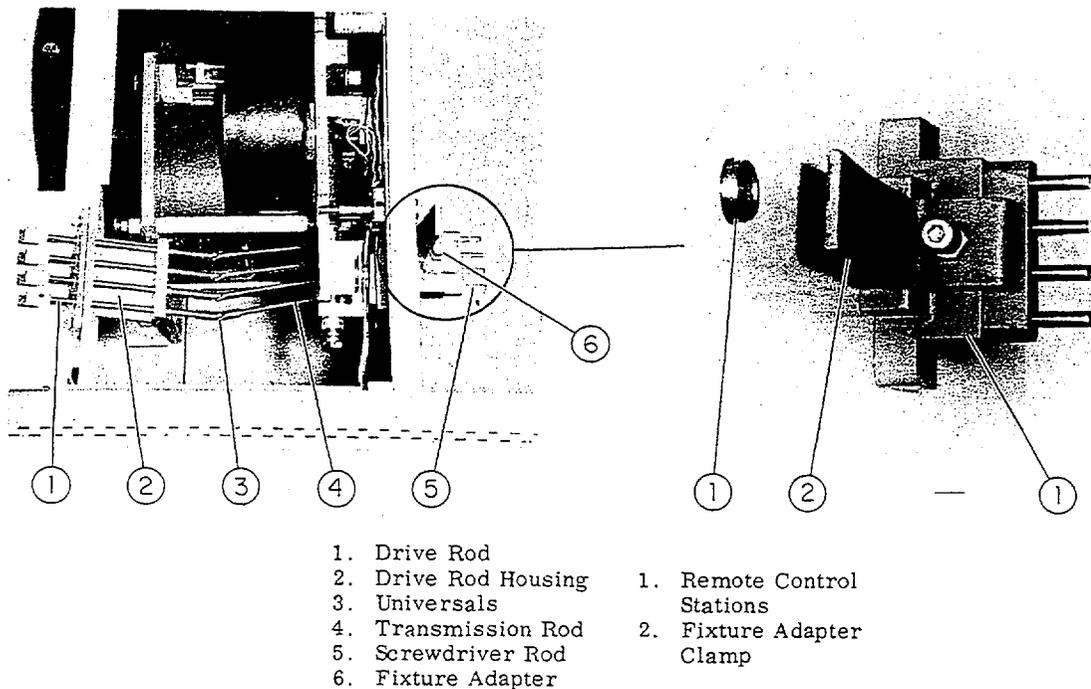


Figure 1-9. Detail of Range-Adjust Remote Control

1-3.7. ELECTRICAL CIRCUITRY

The electrical circuit (figure 1-10) provides illumination in the exposure chamber and powers the signal lamps for monitoring the operating mode and status of the calibrator; 115 V ac power is connected to the calibrator via a 12-ft extension cord. It is fused at 1 ampere and then routed to the power switch. From the switch, 115 V are transmitted to the chamber lamp and to the 115/5 V stepdown transformer from which the other lamp circuits are operated, including the input-power pilot lamp. The indicator-lamp group illuminates to correspond with the selected radiation intensity in the chamber. The appropriate indicator lamp is selected by a wiper-contact system at the hub of the selector wheel, and it is turned on upon circuit completion by the attenuator switch when the lever-bar cam roller drops into one of the notches in the attenuator index ring. When any one of the four lamps in line with the range-adjust controls is lit, it indicates to the operator which range-adjust control must be used. The SAFE radiation-level indicator is set directly below the range-adjust indicators.

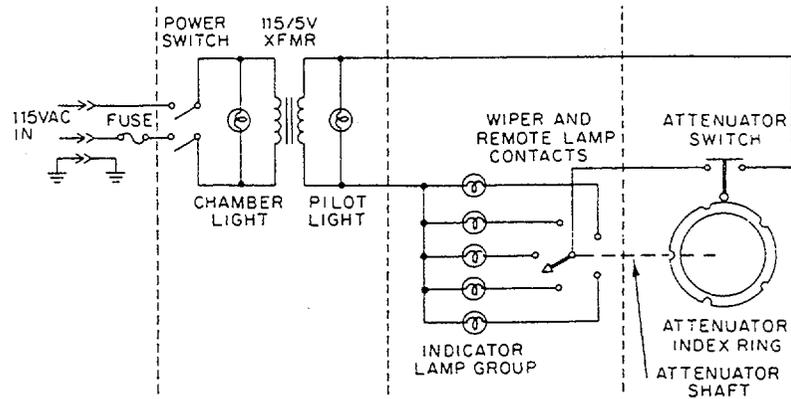


Figure 1-10. Electrical System Diagram

1-3.8. FIXTURES

The calibrator fixtures, except for the range changer and jig, are devices for positioning the detector volume of the different OCD radiation survey meters in the radiation-beam reference plane inside the calibrator exposure chamber. Fixtures 715 and 717 (figure 1-11) are designed for remote-control calibration of the 715 and 717 survey meters. Since the 715 and 717 fixtures are modified survey-instrument cases, the instrument mechanisms are transferred into the fixtures, which makes the potentiometers accessible by remote-control. Three 715 fixtures are supplied, one for each instrument manufacturer.

The universal fixture (figure 1-12) is a metal stand consisting of a platform on three legs and an L-shaped bracket that holds the survey meters. Both parts are adjustable. Before the stand is inserted into the chamber, the height of the platform must be adjusted and

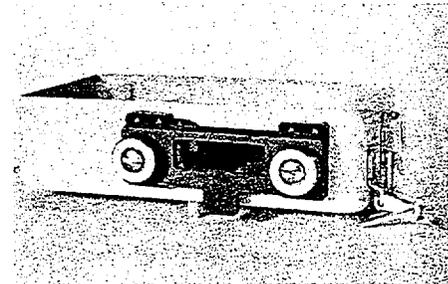
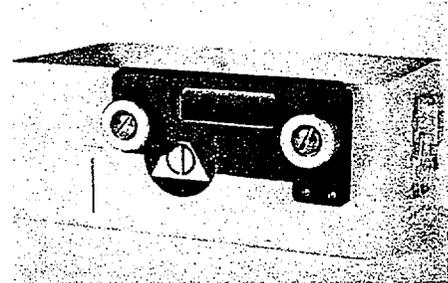


Figure 1-11. 715 and 717 Fixtures

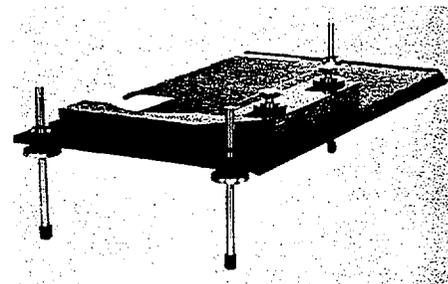


Figure 1-12. Universal Fixture

Equipment Description

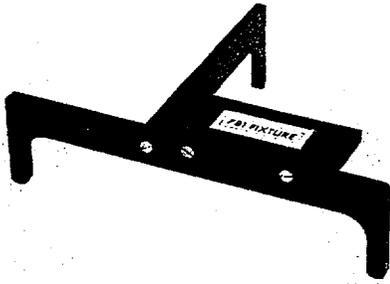


Figure 1-13. 781 Fixture

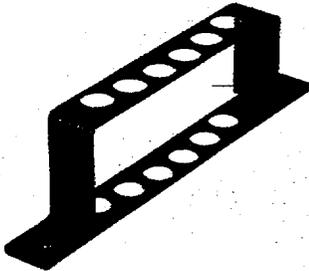


Figure 1-14. Dosimeter Fixture

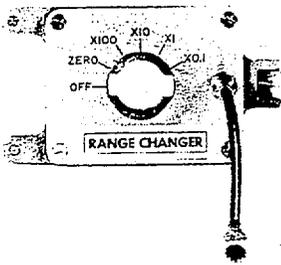


Figure 1-15. Range Changer Fixture

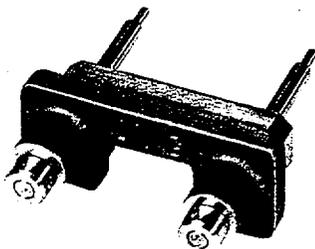


Figure 1-16. Alignment Jig

the meter-locator bracket set for the particular survey meter under test. The survey meters listed in Table 4-I are calibrated on the universal fixture.

The 781 fixture (figure 1-13) is a locating shoe onto which the detector unit of the aerial survey meter is placed.

The dosimeter fixture (figure 1-14) is a six-station U-shaped bracket welded to a similar, flat base that is then secured to the universal fixture. The six dosimeter stations are symmetrically spaced and radially equidistant from the source. Thus, each dosimeter receives an equal radiation dose.

The range-changer fixture (figure 1-15) is a geared device through which the range switch of the 715, 717, 720-3, and 720-3A survey meters can be turned remotely. A gearing mechanism is housed in the plate that fits on the survey meters and holds the range knob in a rotatable slot. Connecting the plate's flexible cable to the spline of the range-changer remote control completes the remote control path from the fixture to the calibrator control panel.

The jig (figure 1-16) fits into the 715 and 717 fixture-adapter socket. It is used to align the socket with the survey meter's potentiometers so that when the fixture is clamped onto the chamber fixture adapter via the socket, the potentiometers are positioned in line with the remote-control screwdrivers.

Equipment Description

Exposure Rate:

- Inside Chamber
 - < 4 mR/hr
 - 0.4 R/hr (X0.1 meter range)
 - 4 R/hr (X1 meter range)
 - 40 R/hr (X10 meter range)
 - 400 R/hr (X100 meter range)
- Ext. Surface of Unit
 - ≤ 2 mR/hr

Power Requirements:

- Voltage
 - 115 V ac
- Current
 - 1 ampere

Equipment Supplied:

- Spare-parts Kit
 - One (1)
- Accessory Case
 - One (1)

One (1) manual

One (1) extension cord

Three (3) Calibrator Wipe Tests
and Radiation Survey Records

One (1) Alignment Jig

Six (6) fixtures

Universal fixture

Dosimeter fixture

715 fixture

717 fixture

781 fixture

Range Changer fixture

section 2

safety and handling precautions

2-1. GENERAL

In providing a calibration and test chamber for CD portable radiation survey instruments, the CDV-794 presents two potential hazards to the operator: radiological and electrical.

NOTE

It is mandatory that the operator be familiar with the potential hazards and with the precautionary measures directed by this section.

The following subsections describe these hazards and the necessary operator actions. Precautions are also outlined regarding accidents (fire and transportation).

2-2. RADIOLOGICAL HAZARDS

2-2.1. DESCRIPTION OF THE HAZARDS

Two potential hazards arise from the 130 curie, (4.81TBq) cesium-137 source confined in the main shield. The principal hazard is external gamma radiation, which would be caused by partial or complete loss of the uranium or lead shielding. The second hazard is a radioactive contamination which would be caused by the escape of cesium material from the source capsule or by uranium material from the shield housing.

2-1

Safety

2-2.2 PROTECTION

The calibrator is designed to reduce to a minimum the probability of either hazard occurring. The design safeguards are supplemented by personnel, area, and equipment monitoring procedures given in this section.

Personnel monitoring equipment (film badges or TLD's and CDV-138 pocket dosimeters) must be supplied to each calibrator operator and utilized in accordance with procedures to be established by the cognizant Health Physicist or Radiation Protection Officer. The procedures must satisfy all the requirements of Title 10, Part 20 of the Code of Federal Regulations.

In accordance with procedures to be established by the cognizant Health Physicist or Radiation Protection Officer, the general working area where the calibrator is located must be periodically surveyed for external exposure-rate levels. A permanent record (Calibrator Wipe Test and Radiation Survey Record) of these data must be maintained. If exposure rates above 2 mR/hr at the surface of the calibrator are detected, the procedures given in par. 2-3 must be followed immediately.

The area where the calibrator is located must also be marked AT ALL TIMES by signs bearing the words CAUTION RADIOACTIVE MATERIAL, 130-CURIES CESIUM-137, and displaying the purple or magenta standard radiation symbol on a yellow background. Signs of this type are affixed to each calibrator.

2-3 RADIATION EXPOSURE-RATE CHECK PROCEDURES

The external radiation hazard is controlled by the system of shields and interlocks described in Section I of this volume. The following procedure for checking the exposure rates is to ascertain that the shielding is unimpaired. This check must be performed when shipping and receiving the calibrator (par. 3-1.1 and 3-3.1), after an incident could affect shielding integrity (Fire, par. 2-6, and Transportation Accidents, par. 2-7), and when otherwise specified by the Radiation Protection Officer.

Safety

Proceed as follows:

a. Enter the calibrator area with a CDV-700 type survey meter and approach the calibrator.

b. If exposure rate above 2 mR/hr are detected 1 foot or more from the calibrator, immediately take the following steps:

(1) Clear the calibrator area of personnel. Survey the area to establish the 2 mR/hr isodose rate line. Isolate the area with barriers, rope, and locked doors and post radiation warning signs according to Title 10, Part 20 of the Code of Federal Regulations. If necessary, post guards to ensure that no one enters the area.

(2) Immediately notify the following persons by telephone:

Radiological Defense Officer/Radiological Defense Program Office of the appropriate FEMA regional office.

c. If exposure rates at a distance 1 foot from the calibrator are not greater than 2 mR/hr, proceed with the check of the calibrator.

d. Place the detector of the CDV-700 on the external surface of the calibrator. The radiation exposure rate must not exceed 2 mR/hr at any point on the external surface for any position of the RADIATION-LEVEL SELECTOR wheel. If surface exposure rates of 2 mR/hr or above are detected, immediately notify (2) (a) and (b) above.

e. Record all data on the Calibrator Wipe Test and Radiation Survey Record.

2-4. LEAK TEST PROCEDURE

The contamination hazard is controlled by containing the Section I of this volume. The following wipe test procedure is cesium source within a system of sealed vessels as described by established to ascertain that sealing has not been impaired. Wipe test smears must be taken of the unsealed end of the source confinement cylinder at intervals of not more than 6 months.

test must be conducted by (or under the direction of) a Radiation Protection Officer or authorized health physicist. The following procedure must be performed:

- a. Lock RADIATION-LEVEL SELECTOR wheel in SAFE position. Observe SAFE green indicator.
- b. Remove extension power cord from power plug on left end of cabinet.
- c. Remove cabinet access cover on the left side (figure 1-3)
- d. Place detector-of CDV-700 near open access port. PERFORM RADIATION EXPOSURE RATE CHECK AS DESCRIBED IN SECTION 2-3 ABOVE.
- e. Using Whatman No. 50 (or equivalent) filter paper that has been moistened with isopropyl alcohol, smear the protruding portion of the source plug container (figure 1-2).
- f. Check smear with CDV-700 for gross contamination. Let smear air-dry and evaluate the smear with an appropriate G-M counter or a gas-flow proportional counter at an known counting efficiency, E cpm/dpm (counts per minute/disintegrations per minute). Convert net count rate to units of microcuries using the appropriate E factor. Compare the results with allowable limit of 0.005 microcurie (185 Bq) activity. If 0.005 microcurie (185Bq) or more of gross beta-gamma activity is detected, immediately notify by telephone and telegraph the National Instrumentation Center of the Federal Emergency Management Agency and the Radiological Defense Officer/Radiological Defense Program Office of the appropriate FEMA Regional Office. Clear the calibrator area of personnel and immediately check for contamination. Restrict all contaminated areas from use until they are cleaned under the supervision of a qualified health physicist and all requirements of Title 10, Part 20 of the Code of Federal Regulations are satisfied.
- g. When it is necessary for personnel to enter the area prior to the institution of, and during, decontamination operations, protective clothing, gloves, and footwear should be worn. If airborne cesium-137 contamination above 1×10^{-8} microcurie milliliter (uCi/ml) or (370 Bq/m³) is present, dust respirators or air masks should also be worn. Contamination control procedures to prevent the spread of radioactive

contamination should be utilized.

Safety

Buffer zones should be established for the changing of contaminated protective clothing. To prevent spread of the contamination, the radioactive contaminated area should not be ventilated without control of the effluent air. All operations must be carried out under the direct supervision of an authorized Health Physicist or the Radiation Safety Officer.

h. The disposition of a calibrator with a leaking radioactive source must be handled directly by the Federal Emergency Management Agency. No attempt to stop the leakage or to dispose of the source shall be made without the written approval of the Radiation Safety Officer of the Federal Emergency Management Agency.

i. Record all wipe test results in units of microcuries in the permanent Calibrator Wipe Test and Radiation Survey Record of the calibrator. Replace the access cover and tighten the four bolts. The wire seal need not be replaced.

2-5. ELECTRICAL HAZARDS

2-5.1 DESCRIPTION OF THE HAZARD

Since the calibrator is connected to 115 V ac power, it presents the shock and burn hazards common to all electrically-powered equipment. The hazards have been controlled by grounding the calibrator frame to the ground wire in the extension cord and by fusing one side of the power at the cabinet main switch.

2-5.2 PROTECTION

When maintenance is performed inside the cabinet, the following procedures should be observed.

a. If maintenance is related to the radiation source or to power plug at the left end of the cabinet.

