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DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

49 CFR Part 173

[Docket No. HM166P; Notice No. 82-8]

Radiation Level Limits for Exclusive Use Shipments of Radioactive Materials

AGENCY: Material Transportation Bureau, Research and Special Programs Administration, DOT.

ACTION: Notice of proposed rulemaking.

SUMMARY: The Materials Transportation Bureau (MTB) proposes to amend a section of the Hazardous Materials regulations (HMR) to state more explicitly the external radiation level limitations applicable when radioactive materials are transported under provisions for exclusive-use shipments. The existing wording of § 173.393(j) has resulted in interpretations by shippers, carriers and others which are not consistent with regulatory intent, and has contributed to some cases of noncompliance. The proposed amendment is intended to eliminate apparent inconsistencies in radiation safety that might result from misinterpretation of limitations for "open" and "closed" transport vehicles.

The maximum allowable radiation level for radioactive material packages transported under exclusive-use provisions is proposed to be reduced to 1000 millirem per hour at the surface of the package instead of at one meter from the package. This is consistent with international safety standards and charges MTB and the Nuclear Regulatory Commission proposed in 1979 (44 FR 1852 and 44 FR 48234, respectively). During transportation, it is also proposed to establish radiation level limitations referenced to points on and near accessible external surfaces of the vehicle or load. They are, 200 millirem per hour at the surface and 100 millirem per hour at a distance of 2 meters. This would eliminate consideration of imaginary planes projected from edges of "open" transport vehicles. The proposed amendment would also clarify requirements applicable to private carriers when excepted from the radiation level limitation of 2.0 millirem per hour in normally occupied spaces, such as cabs or sleeper compartments of trucks.

The definition of "exclusive-use" in § 173.389(o) would be modified by adding radiological safety capabilities for qualification as a "designated agent"

involved in loading and unloading operations under "exclusive-use" provisions.

DATE: Comments are due on or before December 6, 1982.

ADDRESS: Send comments to Dockets Branch, Materials Transportation Bureau, Department of Transportation, Washington, D.C. 20590, (202) 426-3148. Comments should identify the docket number, and five (5) copies should be submitted. The Dockets Branch is located in Room 8426, Nassif Building, 400 Seventh Street, SW., Washington, D.C. 20590. Office hours are from 8.30 a.m. to 5:00 p.m., Monday through Friday.

FOR FURTHER INFORMATION CONTACT:

A. Wendell Carriker, Office of Hazardous Materials Regulation, Materials Transportation Bureau, 400 Seventh Street, SW., Washington, D.C. 20590, (202) 426-2311

SUPPLEMENTARY INFORMATION:

I. Basis for Proposed Rule

1. Background

The radiation level limitations for exclusive use, or full-load, shipments of radioactive materials have been a part of domestic and international regulatory standards for many years. MTB published a notice of proposed rulemaking (NPRM), Docket HM-169, in the *Federal Register* (44 FR 1852) on January 8, 1979, which includes a broad historical relationship between DOT and the International Atomic Energy Agency (IAEA) regulatory standards. Without extensive elaboration about radiation levels for exclusive-use shipments, HM-169 proposed changes which include restricting packages to 1000 millirem per hour at any point on the surface rather than 1000 millirem per hour at one meter from any point on the package surface. Other minor proposals in HM-169 related to external radiation levels for exclusive-use shipments are mainly nonsubstantive, rewordings of existing provisions.

Subsequent to issuance of the NPRM in HM-169, there have been a number of requests for interpretation of § 173.393(j) with respect to "open vehicles" and "closed vehicles" operating under exclusive-use conditions. The meaning and application of § 173.393(j) have been difficult to interpret for purposes of compliance and enforcement. It was determined by both the Department of Transportation and the Nuclear Regulatory Commission (NRC) in meeting with representatives of the nuclear industry that even the wording of the changes proposed in Docket HM-169 does not adequately clarify the issues, and further consideration is needed.

Another area of confusion in interpretation involves the relationship between § 173.393(j) and § 177.842(a). Some carriers and shippers erroneously concluded that the exception in § 177.842(a) from the total transport index limitation of 50 per vehicle for packages complying with § 173.393(i) is applicable to their operation, provided the radiation levels on and around their vehicle are within the limits of § 173.393(j) (2), (3) and (4). That misinterpretation stems from a failure to consider the first sentence in § 173.393(j) as presently written, which excludes packages meeting limits of § 173.393(i).

2. Applications Concept

The provisions of § 173.393(j) are intended to apply to special conditions which consider radiation safety aspects of the shipment and the resulting radiation exposures. When package radiation levels exceed the limits of § 173.393(i), the package may be shipped if the shipper assumes certain carrier responsibilities and makes arrangements with the carrier to maintain the required exclusive-use conditions, wherein radiation levels of the vehicle and not just the packages are considered.