Safety

- (1) NATIONAL INSTRUMENTATION CENTER (VOICE)
BRANCH FEDERAL EMERGENCY MANAGEMENT AGENCY
RT 601, PO BOX 129, BUILDING 217
BERRYVILLE, VA 22611
(202) 646-2872 OR (FAX) (202) 646-4668
 - (2) RADIOLOGICAL DEFENSE OFFICER/RADIOLOGICAL DEFENSE
PROGRAM OFFICE OF THE APPROPRIATE FEMA REGIONAL
OFFICE
 - (3) APPROPRIATE NRC REGIONAL COMPLIANCE OFFICE OR STATE
LICENSING AGENCY
- e. WITHIN 30 DAYS OF ACCIDENT, SUBMIT A WRITTEN REPORT TO
EACH OF THE ABOVE. LICENSEES LOCATED IN NONAGREEMENT
STATES SHOULD ALSO REPORT TO:

THE DIRECTOR
DIVISION OF COMPLIANCE
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON DC 20545
(ALSO SEE DIRECTIONS PAR. 20-8)

2-7. TRANSPORTATION ACCIDENTS

2-7.1. DESCRIPTION OF THE HAZARD

During shipment and installation, a calibrator might be severely jolted and dropped. IMMEDIATELY CLEAR THE AREA OF PERSONNEL AND CHECK EXPOSURE RATES IN ACCORDANCE WITH THE INSTRUCTIONS OF PAR. 2-3. This check will determine whether faults have occurred in the shielding through which significant mounts of gamma radiation might be emitted.

2-7.2. PROTECTION

The calibrator is designed and constructed to withstand shock and vibration. Normal in-transit shock and vibration would not be expected to cause shielding or structural failure.

Precautionary exposure rate checks must be conducted, however, in accordance with the instructions of par. 2-3 after shipment or other shock and vibration exposure. Do not service the instrument until authorized by the Radiological Defense Officer/Radiological Defense Program Office Regional Office.

2-8. ADDITIONAL REPORTING REQUIREMENTS

In addition to the reports required by par. 2-3 and 2-6 above, notification by telephone and telegraph as specified in par. 20.2202 and 20.2203, Title 10. Part 20 of the Code of Federal Regulations, must be made immediately after a major incident, loss, or other theft of the radioactive material, or for minor incidents within 24 hours, to: (1) The Director of the appropriate NRC Regional Compliance Office or the appropriate state licensing agency, (2) Federal Emergency Management Agency, Berryville, VA 22611, (Voice) 540-542-2100 or (Telefax) (540) 542-2083 and (3) The Radiological Defense Officer/Radiological Defense Program Office of the appropriate FEMA Regional Office.

Also, provide a written report within 30 days of any reportable incident (10 CFR 20.2202 and 10 CFR 20.2203) to (1) the Nuclear Regulatory Commission, Document Control Desk, Washington, D.C. 20555 with a copy to the Administrator of the appropriate NRC Regional Compliance Office or (2) the appropriate state licensing agency. Additionally, if a wipe test on the calibrator indicates the presence of 0.005 microcurie or more of removable gross beta-gamma activity, according to the condition of each licensee, you must provide written notification within the specified time period to either (1) the Division of Materials Licensing with a copy to the appropriate NRC Regional Compliance Office or (2) the appropriate state licensing agency.

September 25, 1985

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Shipment and Installation

section 3

shipment and installation

3-1 SHIPMENT

When the calibrator must be moved, reshipped, or relocated, notify the Radiological Defense Officer/Radiological Defense Program Office of the appropriate FEMA Regional Office in writing immediately. In addition to instructions for shipment and special handling at destination, the paragraphs below outline steps for preparing the calibrator for shipment.

3-1. 1. CALIBRATOR PREPARATION

When preparing the calibrator for shipment, follow the steps of this procedure:

- a. Perform a wipe test and record the data. Refer to the procedure outlined in par. 2-4.
- b. Remove the interlock-mechanism safe-secure bolt from the accessory case.
- c. Fix the interlock mechanism in the SAFE position with the safe-secure bolt (see figure I - 77). Check that the RADIATION-LEVEL SELECTOR wheel can be oscillated but not rotated. Safety-wire the safe-secure bolt to the RANGE SELECT knob.

Shipment and Installation

d. Roll the chamber door leftward and place it over the control panel. Block door in place. See figure 3-1 (B).

e. Close the lower cabinet cover.

f. Close the upper cabinet cover and lock. Mail keys to consignee separately by registered mail to the FEMA National Instrumentation Center with return receipt required. The key may be hand delivered to the consignee.

g. Check that the cabinet access cover is safety-wired.

h. Check that the accessory case contains one manual, one or more Calibrator Wipe Test and Radiation Survey Record sheets, an extension power cord, the calibrator fixtures (6), and one alignment jig.

3-1.2. PACKAGING PREPARATION

The shipping container for transporting the calibrator must be a sturdy wooden frame. The following procedure is recommended:

NOTE

Services of professional movers/riggers should be obtained for crating and moving the calibrator.

a. Prepare platform and crate enclosure. Refer to figure 3-1 (A).

b. Place calibrator on platform and bolt stand legs to platform.

c. Secure accessory case and spare parts kit to platform.

d. Cover calibrator and its accessory case and spare parts kit with a waterproof paper.

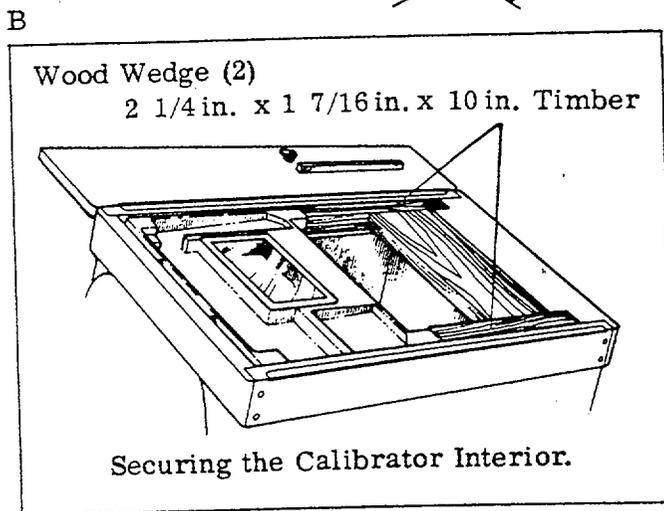
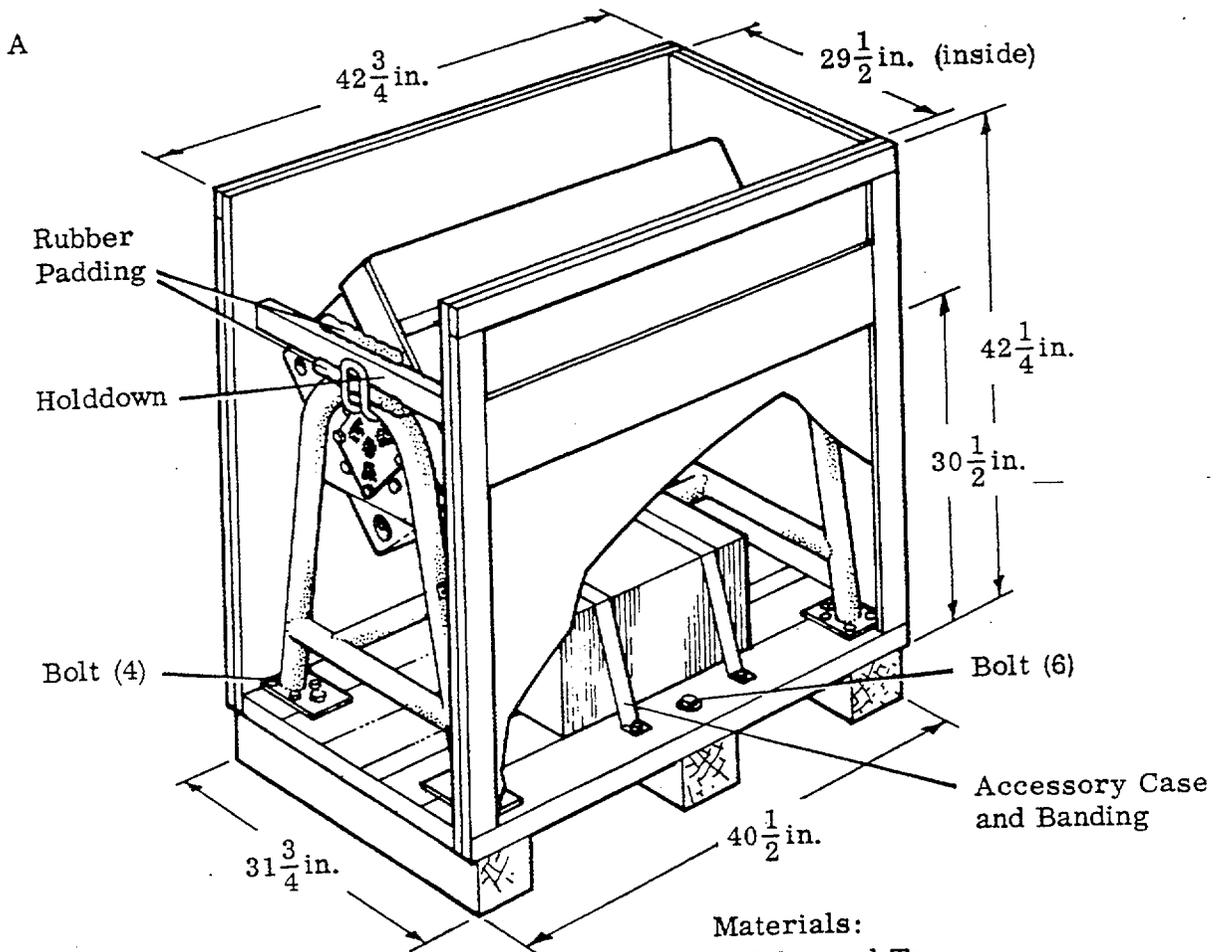
e. Block the calibrator within the crate as depicted in figure 3-1 (A).

3-1.3. SHIPPING INSTRUCTION

When shipping the calibrator, observe the following procedures:

- a. The consignor should utilize only carriers licensed and insured to ship the radioactive materials.

Shipment and Installation



Materials:

- Sides and Top—
- 3/8 in. Plywood
- Strapping —
- 1 in. x 3 in. (Edges)
- Holddown —
- 2 in. x 4 in. Timber
- 1 in. x 6 in. (2 Sides Only)
- Platform —
- 2 in. x 8 in. Timber
- Skids —
- 4 in. x 4 in. Timber
- Carriage Bolt 3/8 in. x 6 in.
- Calibrator —
- Carriage Bolt 1/2 in. x 4 in.

Figure 3-1. Construction Data-Calibrator Shipping Container

Shipment and Installation

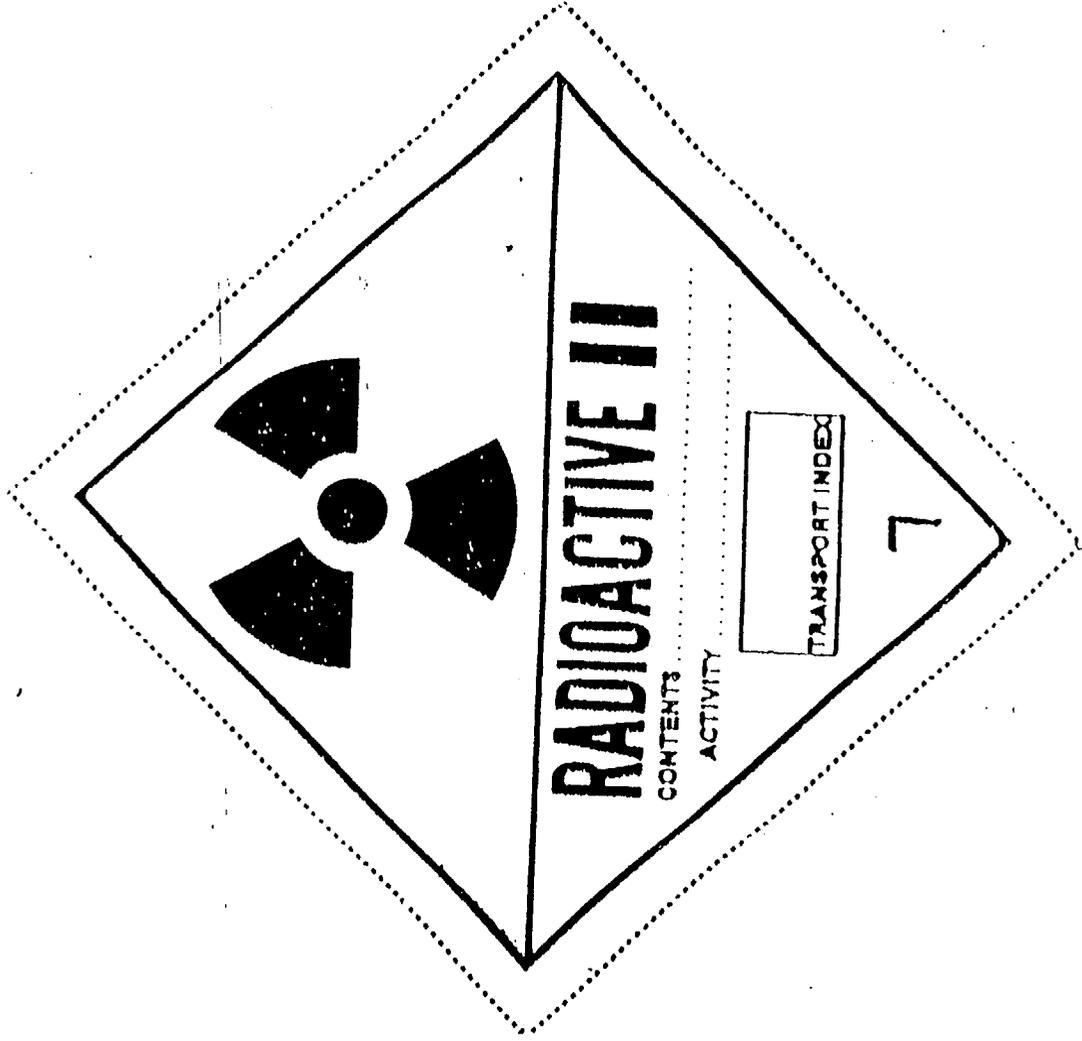


Figure 3-2. Shipping Label

Shipment and Installation

WARNING

IMMEDIATELY UPON ARRIVAL, THE EXPOSURE RATES AT CONTACT WITH THE CRATE MUST BE MEASURED. A CD V-700 METER MAY BE USED. THE EXPOSURE RATE AT CONTACT WITH THE CRATE MUST NOT EXCEED 2 MR/HR. IF FOUND TO BE HIGHER, IMMEDIATELY NOTIFY THE APPROPRIATE FEMA PERSONNEL AS REQUIRED BY PAR. 2-3.

- a. Uncrate the unit but do not remove it from its platform. Store shipping crate - it can be reused.
- b. Visually check the calibrator for damage and if received direct from the manufacturer check that the wire-seals are intact. Investigate any discrepancies immediately and report these to the Radiological Defense Officer/Radiological Defense Program Office of the Appropriate FEMA Regional Office.
- c. Calibrator may be moved by inserting the tines of a forklift under the wooden platform. Exercise greater caution when moving the calibrator in the direction of its short base dimension.
- d. Do not transport calibrator to installation site until incoming inspection is completed.

3-3. INCOMING INSPECTION

3-3.1. RADIATION INSPECTION

The following inspection should be performed:

- a. Conduct a complete exposure rate survey in accordance with par. 2-3.
- b. Unlock and open the cabinet covers.
- c. Remove wood shipping blocks wedging chamber door.
- d. Roll chamber door rightward and place it over exposure chamber.

Repeat step a. above. Record the maximum dose rate measured on Calibrator Wipe Test and Radiation Survey Record shipped in the accessory case.

e. If received direct from the manufacturer, break wire-seal of access cover on left side of cabinet. Remove cover and perform a wipe test on end of source plug container. Refer to procedure outlined in par. 2-4. Record amount of removable contamination in units of microcuries on Calibrator Wipe Test and Radiation Survey Record in accessory case.

If the results of d and e are acceptable, proceed to mechanical and electrical inspection (par. 3-3.2). After completion of that section, repeat step d with a survey meter in the chamber and the SELECTOR wheel rotated to the 400 R/hr position. External dose rates should still not exceed 2 mR/hr.

3-3.2. MECHANICAL AND ELECTRICAL INSPECTION

Perform the following inspection:

- a. Check cover lock and handle. Check top cover bumper stops.
- b. Open and close covers. Covers should swing smoothly on the hinge. All hinge screws should be tight.
- c. Roll chamber door on its rails. A slight force should move it. No binding should be evident. Even contact should be made on both rubber bumpers without any metal portion of the door first making contact with the right rail end bar.
- d. Check cabinet, control panel, and exposure chamber for loose parts.
- e. Check each of the RANGE-ADJUST controls for free 360° rotation as well as ease of movement to each extreme from all the way pulled out to all the way pushed in. No binding should be present. Rotate the RANGE SELECT control knob; this should turn freely.
- f. If a mechanical defect is indicated, refer to Section 5 for corrective action.

CAUTION

CALIBRATOR MUST BE GROUNDED. CONNECT CALIBRATOR TO A 115 VAC, GROUNDED, 3-CONDUCTOR POWER OUTLET ONLY. THE CALIBRATOR IS EQUIPPED WITH A POWER CORD.

Shipment and Installation

- g. Turn ON power at cabinet main switch. Check that main-power pilot lamp (green), SAFE radiation-level indicator (green), and chamber lamp are ON.
- h. Remove safe-secure bolt and place it in the accessory case.
- i. With chamber door in position over exposure chamber, rotate SELECTOR wheel downward to first radiation level indicated (400 R/hr). Check for binding or rubbing. Check that the X100 RANGE ADJUST indicator glows.
- j. Standing well to the control panel side of the calibrator, try to roll chamber door toward the control panel. It should not move.

WARNING

IF THE DOOR ROLLS OPEN, THE SAFETY-INTERLOCK MECHANISM IS DEFECTIVE. PLACE THE DOOR OVER THE EXPOSURE CHAMBER. TURN THE SELECTOR WHEEL TO THE SAFE POSITION. POST A "DO NOT OPERATE" SIGN ON THE EQUIPMENT AND FOLLOW THE CORRECTIVE MAINTENANCE PROCEDURES OF SECTION 5.

- k. Repeat steps j. and k. for the 40, 4, and 0.4 R/hr positions of the SELECTOR wheel. The SELECTOR wheel should rotate freely without binding and, at each dose rate position, the detent mechanism should provide a positive feel that it has stopped in the detent at the correct location.
- l. Resecure calibrator.

3-4. INSTALLATION

No special facilities are required for this calibrator. Follow this procedure when installing it:

- a. The calibrator should be placed in the maintenance shop in a location most convenient for the calibration of the instruments -- uncalibrated instruments should flow easily to the calibrator and calibrated instruments away from the calibrator.

b. The most important consideration in locating the calibrator is to eliminate glare from overhead lights and to make sure the operator can clearly see the instrument's meter when the instrument is in the exposure chamber. Overhead lighting may need to be adjusted.

c. The calibrator is designed so that the integrity of the shield will not be destroyed even though the calibrator might be involved in a fire. However, after the calibrator has been installed, it is recommended that the fire department providing service to the building in which the calibrator is located be notified.

d. The weight of the calibrator is approximately 1100 pounds. The floor construction must be capable of sustaining this weight. If desired, four casters may be used under the leg pads, but since the calibrator has a relatively high center of gravity, caution should be exercised if it is moved on casters. The specification for stability up to 25° of tilt is not applicable when the calibrator is mounted on casters.

e. Source of 115 V ac, grounded power is required.

3-5. PREPARATION FOR USE

To use the calibrator, proceed as follows:

- a. Unbolt the calibrator from the platform.
- b. Remove the calibrator from the platform and locate it in the selected area.
- c. Check that the calibrator cannot be rocked; if necessary apply small shims under the appropriate leg pad to stabilize the calibrator.
- d. Connect the extension power cord to the cabinet input jack and also to the building power outlet. With an ohmmeter, check for continuity between the cabinet and building electrical ground.

APPENDIX B

FEMA CDV-794 LEAK TEST DATA SHEET

FEMA LEAK TEST DATA SHEET

CD V-794 CALIBRATOR

Region: _____ State: _____ Date: _____ Name: _____

RAM ID No. _____ CD V-794: Serial No. _____; Model No. _____

Scaler: Name _____; Serial No. _____; Model No. _____

Operating Voltage: _____; Background: _____ cpm.

Counting Time: 5 Minutes; Efficiency: _____; Eff Factor: _____

Sensitivity: _____ picocuries.

Wipe No.	Column Area Wipe Tested	(1)	(2)	(3)	(4)	(5)
		Total Count (5 min)	Gross Count (cpm)	Net Count (cpm)	Net Activity (dpm)	Net Activity (pCi)
1.	Inside Cabinet Access Cover	_____	_____	_____	_____	_____
2.	Source Plug Container	_____	_____	_____	_____	_____
3.	Exterior of Cabinet	_____	_____	_____	_____	_____

- Column 2 = (Column 1) / (5 minutes)
- Column 3 = (Column 2) - (Background cpm)
- Column 4 = (Column 3) x (Eff Factor)
- Column 5 = (Column 4) / (2.22 dpm/pCi)

If any net cpm (Column 3) is GREATER THAN TWICE the background cpm, NOTIFY at once the Regional Program Manager, and the Chairman of FEMA's Radiation Control Committee.

Please note below any physical condition of the CD V-797 base unit that departs from the norm.

COMMENTS:

APPENDIX C

DOT EXEMPTION NO. DOT-E-8667

47

JUN 15 1981

U. S. Department of Transportation
Office of Hazardous Materials Regulation
Attention: Exemptions Branch
Washington, D.C. 20550

Dear Sir:

The Federal Emergency Management Agency (FEMA) requests an exemption in accordance with 49 CFR 107, Subpart B, to permit shipment of the CDV-794, radiological instrument calibrator. Enclosed are triplicate copies of the application for exemption submitted in accordance with 49 CFR 107.103.

The point of contact for this request is George C. Meyer, Senior Health Physicist, Radiological Defense and Technological Hazards Branch, State and Local Operations Division. He may be reached at (202) 566-1617.

Sincerely yours,

~~SIGNED~~

John E. Dickey
Acting Director for
Population Protection Preparedness

Enclosure

Application for Exemption
with Attachments (in triplicate)

cc: CF(2)
RF
DIR
SLPS(Casey)
SLPS-PP(2)
SLPS-PP(Healy)
SLPS-PP(RADEF)

SLPS-PP(RADEF)/GCMeyer/bik/566-1617/4203 GSA/6-11-81/File: 3000-115

APPLICATION FOR EXEMPTION

The Federal Emergency Management Agency (FEMA) requests an exemption in accordance with 49 CFR 107, Subpart B, to permit shipment of the CDV-794, radiological instrument calibrator.

The availability of operational, calibrated radiological instrumentation is critical in determining the radiation environment following a nuclear attack. Radiation detection and measuring instruments are an important part of the nation's civil defense capability for citizen survival. The importance of these instruments is indicated by the fact that FEMA and its predecessor agencies procured over 5 million instruments and granted them to the States for civil defense use. In addition, FEMA funds 100 percent of the costs of the State maintenance and calibration facilities which service these instruments. Instrument calibration is a vital factor in maintaining the reliability of these radiological instruments. Each maintenance and calibration facility has on loan from FEMA, a CDV-794 that is used to calibrate the high range survey meters. These high range survey meters are the backbone of the civil defense radiation measurement capability for the nuclear attack environment.

The CDV-794 calibrator contains radioactive material. The material is 130 curies of cesium-137. This is a Type B quantity. The cesium-137, in the form of cesium chloride pellets, is doubly encapsulated in an ORNL-2339A capsule. The ORNL capsule is further encapsulated within a tungsten alloy source plug. The source plug is housed in a primary shield consisting of 180 lbs. of depleted uranium. (See Attachment A, Pages 10 + 12.)

At the time of procurement, (Contract No. OCD-PS66-149) Technical Operations Inc., the manufacturer, certified that the calibrator met the requirements as a DOT Specification 55 container. (See Attachment A, Page 37.) A total of 70 calibrators were procured. They are on loan to State maintenance and calibration facilities, other federal agencies and contractors.

The CDV-794 calibrators were originally shipped by highway transportation from the manufacturer, Technical Operations Inc., Burlington, MA, to the maintenance and calibration facilities in the 50 States, Puerto Rico, D.C.; Federal Depots in California, Kansas, Pennsylvania and Virginia; and FEMA contractors such as the National Bureau of Standards, MD, and Oak Ridge National Laboratories, TN. Since then, they have only been moved when the maintenance and calibration facility is relocated; when the Federal Depots were all consolidated into the Richmond, VA Depot; when a contractor no longer needs the calibrator; or when a calibrator must be shipped to the FEMA Radiological Instrument Test Facility, Washington Navy Yard, Washington, D.C., for mechanical repair and returned. Transportation was usually by motor freight except to or from Alaska, Hawaii or Puerto Rico where air cargo or water transportation was required. The calibrators have been transported at

least 90 times. There have been no accidents or incidents involving the CDV-794 calibrator. Transportation was terminated in 1979 because we were advised that the calibrator did not comply with current shipping regulations.

The CDV-794 does not comply with current DOT regulations for the following reasons: (1) The capsule does not meet the requirements of 173.389(a)(3) as radioactive material in special form because the capsule when heated to 1475° F may rupture due to the expansion of the cesium chloride pellets. (2) The calibrator will not withstand the 30 ft. free drop required by 173.398(b) (2)(i) for a Type B package. The uranium shielding which contains the radioactive source is bolted to the calibrator body. The bolts will not withstand the force of the 30 ft. drop. It would be impossible to add additional bracing without disassembly which is only authorized at the Radiological Instrument Test Facility and Technical Operations, Inc.

On several calibrators, the assembly for turning the attenuator wheel has started to bind making it difficult to turn the attenuator. This can be corrected by removing the radioactive material, (this requires special equipment) and then removing the attenuator wheel assembly and machining the shaft. The calibrator is then reassembled and restandardized. The FEMA Radiological Instrument Test Facility is the only location, other than Technical Operations Inc., that is authorized by the Nuclear Regulatory Commission (NRC) to remove the radioactive materials from the calibrator.

It is requested that an exemption be granted to permit shipment of the CDV-792 calibrator using the same procedures used prior to 1979. Section 3 of the, Operation & Maintenance Manual for the CDV-794 Model 2 Radiological-Instrument Calibrator (Attachment 8) contains instructions for preparing the calibrator for shipment. Properly packaged, the calibrator meets the criteria for a Radioactive Yellow II label. The proposed mode of transportation to be used for the exemption item would be motor freight except to or from Alaska, Hawaii or Puerto Rico where air cargo or water transportation is required. The CDV-794 calibrator would only be transported when required. Prior to transport, the calibrator would be transferred from the the Custodian's Byproduct Materials License to FEMA's Byproduct Material License. The calibrator will be in FEMA's custody when shipped. Therefore, only FEMA will need the exemption requested by this application.

It is requested that the exemption be granted for a period of 24 months from date of issue. FEMA is currently developing a procedure whereby the encapsulated radioactive material would be removed from the CDV-794 calibrator and transferred to a Specification 2R container with overpack for shipment. This requires designing and manufacturing a specification shipping container assembly and obtaining authorization from the NRC to unload and reload the encapsulated radioactive material from the CDV-794 anywhere in the United States. It is anticipated that this will require approximately 24 months.

The COV-794 had been shipped without incident. Therefore, this exemption will be consistent with the public interest (national survival) and will adequately protect against the risks to life and property which are inherent in the transportation of hazardous materials in commerce.

The point of contact for this request is George C. Meyer, Senior Health Physicist, Radiological Defense and Technological Hazards Branch, State and Local Operational Systems Division. He may be reached at (202) 566-1617.



U.S. Department
of Transportation

Research and
Special Programs
Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

DOT-E 8667

1. The Federal Emergency Management Agency (FEMA) is hereby granted an exemption from those provisions of this Department's Hazardous Materials Regulations specified in paragraph 5 below to offer packages prescribed herein of sealed sources of radioactive material for transportation in commerce subject to the limitations and special requirements specified herein. This exemption authorizes use of CDV-794 calibrators instead of DOT specification or Nuclear Regulatory Commission certified packages, and provides no relief from any regulation other than as specifically stated.
2. BASIS. This exemption is based on the FEMA letter of application dated June 15, 1981, submitted in accordance with 49 CFR 107.103 and the public proceeding thereon.
3. HAZARDOUS MATERIALS (Descriptor and class). Radioactive materials doubly encapsulated in steel capsules not meeting special form criteria.
4. PROPER SHIPPING (49 CFR 172.101). Radioactive material, n.o.s.
5. REGULATION AFFECTED. 49 CFR 173.395(b).
6. MODES OF TRANSPORTATION AUTHORIZED. Motor vehicle, cargo vessel, cargo-only aircraft.
7. SAFETY CONTROL MEASURES.
 - a. Packaging prescribed for the Type B quantity ¹³⁷Cs sources is the CDV-794 calibrator prepared for transport in accordance with the procedures described in the Operation and Maintenance Manual for the calibrator.
 - b. The safety measures described in the letter of application for this exemption and any subsequent related safety instructions prepared by the FEMA Senior Health Physicist identified in the application are incorporated into this exemption.
8. SPECIAL PROVISIONS.
 - a. A copy of this exemptions must be carried aboard each vessel, aircraft, motor vehicle used to transport packages covered by this exemption.
 - b. Drivers must have been instructed as to necessary safeguards and proper procedure in the event of unusual delay, fire, or accident.
9. REPORTING REQUIREMENTS. Any incident involving loss of contents of the package must be reported to the Office of Hazardous Materials Regulation as soon as practicable.

10. EXPIRATION DATE. September 15, 1983.

Issued at Washington, D.C.:



Alan I. Roberts
Associate Director for
Hazardous Materials Regulation
Materials Transportation Bureau

OCT 19 1981

(DATE)

Address all inquiries to: Associate Director for Hazardous Materials Regulation,
Materials Transportation Bureau, Research and Special Programs Administration,
U.S. Department of Transportation, Washington, D.C. 20590. Attention: Exemptions
Branch.

Dist: USCG, FAA, FHWA.



U.S. Department
of Transportation

Research and
Special Programs
Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

DOT-E 8667
(EXTENSION)

In accordance with 49 CFR 107.105 of the Department of Transportation (DOT) Hazardous Materials Regulations DOT-E 8667 is hereby extended by changing the expiration date in paragraph 10 from September 15, 1983 to August 15, 1985.

This extension applies only to party(s) listed below based on the application(s) received in accordance with 49 CFR 107.105. All other terms of the exemption remain unchanged. This extension forms part of the exemption and must be attached to it.

Alan I. Roberts
Associate Director for
Hazardous Materials Regulation
Materials Transportation Bureau

SEP 23 1983

(DATE)

Dist: FAA, FHWA, USCG

EXEMPTION HOLDER

Federal Emergency Management Agency
Washington, D.C.

APPLICATION DATE

June 29, 1983



U.S. Department
of Transportation

Research and
Special Programs
Administration

400 Seventh St. S.W.
Washington, D.C. 20590

DOT-E 8667
(FIRST REVISION)
(CORRECTED COPY)

1. The Federal Emergency Management Agency (FEMA), Washington, D.C., is hereby granted an exemption from those provisions of this Department's Hazardous Materials Regulations specified in paragraph 5 below to offer packages prescribed herein of special form sources of radioactive material for transportation in commerce subject to the limitations and special requirements specified herein. This exemption authorizes use of CDV-794 calibrators instead of DOT specification or Nuclear Regulatory Commission certified packages, and provides no relief from any regulation other than as specifically stated.
2. BASIS. This exemption is based on the FEMA letter of application dated April 23, 1985, submitted in accordance with 49 CFR 107.105 and the public proceeding thereon.
3. HAZARDOUS MATERIALS (Descriptor and class). Special form radioactive materials in a shielded calibrator device.
4. PROPER SHIPPING NAME (49 CFR 172.101). Radioactive material, special form, n.o.s.
5. REGULATION AFFECTED. 49 CFR 173.416, 175.3.
6. MODES OF TRANSPORTATION AUTHORIZED. Motor vehicle, cargo vessel, cargo-only aircraft.
7. SAFETY CONTROL MEASURES.
 - a. The CDV-794 is authorized as a packaging for special form sources of ¹³⁷Cs with an activity not exceeding 130Ci (4.8TBq) when the CDV-794 is prepared for transport in accordance with the procedures described in the Operation and Maintenance Manual for the calibrator.
 - b. The safety measures described in the June 15, 1981 letter of application for this exemption and any subsequent related safety instructions prepared by the FEMA Senior Health Physicist identified in the application are incorporated into and are requirements of this exemption.
8. SPECIAL PROVISIONS.
 - a. FEMA authorized custodians of CDV-794 calibrators may also ship them pursuant to the provisions of 49 CFR 173.22a.
 - b. A copy of this exemption must be carried aboard each vessel, aircraft, and motor vehicle used to transport packages covered by this exemption.

c. Drivers must have been instructed or provided written instructions as to necessary safeguards and proper procedures to be followed in the event of unusual delay, fire, or accident.

9. REPORTING REQUIREMENTS. Any incident involving loss of contents of the package must be reported to the Office of Hazardous Materials Regulation as soon as practicable.

10. EXPIRATION DATE. June 15, 1987.

Issued at Washington, D.C.:

SEP 19 1985



(DATE)

Alan I. Roberts
Associate Director for
Hazardous Materials Regulation
Materials Transportation Bureau

Address all inquiries to: Associate Director for Hazardous Materials Regulation,
Materials Transportation Bureau, Research and Special Programs Administration, U.S.
Department of Transportation, Washington, D.C. 20590. Attention: Exemptions Branch.

Dist: USCG, FAA, FHWA.



U.S. Department
of Transportation

Research and
Special Programs
Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

DOT-E 8667 (EXTENSION)
FIRST REVISION September 19, 1985
(CORRECTED COPY)

In accordance with 49 CFR 107.105 of the Department of Transportation (DOT) Hazardous Materials Regulations DOT-E 8667 is hereby extended by changing the expiration date in paragraph 10 from June 15, 1987 to May 15, 1989.

This extension applies only to party(s) listed below based on the application(s) received in accordance with 49 CFR 107.105. All other terms of the exemption remain unchanged. This extension forms part of the exemption and must be attached to it.

SM J. Suzanne Helgeseth
Alan I. Roberts
Director
Office of Hazardous Materials
Transportation

JUN 5 1987

(DATE)

Dist: FEWA USCG FAA

EXEMPTION HOLDER

APPLICATION DATE

Federal Emergency Management Agency
Washington, DC

April 30, 1987



U.S. Department
of Transportation

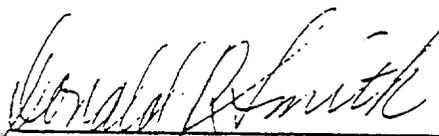
Research and
Special Programs
Administration

410 Seventh Street, N.W.
Washington, D.C. 20590

DOT-E 8667 (EXTENSION)
FIRST REVISION September 19, 1985
CORRECTED COPY

In accordance with 49 CFR 107.105 of the Department of Transportation (DOT) Hazardous Materials Regulations DOT-E 8667 is hereby extended for the party(ies) listed below by changing the expiration date in paragraph 1C to March 31, 1991. This change is effective from the issue date of this extension. All other terms of the exemption remain unchanged.

This extension applies only to party(ies) listed below based on the application(s) received in accordance with 49 CFR 107.105 and the public proceeding thereon. This extension constitutes a necessary part of this exemption and must be attached to it.



Alan I. Roberts
Director
Office of Hazardous Materials
Transportation

MAY 16 1989

(DATE)

Dist: FEWA USCG FAA

EXEMPTION HOLDER

APPLICATION DATE

Federal Emergency Management Agency

March 10, 1989

Washington, DC

*Received 5/25/89
[Signature]*



U.S. Department
of Transportation

Research and
Special Programs
Administration

U.S. DEPARTMENT OF TRANSPORTATION
WASHINGTON, D.C. 20590

DOT-E 8667 (EXTENSION)
FIRST REVISION September 19, 1985
CORRECTED COPY

In accordance with 49 CFR 107.105 of the Department of Transportation (DOT) Hazardous Materials Regulations DOT-E 8667 is hereby extended for the party(ies) listed below by changing the expiration date in paragraph 10 to January 31, 1993. This change is effective from the issue date of this extension. All other terms of the exemption remain unchanged.

This extension applies only to party(ies) listed below based on the application(s) received in accordance with 49 CFR 107.105 and the public proceeding thereon. This extension constitutes a necessary part of this exemption and must be attached to it.

Alan I. Roberts
Alan I. Roberts
Associate Administrator
for Hazardous Materials Safety

FEB 28 1991

(DATE)

Dist: FHWA USCG FAA

EXEMPTION HOLDER

APPLICATION DATE

Federal Emergency Management Agency
Washington, DC

January 28, 1991



U.S. Department
of Transportation
**Research and
Special Programs
Administration**

DOT-E 8667 (EXTENSION)
FIRST REVISION September 19, 1985
CORRECTED COPY

In accordance with 49 CFR 107.105 of the Department of Transportation (DOT) Hazardous Materials Regulations DOT-E 8667 is hereby extended for the party(ies) listed below by changing the expiration date in paragraph 10 to September 30, 1994. This change is effective from the issue date of this extension. All other terms of the exemption remain unchanged.

This extension applies only to party(ies) listed below based on the application(s) received in accordance with 49 CFR 107.105. This extension constitutes a necessary part of this exemption and must be attached to it.

JAN 29 1993

Alan I. Roberts
Associate Administrator
for Hazardous Materials Safety

(DATE)

Dist: FEWA USCG FAA

EXEMPTION HOLDER

APPLICATION DATE

Federal Emergency Management Agency
Washington, DC

December 25, 1992



U.S. Department of Transportation
Research and Special Programs Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

DOT-E 8667 (EXTENSION)
FIRST REVISION September 19, 1985
CORRECTED COPY

In accordance with 49 CFR 107.105 of the Department of Transportation (DOT) Hazardous Materials Regulations DOT-E 8667 is hereby extended for the party(ies) listed below by changing the expiration date in paragraph 10 to July 31, 1996. This change is effective from the issue date of this extension. All other terms of the exemption remain unchanged.

This extension applies only to party(ies) listed below based on the application(s) received in accordance with 49 CFR 107.105. This extension constitutes a necessary part of this exemption and must be attached to it.

AUG 29 1994

(DATE)

Alan I. Roberts
Associate Administrator
For Hazardous Materials Safety

Dist: FHWA USCG FAA

EXEMPTION HOLDER

APPLICATION DATE

Federal Emergency Management Agency
Washington, DC

July 29, 1994

ADVISORY

IF YOU ARE A HOLDER OF AN EXEMPTION THAT AUTHORIZES THE USE OF A PACKAGING WITH A MAXIMUM CAPACITY LESS THAN 450 L (119 GALLONS) OR A MAXIMUM NET MASS LESS THAN 400 KG (882 POUNDS), PLEASE BE ADVISED THAT YOUR EXEMPTION MAY NOT BE RENEWED BEYOND SEPTEMBER 30, 1996. IN ADDITION, NO NEW CONSTRUCTION OF PACKAGINGS WHICH FALL WITHIN THE NON-BULK CAPACITIES LISTED ABOVE ARE AUTHORIZED AFTER SEPTEMBER 30, 1994. THIS IS CONSISTENT WITH THE IMPLEMENTATION OF THE NEW PACKAGING REQUIREMENTS ADOPTED UNDER DOCKET HM-181. ANY APPLICATION SUBMITTED TO THIS OFFICE TO RENEW AN EXEMPTION BEYOND THE SEPTEMBER 30, 1996 DATE WILL BE DENIED UNLESS THE APPLICATION CONTAINS SUPPORTING INFORMATION TO JUSTIFY THE CONTINUATION OF THE EXEMPTION.



U.S. Department
of Transportation

400 Seventh Street, S.W.
Washington, D.C. 20590

**Research and
Special Programs
Administration**

DOT-E 8667 (EXTENSION)
FIRST REVISION September 19, 1985

In accordance with 49 CFR 107.109 of the Department of Transportation (DOT) Hazardous Materials Regulations DOT-E 8667 is hereby extended for the party(ies) listed below by changing the expiration date in paragraph 10 to March 31, 1999. This change is effective from the issue date of this extension. All other terms of the exemption remain unchanged.

This extension applies only to party(ies) listed below based on the application(s) received in accordance with 49 CFR 107.109. This extension constitutes a necessary part of this exemption and must be attached to it.

Alan I. Roberts
for Alan I. Roberts
Associate Administrator
for Hazardous Materials Safety

4/28/97
(DATE)

Dist: FHWA USCG FAA

EXEMPTION HOLDER

APPLICATION DATE

Federal Emergency Management Agency
Washington, DC

February 12, 1997

NOV 17 1998

U.S. Department
of Education
Research and
Special Programs
Administration

400 Severn Street, S.W.
Washington, D.C. 20555

ATTENTION REGISTRATION HOLDERS(S)

Enclosed is the 2nd Revision of ECT-E 8667. Please note the
modification(s) to Program(s) Alto format and Expectation sheet

Sincerely,
D. Sumner Hedgepeth

I. Sumner Hedgepeth, Director
Office of Hazardous Materials
Exemptions & Approvals

620



U.S. Department
of Transportation

Research and
Special Programs
Administration

NOV 17 1998

400 Seventh Street, S.W.
Washington, D.C. 20590

DOT-E 8667
(SECOND REVISION)

EXPIRATION DATE: October 31, 2000

(FOR RENEWAL, SEE 49 CFR SECTION 107.109)

1. GRANTEE: The Federal Emergency Management Agency (FEMA)
Washington, D. C.
2. PURPOSE AND LIMITATION:
 - a. This exemption authorizes the transportation in commerce of special form sources of radioactive material in CDV-794 calibrators instead of DOT specification or Nuclear Regulatory Commission certified packages. This exemption provides no relief from any Hazardous Materials Regulation (HMR) other than as specifically stated herein.
 - b. The safety analyses performed in development of this exemption only considered the hazards and risks associated with transportation in commerce. The safety analyses did not consider the hazards and risks associated with consumer use, use as a component of a transport vehicle or other device, or other uses not associated with transportation in commerce.
3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.
4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR 173.416 and 175.3.
5. BASIS: This exemption is based on the application of FEMA dated September 21, 1998, submitted in accordance with 49 CFR 107.109.

6. HAZARDOUS MATERIALS (49 CFR 172.101):

Proper Shipping Name/ Hazardous Materials Description	Hazard Class/ Division	Identi- fication Number	Packing Group
Radioactive material, special form, n.o.s.	7	UN1274	N/A

For the N.O.S entries above, the requirements of 49 CFR 172.203(k) must be met.

7. SAFETY CONTROL MEASURES:

a. The CDV-794 is authorized as a packaging for special form sources of ¹³⁷Cs with an activity not exceeding 130Ci (4.8TBq) when the CDV-794 is prepared for transport in accordance with the procedures described in the Operation and Maintenance Manual for the calibrator.

b. The safety measures described in the June 15, 1981 letter of application for this exemption and any subsequent related safety instructions prepared by the FEMA Senior Health Physicist identified in the application are incorporated into and are requirements of this exemption.

8. SPECIAL PROVISIONS:

a. FEMA authorized custodians of CDV-794 calibrators may also ship them pursuant to the provisions of 49 CFR 173.22a.

b. A current copy of this exemption must be maintained at each facility where the package is offered or reoffered for transportation.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, cargo vessel, and cargo aircraft only.10. MODAL REQUIREMENTS:

a. A copy of this exemption must be carried aboard each cargo vessel, aircraft or motor vehicle used to transport packages covered by this exemption. The shipper shall furnish a copy of this exemption to the air carrier before or at the time the shipment is tendered.

NOV 17 1998

b. Drivers must have been instructed or provided written instructions as to necessary safeguards and proper procedures to be followed in the event of unusual delay, fire, or accident.

11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. Section 5101 et seq:

- o All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, 49 CFR Parts 171-180.
- o Registration required by 49 CFR 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in 49 CFR 171.8, who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by 49 CFR 172.700 through 172.704.

No person may use or apply this exemption, including display of its number, when the exemption has expired or is otherwise no longer in effect.

12. REPORTING REQUIREMENTS: The carrier is required to report any incident involving loss of packaging contents or packaging failure to the Associate Administrator for Hazardous Materials Safety (AAHMS) as soon as practicable. (49 CFR 171.15 and 171.16 apply to any activity undertaken under the authority of this exemption.) In addition, the holder(s) of this exemption must inform the AAHMS, in writing, of any incident involving the package and shipments made under the terms of this exemption.

Issued at Washington, D.C.:



Alan I. Roberts
Associate Administrator for
Hazardous Materials Safety

NOV 17 1998

(DATE)

NOV 17 1998

Continuation DOT-E 3667 (2nd Rev.)

Page 4

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590.
Attention: DHM-31.

The original of this exemption is on file at the above office. Photo reproductions and legible reductions of this exemption are permitted. Any alteration of this exemption is prohibited.

Copies of exemptions may be obtained from the AAHMS, U.S. Department of Transportation, 400 7th Street, Washington, DC 20590-0001, Attention: Records Center, 202-366-5046.

Dist: FHWA USCG FAA
PO: sln



U.S. Department
of Transportation

Research and
Special Programs
Administration

JUL 14 2000

400 Seventh Street, S.W.
Washington, D.C. 20590

DOT-E 8667
(THIRD REVISION)

EXPIRATION DATE: June 30, 2002

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: The Federal Emergency Management Agency (FEMA)
Washington, DC
2. PURPOSE AND LIMITATION:
 - a. This exemption authorizes the transportation in commerce of special form sources of radioactive material in CDV-794 calibrators instead of DOT specification or Nuclear Regulatory Commission certified packages. This exemption provides no relief from any Hazardous Materials Regulation (HMR) other than as specifically stated herein.
 - b. The safety analyses performed in development of this exemption only considered the hazards and risks associated with transportation in commerce.
3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.
4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR 173.416 and 175.3.
5. BASIS: This exemption is based on the application of FEMA dated June 22, 2000, submitted in accordance with § 107.109.
6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Proper Shipping Name/ Hazardous Materials Description	Hazard Class/ Division	Identi- fication Number	Packing Group
Radioactive material, special form, n.o.s.	7	UN2974	N/A

JUL 14 2000

7. SAFETY CONTROL MEASURES:

a. The CDV-794 is authorized as a packaging for special form sources of Cs-137 with an activity not exceeding 130Ci (4.8TBq) when the CDV-794 is prepared for transport in accordance with the procedures described in the Operation and Maintenance Manual for the calibrator.

b. The safety measures described in the June 15, 1981 letter of application for this exemption and any subsequent related safety instructions prepared by the FEMA Senior Health Physicist identified in the application are incorporated into and are requirements of this exemption.

8. SPECIAL PROVISIONS:

a. FEMA authorized custodians of CDV-794 calibrators may also ship them pursuant to the provisions of § 173.22a.

b. A current copy of this exemption must be maintained at each facility where the package is offered or reoffered for transportation.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, cargo vessel, and cargo aircraft only.

10. MODAL REQUIREMENTS:

a. A current copy of this exemption must be carried aboard each cargo vessel, aircraft or motor vehicle used to transport packages covered by this exemption. The shipper must furnish a copy of this exemption to the air carrier before or at the time the shipment is tendered.

b. Drivers must have been instructed or provided written instructions as to necessary safeguards and proper procedures to be followed in the event of unusual delay, fire, or accident.

11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:

o All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, 49 CFR Parts 171-180.

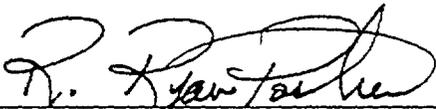
- o Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this exemption, including display of its number, when the exemption has expired or is otherwise no longer in effect.

12. REPORTING REQUIREMENTS: The carrier is required to report any incident involving loss of packaging contents or packaging failure to the Associate Administrator for Hazardous Materials Safety (AAHMS) as soon as practicable. (Sections 171.15 and 171.16 apply to any activity undertaken under the authority of this exemption.) In addition, the holder(s) of this exemption must inform the AAHMS, in writing, of any incident involving the package and shipments made under the terms of this exemption.

Issued at Washington, D.C.:



for Robert A. McGuire
Acting Associate Administrator for
Hazardous Materials Safety

JUL 14 2000

(DATE)

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590
Attention: DHM-31

The original of this exemption is on file at the above office. Photo reproductions and legible reductions of this exemption are permitted. Any alteration of this exemption is prohibited.

Copies of exemptions may be obtained from the AAHMS, U.S. Department of Transportation, 400 7th Street, S.W., Washington, DC 20590-0001, Attention: Records Center, 202-366-5046.

PO: Carriker/alb



Federal Emergency Management Agency

Washington, D.C. 20472

June 22, 2000

Ms. J. Suzanne Hedgepeth
Director of Office of Hazardous Materials
Exemptions and Approvals
U.S. Department of Transportation
Research and Special Programs Administration
Division of Hazardous Materials, Code 31
400 Seventh Street, S.W.
Room 8436
Washington, D.C. 20590-0001

Dear Ms. Hedgepeth:

In accordance with paragraph 107.109 of Title 49, Code of Federal Regulations (CFR), Part 107, the Federal Emergency Management Agency (FEMA) is applying for a renewal of U.S. Department of Transportation's Exemption (DOT-E) 8667. Our current Exemption expires October 31, 2000.

FEMA certifies that the description, technical information, and safety assessment submitted in the original application, and subsequent renewal applications, remains the same. FEMA also certifies that a total of more than two hundred forty (240) shipments of the sixty seven (67) each CD-794 Model 2 Calibrators have been made without accident or incident. These shipments were made starting in 1968 to 1970 time frame, when the CD-794 Calibrators were procured, up to the period ending June 30, 2000. All of these calibrators were also shipped to, and returned from, Oak Ridge National Laboratory during the period 1983-1985, when Special Form Cs-137 sealed sources, with a nominal activity of 130 Ci (4.8 TBq), were fabricated and installed in the Calibrators.

All supporting documentation, including an engineering drawing which confirms that the sources contained in the CDV-794, Model 2 Calibrators meet special requirements, were provided to you under our letters of February 12, 1997, September 17, 1998, and January 21, 1999, requesting renewal DOT-E 8667.

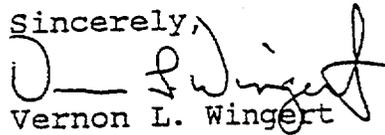
This Exemption is of vital importance to FEMA because of the need to meet NRC imposed time constraints on termination of our By-Product Materials License, and the transfer/disposal of FEMA-owned CDV-794 Calibrators.

In accordance with our renewal request letter of September 17, 1998, we are submitting this renewal request 120 days prior to expiration of the current Exemption.

Currently FEMA is requesting approval from the NRC for a one-time shipment of 10 CDV-794 Calibrators to our Berryville, VA. Facility. This action involves an exemption by the NRC from certain requirements of 10 CFR Part 71, pursuant to 10 CFR 71.8. FEMA is preparing an Environmental Report (ER) that will address the topics identified in 10 CFR 51.30.

If you have any questions or concerns about this letter request for renewal of DOT-E 8667, please contact me at (202) 646-2872.

Sincerely,



Vernon L. Wingert
Chairperson
Radiation Control Committee

cc: Radiation Control Committee

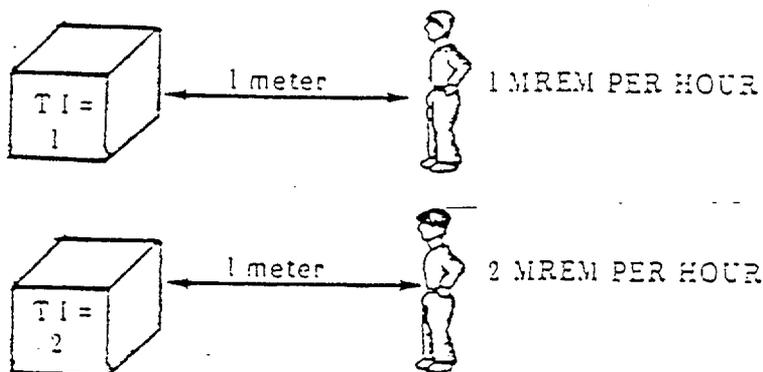
APPENDIX D

SUPPLEMENTAL INFORMATION CONCERNING

THE TRANSPORT INDEX

⊕ WHAT DOES THE TRANSPORT INDEX TELL ME ABOUT THE RADIATION AROUND A PACKAGE?

The Transport Index, more generally referred to as the TI, is given only on RADIOACTIVE YELLOW - II and III labels. It is the highest radiation level, in millirems per hour (mrem/hr), allowed at one meter from any accessible external surface of the package.² This is, it tells the highest radiation dose that can be received by a person who remains for 1 hour at one meter from the surface of a package.



Transport Index (TI)

The regulations state that the TI of a single package must not exceed 10 (except for packages transported in exclusive-use vehicles). For most packages, the TI is much less than 10. Common values are 3 and less. For packages on passenger aircraft the maximum TI is 3.0.

The cumulative dose at one meter from the surface of a package is the TI multiplied by the time (in hours). Thus, if you stayed 1 hour at a distance of one meter from a package with a TI of 3, the maximum dose you could get would be 3 mrem/hour x 1 hour, or 3 mrem. If you stayed half an hour, you would get half as much, or 1.5 mrem. If you stayed 2 hours, you would get twice as much, or 6 mrem.

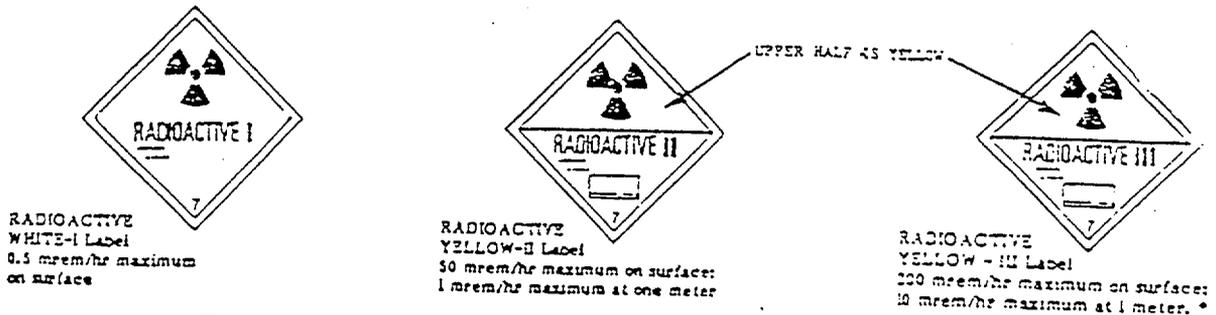
Control of exposure to radiation is accomplished by limiting the total accumulated dose. The person is checked for accumulated radiation over a period of time, usually 3 months (see section on radiation exposure, page 11).

⊕ HOW DOES THE RADIATION LEVEL CHANGE AT DIFFERENT DISTANCES FROM THE SURFACE OF THE PACKAGE?

The radiation level gets smaller as you get farther away from the package and larger as you get closer to the package. The following diagram shows how the radiation level changes for a 1-TI package with 15-inch sides. If you want to know about the radiation levels for a package of about the same size but with another TI, just multiply the levels in the diagram by the other TI. (The numbers are somewhat different for packages of other sizes.)

HOW ARE RADIOACTIVE MATERIALS PACKAGES IDENTIFIED?

MOST RADIOACTIVE MATERIALS PACKAGES ARE IDENTIFIED BY ONE OF THE FOLLOWING LABELS:



Government regulations require that nearly all radioactive materials packages be labeled. Except for those packages containing exempt quantities as defined in the Code of Federal Regulations, Title 49, Sections 173.421 through 173.424. Packages with a RADIOACTIVE WHITE-I label have almost no radiation outside the package; packages with a RADIOACTIVE YELLOW-II label have low radiation levels; and packages with a RADIOACTIVE YELLOW-III label have higher radiation. The radiation levels allowed outside packages are limited by Federal regulations.

The information shown on a RADIOACTIVE label is as follows:

1. Contents - This line gives the name of the radioisotope. Some radioisotopes present only a slight hazard; others are considered very hazardous.
2. Activity - This line tells the amount of radioactivity in terms of an unit of measure called the Curie.
3. Transport Index (TI) - This line is present only on RADIOACTIVE YELLOW-II and YELLOW-III labels. It is the number shown in the open block and indicates the highest radiation level at one meter from the surface of the package, in radiation units of millirems per hour.

WHAT IS REQUIRED OF CARRIERS THAT ACCEPT RADIOACTIVE MATERIALS PACKAGES?

The requirements for carrier handling of hazardous materials are given in the Code of Federal Regulations, Title 49, Part 174 (rail), 175 (aircraft), 176 (vessel), and 177 (public highway). Requirements of the regulations that carriers should be concerned with are:

1. Check for the shipper's certification.
2. Check shipping papers.
3. Inspect the packages.
4. Observe loading, blocking, bracing, and stowage requirements; check limits and controls on total TI and separation distances.
5. Placard the transport vehicle (if rail or highway) when required, and
6. Report any incidents that occur.

The following detailed information on procedures that carriers should follow is designed to help you become familiar with regulatory requirements. It is not to be used in place of DOT Hazardous Materials Regulations are given in CFR, Title 49, Parts 100-199. (Future references to applicable parts of Title 49 will be noted only by the Part or Section number.)

*Packages transported in a vehicle that has been consigned as exclusive use (except aircraft) may exceed these values. Packages aboard passenger aircraft can not exceed 3.0 mrem/hr at

one meter. Exclusive use means any shipment from a single consignor having the exclusive use of a transport vehicle (CFR 49, Sec. 173.403). All initial, intermediate, and final loading and unloading must be carried out by or under the direction of the consignor or consignee.

◆ SHIPPER'S CERTIFICATION

Do not accept labeled radioactive materials packages without a signed certificate from the shipper. The certificate must indicate that 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 (Sec. 172.204). The certificate information may be printed or stamped on the shipping papers. The certificate must be legibly signed, either manually or by typewriter or by other mechanical means.

In the case of air shipments, always keep one signed copy of the shipper's certificate with the shipment (and with each portion of the shipment if it is split). Keep a second copy on file if you are the originating air carrier.

◆ SHIPPING PAPERS

Check information supplied by the shipper for completeness. The information should include the proper shipping name; hazard class of Radioactive Materials if those words are not included in the proper shipping name; the UN identification number; name of each radionuclide; physical and chemical form (if not in special form); activity in each package in terms of curies, millicuries, or microcuries; category of label; transport index (if yellow label); etc., as required by Sections 172.202 and 172.203 of the Regulations. If excepted from labeling, there will be no entry for the category of label applied. Section 172.203 includes a few special requirements for shipments by air and water.

Prepare the appropriate shipping papers to accompany the shipment. If specification of separation distances on shipping papers is required by the carrier, note the distances on the papers. If a shipment by air is to be split in transit, a complete set of documents must accompany each portion of the shipment. For motor vehicle shipments, be sure the papers are within the immediate reach of the driver.

◆ PACKAGES

Inspect the packages and make sure that their security seals are intact. There must be no dents, holes, leaks, or other indication that package integrity has been compromised.

Check the labels and markings on the packages to ensure that:

1. Labels agree with shipping papers,
2. Packages are labeled on two opposite sides,
3. The outside is marked with the appropriate specification number (Sec. 173.241c (LME)), with the proper shipping name (Sec. 172.300), and with the words TYPE A or TYPE B when applicable (Sec. 172.310).
4. Packages that are not permitted aboard passenger-carrying aircraft must be labeled CARGO AIRCRAFT ONLY (Sec. 172.446).

◆ STOWAGE LIMITS AND CONTROLS

Do not place packages with a total transport index (TI: see page 7 for an explanation) greater than 50 in a single transport vehicle or storage location. (Note: No package offered for common transport under nonexclusive-use conditions may have a transport index exceeding 10 (Sec. 173.441).

Ensure that yellow labeled packages are kept separate from areas continuously occupied by persons, live animals, and undeveloped film shipments. Use the table of storage time versus the total transport index (Secs. 174.700, 175.701-703, 176.700 and 177.842).

Observe the prohibitions on loading, transporting, or stowing different kinds of hazardous materials together (see Secs. 174.81, 176.83 and 177.848).

Notify the pilot in command of the aircraft, in writing, of the type of radioactive materials, type of label, quantity and location of packages, results of the inspection of the packages, and other items required by the Regulations (Sec. 175.33). This notification is required for all packages classified as hazardous material.

Observe the stowage rules at your terminal. As shown in Sec. 177.842, there are minimum distances allowed between packages and spaces occupied by personnel.

▶ PLACARDING

Placard any rail or highway vehicle that carries a RADIOACTIVE YELLOW-III packages (Sec. 172.504). Use four (4) placards. Display one on the front, rear, and each side of the transport vehicle.

▶ REPORTING OF INCIDENTS

Report incidents involving fire, accidents, breakage, or suspected radioactive contamination to the shipper AND the Department of Transportation (see Secs. 171.15, 171.16, 174.45, 175.45, 176.48 and 177.807). Do not place in service any vehicle, area, or equipment in which radioactive materials may have been spilled until it has been surveyed and decontaminated [see Secs. 174.750(a), 175.700(b), 176.715 and 177.861].

⊗ WHAT ARE THE MAIN SAFETY RULES FOR THE WORKER TO KEEP IN MIND WHEN HANDLING RADIOACTIVE MATERIALS PACKAGES UNDER NORMAL CONDITIONS?

Safety in handling radioactive materials is based on keeping radiation exposure as low as reasonably achievable.

The main methods used by workers to avoid unnecessary radiation exposure rely on two key elements: (1) time of exposure, and (2) distance from the radiation source. These elements are called time and distance. Points to remember are:

1. ▶ TIME - The rule is: Keep contact time with packages short.
 - Do not loiter in the immediate vicinity of the packages.
 - Handle packages of radioactive material without delay when moving them from one place to another.
 - Do not carry on long conversations near packages.
 - Do not do time-consuming tasks, such as paperwork, near packages.

2. ▶ DISTANCE - The rule is: Avoid staying close to packages unnecessarily.
 - Do not place packages near lunchrooms, offices, desks, or other areas occupied by workers for extended periods.
 - When transporting packages, use a vehicle that allows the required distance between the operator and the packages. Minimum distances are listed in tables in Secs. 174.700, 175.701-703, 176.700 and 177.842.
 - Do not place the packages inside the cab or space occupied by the operator. Place them in the part of the vehicle designed for cargo and away from the operator.

Specific activity of a radionuclide means the activity of the radionuclide per unit mass of that nuclide. The specific activity of a material in which the radionuclide is essentially uniformly distributed is the activity per unit mass of the material.

Surface Contaminated Object (SCO) means a solid object which is not itself radioactive but which has Class 7 (radioactive) material distributed on any of its surfaces. SCO must be in one of two groups with surface activity not exceeding the following limits:

(1) SCO-I: A solid object on which:

(i) The non-fixed contamination on the accessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 4 Bq/cm² (10⁻⁴ microcurie/cm²) for beta and gamma and low toxicity alpha emitters, or 0.4 Bq/cm² (10⁻⁵ microcurie/cm²) for alpha emitters;

(ii) The fixed contamination on the accessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 4 × 10⁴ Bq/cm² (1.0 microcurie/cm²) for beta and gamma and low toxicity alpha emitters, or 4 × 10³ Bq/cm² (0.1 microcurie/cm²) for all other alpha emitters; and

(iii) The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 4 × 10⁴ Bq/cm² (1 microcurie/cm²) for beta and gamma and low toxicity alpha emitters, or 4 × 10³ Bq/cm² (0.1 microcurie/cm²) for all other alpha emitters.

(2) SCO-II: A solid object on which the limits for SCO-I are exceeded and on which:

(i) The non-fixed contamination on the accessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 400 Bq/cm² (10⁻² microcurie/cm²) for beta and gamma and low toxicity alpha emitters or 40 Bq/cm² (10⁻³ microcurie/cm²) for all other alpha emitters;

(ii) The fixed contamination on the accessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 8 × 10⁵ Bq/cm² (20 microcurie/cm²) for beta and gamma and low toxicity alpha

emitters, or 8 × 10⁴ Bq/cm² (2 microcuries/cm²) for all other alpha emitters; and

(iii) The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm² (or the area of the surface if less than 300 cm²) does not exceed 8 × 10⁵ Bq/cm² (20 microcuries/cm²) for beta and gamma and low toxicity alpha emitters, or 8 × 10⁴ Bq/cm² (2 microcuries/cm²) for all other alpha emitters.

Transport index (TI) means the dimensionless number (rounded up to the next tenth) placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. The transport index is determined as follows:

(1) For nonfissile material packages, the number determined by multiplying the maximum radiation level in milliSievert(s) per hour at one meter (3.3 feet) from the external surface of the package by 100 (equivalent to the maximum radiation level in millirem per hour at one meter (3.3 feet)); or

(2) For fissile material packages, the number determined by multiplying the maximum radiation level in milliSievert per hour at one meter (3.3 feet) from any external surface of the package by 100 (equivalent to the maximum radiation level in millirem per hour at one meter (3.3 feet)) or, for criticality control purposes, the number obtained by dividing 50 by the allowable number of packages which may be transported together, whichever number is larger.

Type A quantity means a quantity of Class 7 (radioactive) material, the aggregate radioactivity which does not exceed A₁ for special form Class 7 (radioactive) material or A₂ for normal form Class 7 (radioactive) material, where A₁ and A₂ values are given in § 173.435 or are determined in accordance with § 173.433.

Type B quantity means a quantity of material greater than a Type A quantity.

Unilateral approval means approval of a package solely by the competent authority of the country of origin.

Unirradiated thorium means thorium containing not more than 10⁻⁷ grams uranium-233 per gram of thorium-232.

APPENDIX E

Sample Shipping Paper Entry for CDV-794

CDV-794 CALIBRATOR SHIPPING PAPER

HM Special Form, N.O.S.
RADIOACTIVE MATERIAL: UN2974, RQ

CU: 30 ft³

CHEMICAL & PHYSICAL FORM: Cesium Chloride/Solid,
Cs-137 mBa double
encapsulated in a
stainless steel
encapsulation, in a
shielded calibrator
device.

RADIOACTIVITY PER PACKAGE: 130 curies (4.81 TBq)
total in a shielded
calibrator device.

TOTAL RADIOACTIVITY IN THE TOTAL SHIPMENT: 130 curies (4.81TBq)
137Cs. Maximum radiation
at surface mSv/hr (mR/hr)

TYPE LABEL: Radioactive I, or II

TRANSPORT INDEX: _____

CONTAINER: DOT-E-8667

INDIVIDUAL CONTAINER WEIGHT: 1,300 lbs

TOTAL SHIPMENT WEIGHT: 1,500 LBS

PLACARD REQUIRED: On Transportation Vehicle. (Yes, No)

NOTE: Attached are:

- (1) Radioactive Material Shipping Paper Information
- (2) US Dot Exemption DOT-E-8667 and,
- (3) Special Instructions for Drivers transporting FEMA-
owned radioactive sources.

Appendix F

__ Radioactive Material Shipping Information Forms

RADIOACTIVE MATERIAL MOVEMENT FORM

CHECK ONE: <input type="checkbox"/> SHIPMENT <input type="checkbox"/> RECEIPT		MOVEMENT NUMBER: _____				
From: _____		To: _____				
COMMODITY DESCRIPTION						
Number of Containers	QTY	NSN	Nomenclature	Isotope	Activity	Total Activity
MODE OF SHIPMENT		PHYSICAL CHARACTERISTICS		RADIATION SURVEY RESULTS		
<input type="checkbox"/> Air	<input type="checkbox"/> Truck	<input type="checkbox"/> Special Form	<input type="checkbox"/> Normal Form	Instrument Used: _____		
<input type="checkbox"/> Rail	<input type="checkbox"/> Water	<input type="checkbox"/> Solid	<input type="checkbox"/> Liquid	Calibration Due: _____ SN: _____		
<input type="checkbox"/> Parcel Post	<input type="checkbox"/> Other	<input type="checkbox"/> Gas		Transport Index: _____		
				Surface: _____ mR/hr _____ μ Sv/hr		
				One Meter: _____ mR/hr _____ μ Sv/hr		
				Background: _____ mR/hr _____ μ Sv/hr		
WIPE TEST RESULTS						
Wipe Taken by: _____		Sample Counted by: _____		Removable: _____ dpm/100 cm sq		
Date: _____		Date: _____		LLD: _____ uCi _____ Bq		
BASIC DESCRIPTION						
_____ Radioactive Material, Excepted Package - Instruments & Articles, 7, UN 2910						
_____ Radioactive Material, Excepted Package - Limited Quantity of Material, 7, UN 2910						
_____ Radioactive Material, Excepted Package - Articles Manufactured From Natural OR Depleted Uranium OR Thorium, 7, UN 2910						
_____ Radioactive Material, Special Form, n.o.s., 7, UN 2974						
_____ Radioactive Material, n.o.s., 7, UN 2982						
_____ Radioactive Material, Low Specific Activity, n.o.s., 7, UN 2912						
_____ Radioactive Material, Fissile, n.o.s., 7, UN 2918						
_____ Radioactive Material, Excepted Package - Empty Packaging, 7, UN 2910						
Labelling		Marking			Shipping Papers	
<input type="checkbox"/> White I	<input type="checkbox"/> Yellow II	<input type="checkbox"/> Radioactive	<input type="checkbox"/> Radioactive LSA	<input type="checkbox"/> Included & Complete	<input type="checkbox"/> Exempt	<input type="checkbox"/> Exempt
<input type="checkbox"/> Yellow III	<input type="checkbox"/> Exempt	<input type="checkbox"/> Waste Class A, B, C	<input type="checkbox"/> Other (_____)			
<input type="checkbox"/> Exempt		<input type="checkbox"/> Exempt				
24 HOUR EMERGENCY RESPONSE COMMERCIAL PHONE NUMBER: ()						
COMMENTS:						
Printed Name of RPO or Designee: _____			Signature: _____		Date: _____	

Appendix G

Special Instructions For Drivers
Transporting FEMA-owned Radioactive Material
in a DOT-E-8667 Container,
In the Event of Fire or Accident.

Special Instructions for Drivers Transporting FEMA-owned
Radioactive Materials in a Dot-E-8667 Container.
In The Event of Fire or Accident.

The following information is furnished in compliance with paragraph 8c of DOT exemption number DOT-E-8667 (corrected copy, first revision).

1. The same procedures and precautions are to be followed in handling and transporting this package that is used in handling and transporting other hazardous materials shipments containing radioactive materials.
2. In the event of an Accident or Fire, follow this procedure in addition to any standing operating procedures:
 - A. If the vehicle is involved in a fire, move all people upwind and stay clear of smoke.
 - B. If there is no fire, check for damage to the outer container. If the outer container is damaged, evacuate all personnel to a distance of at least 200 feet from the container until it has been determined that the radiation shielding in the container is functioning properly.
 - C. Notify police and/or fire personnel responding to the accident that you are transporting radioactive materials. Show them a copy of the shipping papers and these instructions.
 - D. Request that the police or fire person in charge at the incident notify the appropriate State agency (e.g., State radiological health agency).
 - E. Immediately notify the Federal Emergency Management Agency (FEMA) Duty Officer by calling collect (202) 898-6100. Tell the Duty Officer the authorization code for the collect call is "RADEF EMERGENCY". If your (driver) is not able to call, request that someone else, such as the person from the response team who is in charge, call FEMA for you.

November 2000

Give the FEMA Duty Officer the following information:

1. There has been an accident involving FEMA- owned radioactive materials.
2. The radioactive material is in a CD V-794 Calibrator.
3. Location of accident
4. Time of accident.
5. Any injuries.
6. Extent of damages to the package and the vehicle.
7. Was there a fire?
8. Name of the driver.
9. Were State authorities notified? Name and telephone number if known.
10. Name of person making the report.
11. Telephone number where driver of person calling can be reached for additional information.

For additional information, consult the current Emergency Response Guidebook, Guide 164.

For Emergency Assistance, call CHEMTREC (800) 424-9300.

2000 EMERGENCY RESPONSE GUIDEBOOK



A GUIDEBOOK FOR FIRST RESPONDERS
DURING THE INITIAL PHASE OF A
DANGEROUS GOODS/HAZARDOUS MATERIALS INCIDENT

POTENTIAL HAZARDS

HEALTH

- Radiation presents minimal risk to transport workers, emergency response personnel, and the public during transportation accidents. Packaging durability increases as potential hazard of radioactive content increases.
- Undamaged packages are safe; contents of damaged packages may cause external radiation exposure, and much higher external exposure if contents (source capsules) are released.
- Contamination and internal radiation hazards are not expected, but not impossible.
- Type A packages (cartons, boxes, drums, articles, etc.) identified as "Type A" by marking on packages or by shipping papers contain non-life endangering amounts. Radioactive sources may be released if "Type A" packages are damaged in moderately severe accidents.
- Type B packages, and the rarely occurring Type C packages, (large and small, usually metal) contain the most hazardous amounts. They can be identified by package markings or by shipping papers. Life threatening conditions may exist only if contents are released or package shielding fails. Because of design, evaluation, and testing of packages, these conditions would be expected only for accidents of utmost severity.
- Radioactive White-I labels indicate radiation levels outside single, isolated, undamaged packages are very low (less than 0.005 mSv/h (0.5 mrem/h)).
- Radioactive Yellow-II and Yellow-III labeled packages have higher radiation levels. The transport index (TI) on the label identifies the maximum radiation level in mrem/h one meter from a single, isolated, undamaged package.
- Radiation from the package contents, usually in durable metal capsules, can be detected by most radiation instruments.
- Water from cargo fire control is not expected to cause pollution.

FIRE OR EXPLOSION

- Packagings can burn completely without risk of content loss from sealed source capsule.
- Radioactivity does not change flammability or other properties of materials.
- Radioactive source capsules and Type B packages are designed and evaluated to withstand total engulfment in flames at temperatures of 800°C (1475°F).

PUBLIC SAFETY

- CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- Priorities for rescue, life-saving, first aid, and control of fire and other hazards are higher than the priority for measuring radiation levels.
- Radiation Authority must be notified of accident conditions. Radiation Authority is usually responsible for decisions about radiological consequences and closure of emergencies.
- Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions.
- Stay upwind. • Keep unauthorized personnel away.
- Delay final cleanup until instructions or advice is received from Radiation Authority.

PROTECTIVE CLOTHING

- Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide adequate protection against internal radiation exposure, but not external radiation exposure.

EVACUATION

- Large Spill**
 - Consider initial downwind evacuation for at least 100 meters (330 feet).
- Fire**
 - When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.

EMERGENCY RESPONSE

FIRE

- Presence of radioactive material will not influence the fire control processes and should not influence selection of techniques.
- Move containers from fire area if you can do it without risk.
- Do not move damaged packages; move undamaged packages out of fire zone.

Small Fires

- Dry chemical, CO₂, water spray or regular foam.

Large Fires

- Water spray, fog (flooding amounts).

SPILL OR LEAK

- Do not touch damaged packages or spilled material.
- Damp surfaces on undamaged or slightly damaged packages are seldom an indication of packaging failure. Contents are seldom liquid. Content is usually a metal capsule, easily seen if released from package.
- If source capsule is identified as being out of package, DO NOT TOUCH. Stay away and await advice from Radiation Authority.

FIRST AID

- Medical problems take priority over radiological concerns.
- Use first aid treatment according to the nature of the injury.
- Do not delay care and transport of a seriously injured person.
- Persons exposed to special form sources are not likely to be contaminated with radioactive material.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Injured persons contaminated by contact with released material are not a serious hazard to health care personnel, equipment or facilities.
- Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.

APPENDIX H

NRC INFORMATION NOTICE NO. 87-31:
BLOCKING, BRACING, AND SECURING OF
RADIOACTIVE MATERIALS IN TRANSPORTATION,
JULY 10, 1987

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
WASHINGTON, D. C. 20555

July 10, 1987

NRC INFORMATION NOTICE NO. 87-31: BLOCKING, BRACING, AND SECURING OF RADIOACTIVE MATERIALS PACKAGES IN TRANSPORTATION

Addressees:

All NRC licensees.

Purpose:

This notice is provided to remind licensees of their responsibilities to ensure the proper blocking, bracing, and securing (tie-down) of radioactive materials packages being offered to a carrier, wherein transport by exclusive-use vehicle is required, or packages being transported by the licensee as a private carrier, whether by an exclusive-use or a non-exclusive-use vehicle.

It is suggested that licensees review this information for applicability to their shipping and transportation program and consider actions, if appropriate, to preclude similar problems with their shipments. However, suggestions contained in this notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

There has been evidence of inadequacies in the blocking, bracing, and securing of packages to the transport vehicle involving packaged shipments of low-specific-activity (LSA) radioactive material (radwaste) in drums or bins. The following are recent, typical examples of such inadequacies:

On April 25, 1986, an exclusive-use shipment of LSA waste from a nuclear power plant in the Midwest arrived at the Barnwell, South Carolina waste disposal site. The inspector for the State of South Carolina who was at the site observed that the three packages on the flatbed trailer had shifted in transit as a result of inadequate blocking and bracing.

On July 7, 1986, a nuclear fuel plant in the southeast made a shipment of two 10-ton uranium hexafluoride cylinders to the gaseous diffusion plant at Paducah, Kentucky. After departure, one cylinder broke free and fell from the vehicle onto the ground when the truck made a sudden stop. Contributing causes of the load separation were a faulty hold-down strap and inadequate bracing and tie-down of the cylinder and cylinder supports.

On June 5, 1986, an exclusive-use shipment of LSA waste from a nuclear plant in the South arrived at the Barnwell waste disposal site. When the State of South Carolina inspector at the site opened the closed trailer, he observed that the blocking and bracing that had been provided was inadequate to prevent the movement of some drums during transit.

In each of these instances, enforcement action was taken against the shipper for failure to comply with the Department of Transportation (DOT) regulations.

Discussion:

Section 10 CFR 71.5(a) requires that each licensee who transports licensed material outside of the confines of its plant or place of use or who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the DOT in 49 CFR Parts 170-189 for the mode of transport used. These requirements apply whether the mode of transport is by rail, air, water, or public highway.

Many packages offered for transport by licensees, including waste shipments, qualify as LSA as defined in 49 CFR 173.403(n). When packaged LSA materials are shipped by exclusive-use vehicles, the requirements in 40 CFR 173.425(b) must be met.

In addition to the limits for external radiation levels and removable contamination, the other requirements of 49 CFR 173.425(b) should be recognized by all licensees. Specifically, 49 CFR 173.425(b)(4) requires that the shipment must be loaded by the consignor (e.g., the licensee shipper) and unloaded by the consignee. Section 49 CFR 173.425(b)(6) requires that the shipment must be braced to prevent shifting under normal transportation conditions. Bracing of loads may involve blocking, shoring, tie-downs (chains and/or straps), or other restraints.

For all shipments of radioactive material requiring an exclusive-use vehicle, the licensee-shipper is responsible for assuring that the shipment is properly loaded and secured; it is not the responsibility of the driver or carrier company. In other words, in such cases, the shipper is assigned the responsibility for certain functions that are normally (for non-exclusive-use shipments) the responsibility of the carrier. Section 49 CFR 173.403(i), states that "all initial, intermediate, and final loading and unloading are to be carried out in accordance with the directions of the consignor or consignee." Blocking, bracing, and tie-downs, therefore, are considered to be a part of the loading process and the responsibility of the consignor-shipper-licensee for exclusive-use shipments. If a load shifts during normal transport, the licensee bears the responsibility and may be subject to enforcement actions under 10 CFR 2 when violations occur. In some cases, the carrier may perform inspections of tie-down provisions during transport. The applicable instruction provided by the shipper to the carrier for maintenance of exclusive-use shipment control may provide guidance on this subject.

Pursuant to 49 CFR 177.842(d), radioactive materials packages must be blocked and braced such that they cannot change position during conditions normally incident to transportation. This requirement applies to common or contract

(i.e., "for-hire" carriers) and private carriers. Therefore, whether or not the shipment is by exclusive-use vehicle, the requirement applies to licensees that are transporting packages and acting as both a shipper and a private carrier; e.g., radiographers, well logging companies, radiopharmacy suppliers, waste brokers, etc.

For shipments offered by a licensee-shipper to a common carrier; e.g., partial loads in a vehicle that is not for exclusive-use, the carrier is ultimately responsible for the proper blocking, bracing, and securing of the package. All too frequently, incidents occur wherein packages are thrown onto the roadway and lost because of the carrier's failure to properly secure the load and/or failure to secure the cargo door. In such cases, the carrier may be subject to enforcement actions by the DOT or a State regulatory authority.

Actions taken by licensees to ensure that shipments are properly loaded and braced have included written loading procedures with detailed checklists and quality control oversight and release requirements. When a licensee ships several types of packages, detailed procedures with a checklist have been prepared for each. The applicable certificate-of-compliance for an NRC-certified package may sometimes contain prescriptions for package tie-down arrangements.

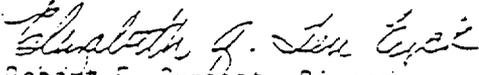
Specific regulatory and technical standards for tie-down of packages to transport vehicles may be found in:

§49 CFR 393.100, 393.102, and 393.104 - for motor vehicles;

§10 CFR 71.45(b) - applicable to tie-down attachment points that are structural components of radioactive packages that are subject to the Package Approval Standards of Subpart E of 10 CFR 71;

ANSI N-14.2 - Proposed American National Standard "Tie-down for Truck Transport of Radioactive Materials" (currently in the form of Draft 5, Revision 2, September 2, 1986, and available from the Secretary, NRC Committee, International Energy Associates Limited, 3211 Jermentown Road, Fairfax, Virginia 22030).

No written response to this information notice is required. If you have any questions regarding this matter, please contact the Regional Administrator of the appropriate NRC regional office or this office.


for Robert F. Burnett, Director
Division of Safeguards and Transportation
Office of Nuclear Material Safety
and Safeguards

Technical Contact: A. W. Grella, NMSS
(301) 427-4709

Attachment: List of Recently Issued NRC Information Notices

APPENDIX I

IAEA CERTIFICATION OF COMPETENT AUTHORITY SPECIAL FORM
RADIOACTIVE MATERIALS CERTIFICATION NUMBER USA/0531/S,
REVISION 0



U.S. Department
of Transportation

**Research and
Special Programs
Administration**

**IAEA CERTIFICATE OF COMPETENT AUTHORITY
SPECIAL FORM RADIOACTIVE MATERIALS
CERTIFICATE NUMBER USA/0531/S, REVISION 0**

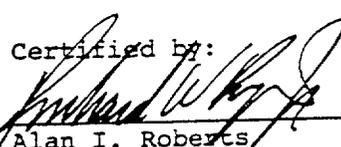
400 Seventh Street, S.W.
Washington, D.C. 20590

This certifies that the source described has been demonstrated to meet the regulatory requirements for special form radioactive material as prescribed in the regulations of the International Atomic Energy Agency¹ and the United States of America² for the transport of radioactive materials.

1. Source Identification - Model DSK 2384
2. Source Description - The source is a double encapsulation of 316 L stainless steel sealed by inner gas weld with outside diameter of 12.5 mm (0.49 in) by 53 mm (2.1 in) long. The source is manufactured in accordance with ORNL drawing No. DSK 2384 (attached).
3. Radioactive Contents - Source consists of not more than 4.8 Tbq (130 Ci) of Cs 137 in the form of Cesium Chloride pellets.
4. Quality Assurance - Records of Quality Assurance activities required by Paragraph 209 of the IAEA regulations¹ shall be maintained and made available to the authorized officials for at least three years after the last shipment authorized by this certificate. Consignors and consignees in the United States exporting or importing shipments under this certificate shall satisfy the requirements of Subpart H of 10 CFR 71.
5. Expiration Date - This certificate expires August 31, 2002.

This certificate is issued in accordance with paragraph 703 of the IAEA Regulations and Section 173.476 of Title 49 of the Code of Federal Regulations, in response to the petition and information dated February 12, 1997 and June 17, 1997 submitted by Federal Emergency Management Agency, Washington, DC, and in consideration of other information on file in this Office.

Certified by:


Alan I. Roberts

Associate Administrator for Hazardous Materials Safety

AUG 27 1997

(DATE)

Revision 0 - Original design approval.

1 "Safety Series No. 6, Regulations for the Safe Transport of Radioactive Materials, 1985 Edition, as amended 1990", published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

2 Title 49, Code of Federal Regulations, Parts 100 - 199, United States of America.

APPENDIX J

SHIPMENT OF RADIOACTIVE
MATERIALS UNDER FEMA'S DOT EXEMPTION

**SHIPMENT OF RADIOACTIVE MATERIALS
UNDER FEMA'S DOT EXEMPTION**

(format copy)
(shipmstr.doc)

(file name s_xx_yy.doc)
xx = state being shipped from
yy = state being shipped to

Table of Contents

1. Checklist for Shipping CDV-794 Calibrator
2. Part A: Transfer of radioactive items from state/agency to FEMA for shipment under FEMA's DOT Exemption. (xx)
3. Part B: Transfer (grant) of radioactive material to state/agency after shipment under FEMA's DOT exemption. (yy)

CHECKLIST FOR SHIPPING

CDV-794, CALIBRATOR

CDV-794, Serial Number _____, RAM ID Number _____,

Shipped from _____, to _____.

- ___ 1. Copy of wipe test data from state/agency transferring calibrator to FEMA.
- ___ 2. Copy of license of state/agency transferring calibrator to FEMA.
- ___ 3. Copy of license of state/agency receiving calibrator.
- ___ 4. Letter transferring calibrator from state/agency to FEMA (Shipment doc, part a).
- ___ 5. Letter transferring calibrator from FEMA to receiver (Shipment doc, part b).
- ___ 6. Shipping papers to ship calibrator from state/agency transferring calibrator to state/agency receiving calibrator.

794check.doc

Part A: Transfer of radioactive items from state/agency to FEMA for shipment under FEMA's DOT Exemption. (xx)

inside address
ATTN:

Dear :

SUBJECT: Receipt and Transfer of Radioactive Material

This is to acknowledge the receipt and transfer on --- of the following radioactive materials from --, (NRC/Agreement State) License number ---to the Federal Emergency Management Agency (FEMA). -FEMA has an NRC license number 08-01297-06 authorizing possession of these items.

Items transferred to FEMA:

One (1) CDV-050, Check Source, serial number __, originally containing 50 nanocuries of Cesium-137, (FEMA RAM ID Number __).

One (1) CDV-757, Barrier Shielding Demonstrator, serial number __, originally containing 1 millicurie of Cesium-137, (FEMA RAM ID Number __).

One (1) CDV-784, Source set, serial number __, originally containing 30 millicuries of Cobalt-60, (FEMA RAM ID Number __).

One (1) CDV-790, Calibrator, serial number __, originally containing 16 millicuries of Cesium-137, (FEMA RAM ID Number __).

One (1) CDV-794, Calibrator, serial number __, originally containing 130 Curies of Cesium-137, (FEMA RAM ID Number __).

One (1) CDV-797, Calibrator, serial number __, originally containing 15 millicuries of Cesium-137, (FEMA RAM ID Number __).

One (1) CDV-999, _____, serial number _____, originally containing _____ of _____, (FEMA RAM ID Number _____).

Total of _ item(s) as listed above.

If you should have any questions concerning this transfer of radioactive materials, please contact Philip McIntire at (202)646-3567 or Carl Siebentritt at (540)542-2100.

Sincerely:

Date _____

Vernon L. Wingert
Chairperson, FEMA Radiation Control Committee

Distribution:

Addressee
FEMA Region
FEMA Radiation Control Committee
File

s_xx_yy.doc (part a)

Part B: Transfer (grant) of radioactive material to state/agency after shipment under FEMA's DOT exemption. (yy)

Inside address
ATTN line last

Dear _____:

SUBJECT: Transfer of Radioactive Material

Upon receipt of shipment, this letter transfers title and ownership of the radioactive materials listed below from FEMA (NRC License number 08-01297-06) to the addressee. This transfer has been coordinated through FEMA's Office of General Council. You have furnished FEMA a copy of your (NRC/Agreement State) License number --- authorizing possession of these items.

Please have an authorized individual sign and return one of the original copies to Vernon Wingert, Chairperson, FEMA Radiation Control Committee, Federal Emergency Management Agency, PT-SL, 500 C Street S.W., Washington, DC 20472. By this signature, you acknowledge possession and accept the title and ownership of the radioactive materials listed below; assume full responsibility for all Nuclear Regulatory Commission or Agreement State licensing requirements; and the ultimate disposal of these materials.

Item(s) being transferred:

One (1) CDV-050, Check Source, serial number __, originally containing 50 nanocuries of Cesium-137, (FEMA RAM ID Number __).

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One (1) CDV-793, Calibrator (UDM-1A), serial number -, originally containing 120 Curies of Cesium-137, (FEMA RAM ID Number ---).

One (1) CDV-794, Calibrator, serial number __, originally containing 130 Curies of Cesium-137, (FEMA RAM ID Number __).

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Sincerely:

Date

Vernon L. Wingert
Chairperson, FEMA Radiation Control Committee

RECEIPT:

I hereby acknowledge the transfer of title and ownership of the radioactive material listed above.

Authorized Individual for Addressee:

Date

Name
Title

Enclosure:

- Second original of letter
- Return envelope

Distribution:

- Addressee (2 copies, one signed original to be returned to FEMA)
- FEMA Region
- FEMA Radiation Control Committee
- File

s_xx_yy.doc (part b)

SHIPMENT OF RADIOACTIVE MATERIALS

UNDER FEMA'S DOT EXEMPTION

(format copy)
(shipmstr.doc)

(file name s_xx_yy.doc)
xx = state being shipped from
yy = state being shipped to

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794check.doc

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One (1) CDV-797, Calibrator, serial number __, originally containing 15 millicuries of Cesium-137, (FEMA RAM ID Number __).

One (1) CDV-999, _____, serial number _____, originally containing _____ of _____, (FEMA RAM ID Number _____).

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Sincerely:

Date _____

Vernon L. Wingert
Chairperson, FEMA Radiation Control Committee

Distribution:

- Addressee
- FEMA Region
- FEMA Radiation Control Committee
- File

s_xx_yy.doc (part a)

Part B: Transfer (grant) of radioactive material to state/agency after shipment under FEMA's DOT exemption. (yy)

Inside address
ATTN line last

Dear _____:

SUBJECT: Transfer of Radioactive Material

Upon receipt of shipment, this letter transfers title and ownership of the radioactive materials listed below from FEMA (NRC License number 08-01297-06) to the addressee. This transfer has been coordinated through FEMA's Office of General Council. You have furnished FEMA a copy of your (NRC/Agreement State) License number --- authorizing possession of these items.

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One (1) CDV-794, Calibrator, serial number , originally containing 130 Curies of Cesium-137, (FEMA RAM ID Number).

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Sincerely:

Date _____
Vernon L. Wingert
Chairperson, FEMA Radiation Control Committee

RECEIPT:

I hereby acknowledge the transfer of title and ownership of the radioactive material listed above.

Authorized Individual for Addressee:

Date _____
Name _____
Title _____

Enclosure:

- Second original of letter
- Return envelope

Distribution:

- Addressee (2 copies, one signed original to be returned to FEMA)
- FEMA Region
- FEMA Radiation Control Committee
- File

s_xx_yy.doc (part b)

Attachment 2

STATE LETTERS

(December 19, 2000)

Correspondence is enclosed to support public health and safety concerns expressed in the SA&ER regarding the potential impact of FEMA's exemption request upon the 7 States which currently have CDV-794 calibrators and which have requested FEMA to remove them. The 7 States are as follows:

1. Georgia
2. Hawaii
3. Kentucky
4. North Carolina
5. New York
6. Ohio
7. Montana



ROY E. BARNES
GOVERNOR

OFFICE OF THE GOVERNOR

Georgia Emergency Management Agency

P.O. Box 18055
Atlanta, Georgia 30316-0055
Tel: (404) 635-7000
In Georgia 1-800-TRY- GEMA
FAX: (404) 635-7205



GARY W. McCONNELL
DIRECTOR

(For SF Files)
GA.

May 2, 2000

Mr. Vernon Wingert
Chairperson, Radiation Control Committee
Federal Emergency Management Agency
500 C Street, SW
Washington, DC 20472

Dear Mr. Wingert:

I have just discussed with Mr. Ralph Myer the Federal Emergency Management Agency's (FEMA) radioactive calibration sources that are currently stored at the Georgia Emergency Management Agency (GEMA).

At Mr. Myers' recommendation, I want to reconfirm with you that GEMA has two FEMA sources, one CDV - 794, Model 2 calibrator and one CDV-790, Model 1 calibrator.

It is understood that funds have been appropriated for FY 2001, enabling FEMA to reclaim these sources by the end of calendar year 2000 and we look forward to that end. We are currently required to store these sources under a somewhat tenuous condition.

Thank you for your continuing assistance in a prompt retrieval of these sources.

Sincerely,

PATRICK COCHRAN
Radiological and Hazardous Materials

NOTE: Copies of an email message to Pat Cochran (State of Georgia) and 4 photographs are attached. This email and the photographs pertain to the storage of a CDV-794 calibrator and other sources within a steel structure (6' x 6' x 10') with radioactive labels affixed to the structure which is located in a parking lot with no controlled access.

12/20/2000

Pat Cochran (State of Georgia)

Pat:

Thank you for taking time to brief me on 12/14/2000, on the current status of the CDV-794 calibrator in the possession of the State of Georgia. Based on this conversation, I am concerned about the storage of this calibrator and other sources currently in the State of Georgia's possession and under the State's license with the NRC Agreement State Office which I believe is the Georgia Department of Natural Resources/Environmental Protection Division (EPD).

In your letter of May 2, 2000, a statement was made that the calibrator and other sources are stored "under a somewhat tenuous condition". When Ralph Myers of my staff contacted you about this statement and reported back to me, I understood that while the calibrator and sources were being stored outside within a large protected structure that the parking lot in which the structure was located had controlled access. From our conversation on 12/14, I understood you to say that the sources are being stored within a protected 6' x 6' x 10' steel structure with a lock with appropriate radioactive labels and notice on the outside of the structure but that the structure was located in a parking lot without controlled access. Thank you for sending the 4 digital photographs after our conversation on 12/14. These photographs reinforce what you told me about the structure and lack of controlled access.

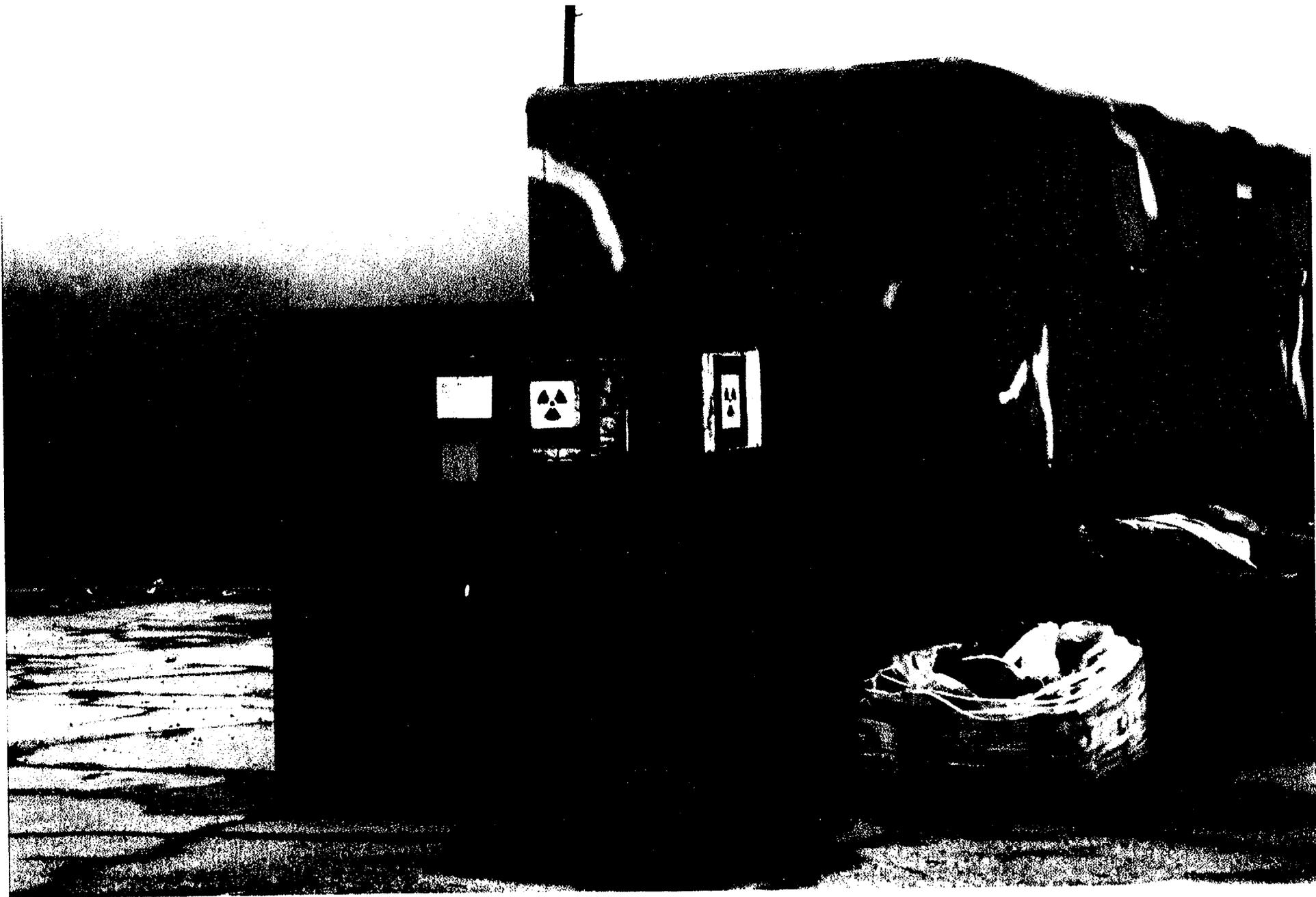
Based on our most recent conversation of 12/18, I understand that the State of Georgia has contacted the State of Georgia EPD and informed EPD staff of the current conditions under which the calibrator and sources are being stored outside of the State facility. Further, I understand from my conversation with you that the Georgia EPD has informed the State that the EPD is not pleased with how the sources are being stored in a parking lot, the storage of the sources in the manner described above is not in violation of the State's license.

As I indicated to you, FEMA has been working with the NRC over the last 18 months to obtain an exemption from the Commission to ship this and other calibrators currently located with State organizations. I want to let you know that I am providing copies of the referenced photographs and a copy of this email to the NRC as documentation to support the urgent need for our exemption so that we can remove this calibrator and others currently located in State facilities.

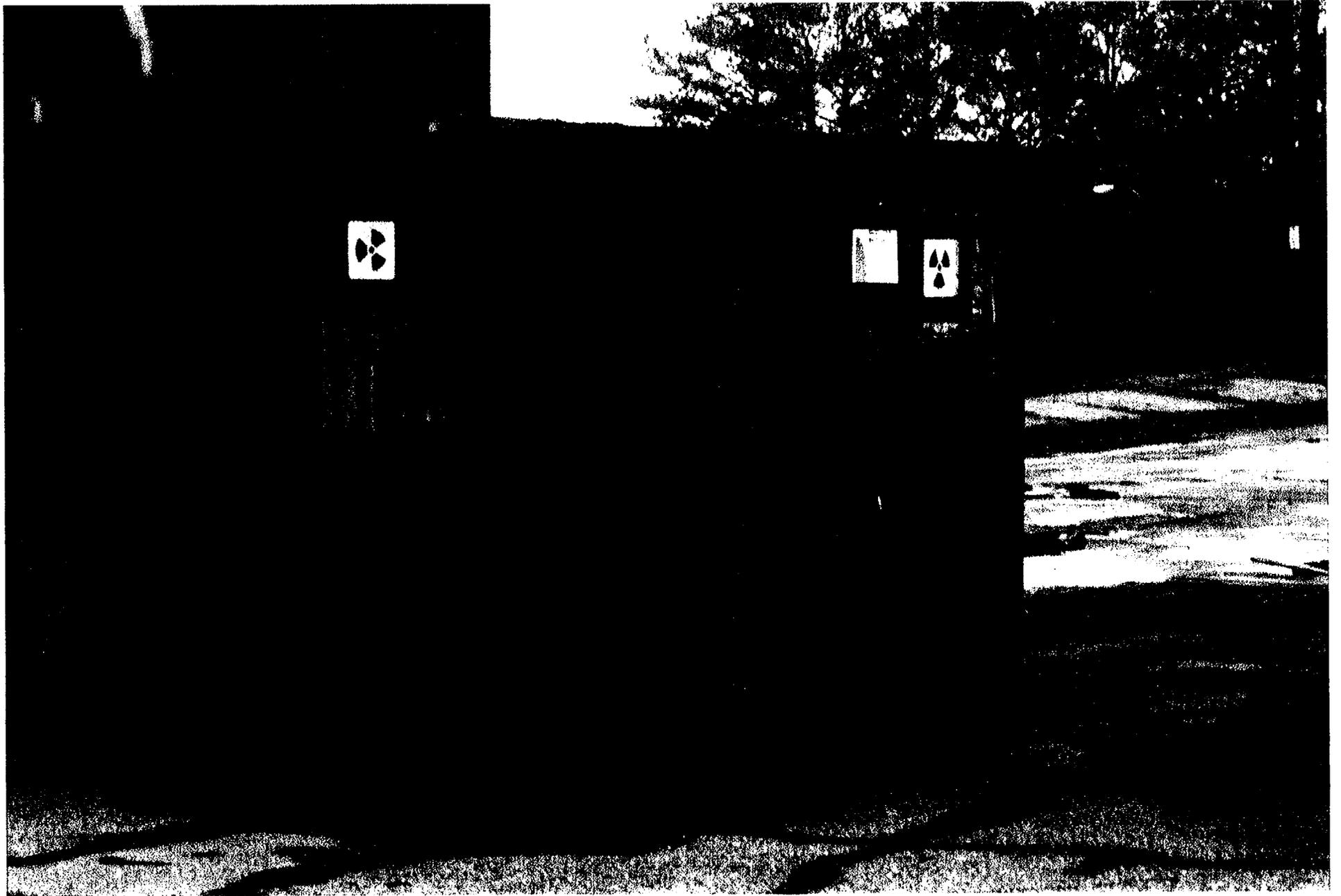
Sincerely,

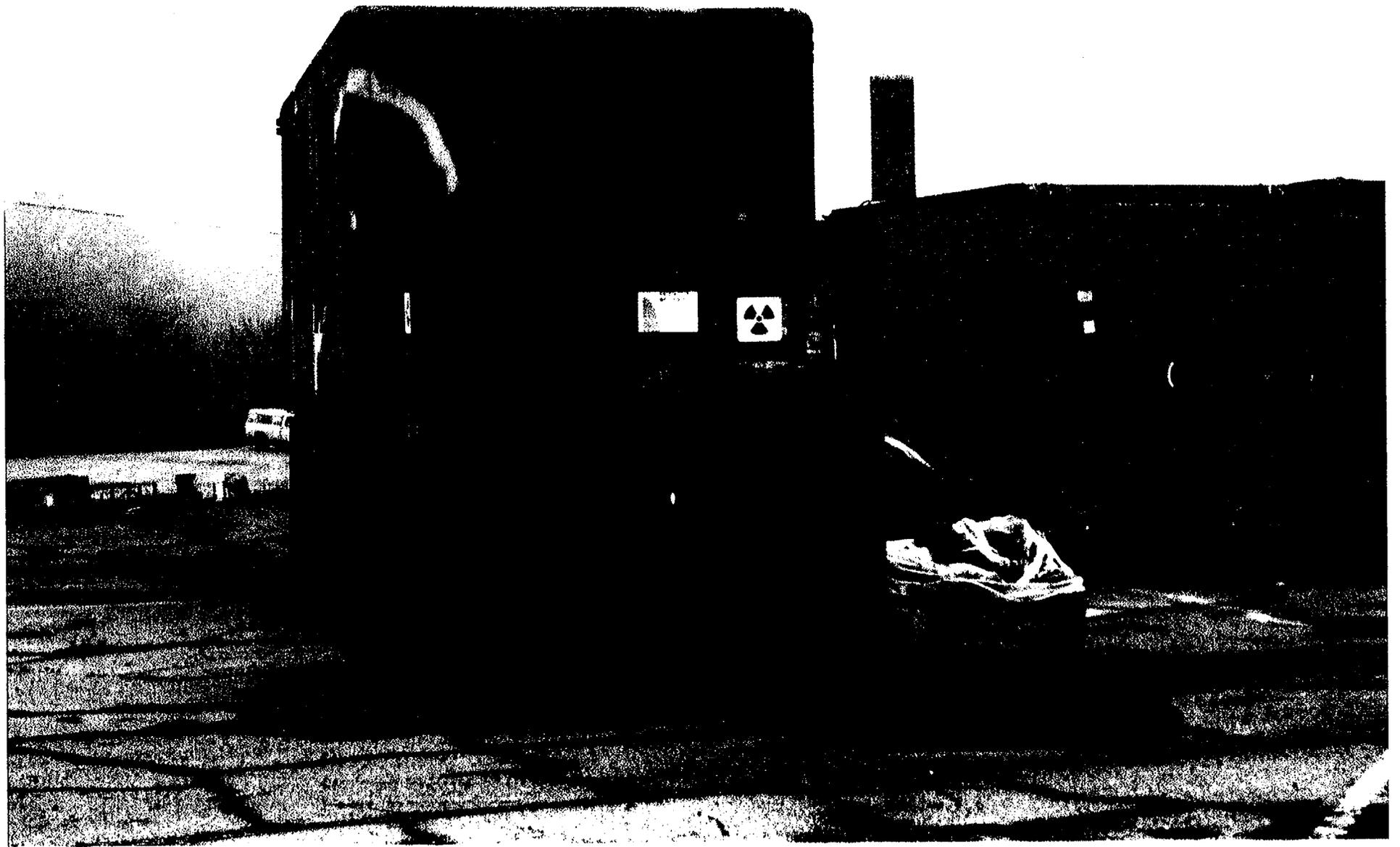
Vern Wingert (FEMA: 202-646-2872)

P.S. I will be on vacation until January 8th, in the meantime, if you need to contact me, please send an email to me at the following address: WingertV@aol.com









BENJAMIN J. CAYETANO
GOVERNOR

ADJUTANT GENERAL EDWARD V. RICHARDSON
DIRECTOR OF CIVIL DEFENSE

ROY C. PRICE, SR.
VICE DIRECTOR OF CIVIL DEFENSE



STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
3349 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495



PHONE (808) 733-4300

FAX (808) 733-4267

June 22, 1999

Ms. Martha Z. Whetstone
Regional Director, Region IX
Federal Emergency Management Agency
Building 105
P. O. Box 29998
Presidio of San Francisco, CA 94129

Dear Ms. Whetstone:

The State of Hawaii is discontinuing the radiological meter calibration program due to lack of funding. Enclosed is a listing of radioactive sources received from the Federal Emergency Management Agency.

Please provide funding and shipping instructions for these sources.

Sincerely,

ROY C. PRICE, SR.
Vice Director of Civil Defense

Enc.

REF: kw
cc: Mr. Fronczkowski

NOV 22

Fax FOR:
RALPH MYERS
FROM: GETARCA
JCTARCS
RIX

SUBJ: HAWAII'S
LETTER
TOTAL PAGES: 2

HAWAII

	<u>TYPE</u>	<u>SERIAL NO.</u>	<u>MODEL NO.</u>	<u>RAM ID NO.</u>	<u>ISOTOPE</u>
1.	CDV-784	312	5	1002	60 Co. Trng. Source
2.	CDV-784	313	5	1001	" " "
3.	CDV-784	314	5	1003	" " "
4.	CDV-784	451	5	1005	" " "
5.	CDV-784	497	5	1004	" " "
6.	CDV-757	68	1	1007	137 Cs Demo. Unit
✓ 7.	CDV-790*	117	1	2264	137 Cs Cal. Unit
8.	CDV-794	48	2	43	137 Cs " "
9.	CDV-798	6	1	1006	137 Cs " "

*We acknowledge the transfer and ownership of the CDV-790 calibration unit on April 22, 1998.

Leaves 8 Total Sources in Hawaii To Be
Transferred/Disposed (Including one (1)
High-Level CDV-794 Calibration)



COMMONWEALTH OF KENTUCKY
DEPARTMENT OF MILITARY AFFAIRS
DIVISION OF DISASTER AND EMERGENCY SERVICES

Frankfort
40501-6168



December 26, 1996

Mr. Steve Brown
FEMA Region IV
Federal Regional Center
Thomasville, GA 31792

Dear Mr. Brown:

In response to continuing changes in the posture of the Federal Emergency Management Agency (FEMA) regarding the Radiological Defense Program (RADEF), I have determined that it is necessary for Kentucky to terminate this program. All unessential program activities have been terminated. That decision is made with regret since my staff and I believe the RADEF program has merit, representing the only existing basis for re-establishing an effective civilian program for monitoring and evaluating radiological threats. The need for such a "baseline" program remains yet without FEMA funding and technical support Kentucky cannot maintain a viable program.

Based on this decision, Kentucky proposes to return custody of federally-owned radioactive materials back to FEMA. Please provide information needed for shipping four (4) radioactive sources to a permanent storage facility. I understand the State of Ohio will accept repair parts and test equipment presently in our possession. However, Ohio will not accept Kentucky's stock of radiological instruments. Please provide instructions for disposal of these instruments.

In addition, my staff and I are concerned about disposal of the radium check-sources that have been removed from damaged CDV-700 case bottoms. Please forward as soon as possible information on funding and procedures for disposal of these check-sources.

Finally, please advise in regard to FEMA funding for closure of this program. My staff advises that funding is needed to transport four radioactive sources, to transport repair parts and test equipment to Ohio and for disposal of remaining RADEF materials and equipment.

Cordially,


W.R. Padgett
Executive Director



North Carolina Department of Crime Control and Public Safety
Division of Emergency Management

James B. Hunt Jr., Governor

Richard H. Moore, Secretary

April 6, 1998

Mr. Ralph Myers
Federal Emergency Management Agency
500 C Street, SW
Washington, DC 20472

Dear Mr. Myers:

The North Carolina Division of Emergency Management went through a major reorganization late last summer, at which time it was decided to close our Radiological Instrument Maintenance and Calibration Shop. On September 30, 1997, our shop was officially closed. We therefore do not have a need to accept ownership of any of the FEMA owned radioactive materials currently on loan to the state.

We will be waiting to hear from someone with FEMA concerning the return of all radioactive sources. We will assist you with this project in any way we can.

Sincerely,

A handwritten signature in black ink, appearing to read "Eric L. Tolbert".

Eric L. Tolbert
Director

ELT:mm



Edward F. Jacoby, Jr., Director

New York State Emergency Management Office

1220 Washington Avenue
Building 22, Suite 101
Albany, NY 12226-2251

RECEIVED - REGIONAL
1997 MAR -6 A 9:41 P 9:27

February 28, 1997

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Dear Ms. Canton:

Thank you for your letter informing of the closing of the National Instrumentation Center at Mt. Weather. Although nuclear attack is not a major focus of our programs, radiological preparedness is a top priority for New York State. Therefore, I feel it is important to continue to provide an instrumentation service program. However, there is a need to modify the current program. I have decided to keep some of the calibrators and radioactive sources. These are listed below:

TYPE	SERIAL#	RAMID#	ISOTOPE
CDV-794	036	57	CS137
CDV-790	297	2147	CS137
CDV-50	7	1511	CS137
CDV-999	94	217	PU239

We are interested in obtaining an additional CDV-790 to be used for the calibration of the CDV-700 geiger counting survey meters.

There is no interest in accepting legal transfer for the remaining sources. These are identified and listed below:

TYPE	SERIAL #	RAMID #	ISOTOPE
CDV-794	007	6	CS137
CDV-793	102	216	CS137
CDV-797	2	2114	CS137
CDV-999	0	219	SR90
CDV-999	0	218	SR90
CDV-999	0	220	SR90
CDV-999	405	223	CO60

DESCRIBE
OTHERS.

In addition, we possess several low level sources that we obtained over the years to support the program. I feel that FEMA has a responsibility for their disposal. Some of these sources include the check source of older geiger counters, water standards and others. I would be happy to provide any information necessary that would facilitate this.

If you need additional information please contact Michael Trier, Supervisor of the Radiation Instrument Facility at 518-457-9972.

Sincerely,



Edward F. Jacoby, Jr.



Dale Shipley
Deputy Director
Emergency Management Agency
2855 West Dublin-Granville Road
Columbus, OH 43235-2206
(614) 889-7150

OHIO DEPARTMENT OF PUBLIC SAFETY

- Administration
- Ohio State Highway Patrol
- Bureau of Motor Vehicles
- Division of Emergency Medical Services
- Emergency Management Agency

December 31, 1996
JAN 08 RECD

Stuart A. Rifkind, Director
Preparedness, Training & Exercise Division
Federal Emergency Management Agency, Region V
175 West Jackson Blvd., 4th Floor
Chicago, Illinois 60604

Dear Mr. Rifkind;

In response to your letter dated December 23, 1996, Ohio Emergency Management Agency has assessed the need for the possession of radioactive sources and has made the following decisions:

A. Ohio EMA will return the following for disposal:

<u>TYPE</u>	<u>SERIAL</u>	<u>RAMID #</u>
CDV-784	66	990
CDV-784	54	1243
CDV-784	105	1261
CDV-784	116	1245
CDV-784	148	1246
CDV-784	160	1248
CDV-790	618	2145
CDV-794	9	22
CDV-794	62	24

Ohio EMA does not possess CDV-784 serial 85, RAM 1264. This is a duplicate of CDV-784 RAM 623 that was transferred to Mt. Weather in October of 1996. (See attachment) Also, Ohio EMA does not possess CDV-50 Serial 0 RAM 44. This Indiana Source was never given to Ohio. In any case, the 50 nano curies of CS-137 is much less than licensable material.

B. Ohio EMA will retain and license the following:

<u>TYPE</u>	<u>SERIAL</u>	<u>RAMID #</u>
CDV-50	10	838
CDV-50	58	26

Mission Statement

...to save lives, reduce injuries and economic losses on the streets and highways of Ohio, and to regulate driver licensing and vehicle registration with the most cost effective methods available.



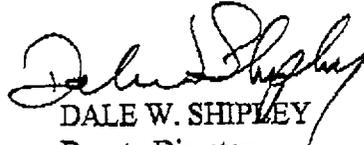
DATE: December 31, 1996

<u>TYPE</u>	<u>SERIAL</u>	<u>RAMID #</u>
CDV-784	99	1275
CDV-784	188	1249
CDV-784	227	1251
CDV-784	233	1252
CDV-784	234	1253
CDV-784	456	992
CDV-790	319	2156
CDV-790	544	2162
CDV-794	8	10
CDV-794	56	63
CDV-999	0	2275
CDV-999	0	2276

Please have someone contact Dan Redman at (614) 688-3363 as to the method of transport for the sources listed above.

FAX 614 688-2183

Sincerely,


DALE W. SHIPLEY
Deputy Director

Encl.: as stated

DS:sla

Author: Tracy Sondéen at ~R8-REGN08(N)

Date: 8/8/97 4:44 PM

Priority: Normal

Receipt Requested

- TO: Carl Siebentritt at ~HQ-HQEICC(P), Philip McIntire at ~HQFENF3

Subject: Rad Source shipping funds

The State of Montana has verbally indicated their intent to return their rad source to FEMA. The State Director has asked if we can obtain funds to ship it back to you. Ideas?

He also mentioned they would be working on a pilot project with DOE re: State Hazardous Materials response plan and for a contract with DOE to do Radiological Risk Analysis for the State. He said DOE was flush with funds right now. Are either of you familiar with this? Please share! Thanks, Tracy

February 28, 1997

Carl:

These are notes from a conversation I had with Dan Poore, the Radef officer in Montana DES. Can you provide some responses to these questions for me? If you answer him directly via his e-mail address, please cc a copy of your response to me.

Thanks, Tracy

Dan Poore - Montana

dpoore@mt.gov

Keeping some radef items, but making some changes in the extent of their involvement. The State needs to make sure they can turn in the CDV-794 (1). They will keep the low range survey meter (CDV-790) and check source for leak tests, and some dosimeters. 715's high range meter dosimeters, changes are all in the field. They have 700-900 kits. Montana will not have any use for them and does not have any place to store them in Montana. They would need to ship them immediately upon receiving them in the State office.

Can Montana ship them to FEMA? What are the appropriate procedures? What time frame are we talking about? How long does Montana have to get them where FEMA wants them to go?

Can Montana still ship the CDV-794? How do they pay for the shipping? What about a container to ship it in?