Similarly, shippers make arrangements with carriers for exclusive-use shipments of some packages of radioactive materials that are classified as fissile or low specific activity. For the more common non-exclusive use shipments, the primary mechanisms for controlling radiation exposure of carrier personnel are: (1) package radiation limits specified in § 173.393(i), (2) the total transport index of the packages in the vehicle, and (3) their separation distance from normally occupied spaces. However, when reasonable radiation level reduction efforts do not achieve § 173.393(i) limits, packages may be transported in exclusive-use vehicles with radiation exposure controlled by limiting radiation levels on and near the vehicles, as well as the package, and by the imposed exclusive-use shipment controls.

Basically, the proposed radiation level limitations for packages and vehicles in § 173.393(j) would apply to shipments of radioactive materials only when the package surface radiation level or transport index limits exceed the § 173.393(i) limits and some other method of controlling radiation exposure is necessary.

3. Package Limits

The existing limitation of 1000 millirem per hour at one meter from the surface of the package is considered to be unsatisfactory. IAEA standards in effect since 1973 have set a limit of 1000

millirem per hour at the surface of the package, and the United States is the only major industrialized country that has not yet adopted the IAEA standards. A soon to be issued final rule under HM-169 is expected to impose the limit of 1000 millirem per hour at the package surface.

Without a package surface limitation, it is hypothetically possible for a package of minimum dimensions (4" x 4" x 4") to have radiation levels near 400 rem per hour at the surface and still meet a limit of 1000 millirem per hour at one meter. In the interest of safety for carrier personnel, emergency services personnel, and the public, the 1000 millirem per hour at the surface is considered to be a more appropriate limit. At the present time, most exclusive-use shipments are probably restricted by vehicle radiation level limits rather than by package radiation level limits.

If a packaging design is such that it cannot be offered for transport as a package in full compliance with the HMR because the surface radiation level is too high, then the activity of its contents must be lowered, or the unit must be provided with additional shielding. The new configuration must satisfy all requirements of a package before it may be offered for transportation.

4. Accessible Surface Limits

It is proposed that external radiation level limits for vehicle and/or package be established with respect to accessibility by personnel during transport. Establishing limits with respect to readily accessible surfaces should eliminate most interpretative difficulties and discrepancies present in existing provisions for "open" and "closed" vehicles in the current regulations. The basic concern is to establish a maximum rate of exposure that might be received by any transport worker, or general public personnel, and for "open" and "closed" vehicles.

Controls established by the shipper for exclusive-use transport of a package with surface levels above 200 millirem per hour or a transport index above 10 would, in many cases, include the use of a "closed transport vehicle" (see § 173.389(q)) to achieve radiation levels on external surfaces at or below 200 millirem per hour. In some cases, in lieu of a permanently enclosed vehicle, the shipper may make arrangements with a carrier to use a flatbed trailer or other "open" vehicle and convert it to a "closed transport vehicle" by means of permanent or temporary personnel barriers. This conversion must be within the basic carrier safety requirements

(such as tie downs, blocking and bracing, materials integrity, etc.). As proposed, the package radiation level limitation for a package within such a personnel barrier would be 1000 millirem per hour at the surface. All readily accessible external surfaces of the vehicle or the barrier could not exceed the 200 millirem per hour limit. Another example of such an arrangement is an "open" vehicle which employs barriers that do not result in the vehicle being converted to a "closed transport vehicle," but still it achieves radiation levels which do not exceed the 200 millirem per hour limit at readily accessible surfaces. An example of this is the use of shielded outer packages such as casks which are commonly used to transport drums of low specific activity (LSA) waste.

It is emphasized that the 200 millirem per hour is a maximum not a goal. In keeping with the principle of "as low as reasonably achievable" (ALARA), the radiation levels at all accessible surfaces (sides, ends, top, and bottom) should be kept ALARA.

In the existing regulations, the absence of a stated radiation level limit at the vertical planes projected from the lateral edges of a package being carried on an open transport vehicle is also believed to be a significant omission. The proposed revision should eliminate the problem and reduce misinterpretations.

5. Two Meters From Accessible Surfaces Limits

The proposed limitation of 10 millirem per hour at any point two meters from any accessible external surface of the vehicle or load constitutes no significant change from existing rules for most conventional closed vehicles such as vans, but it would restrict slightly the presently allowed radiation levels for packages with surface levels less than 200 millirem per hour that are transported on vehicles like flatbeds. At present, the 10 millirem per hour limit is at the plane 2 meters from the lateral edges of the flatbed. In cases such as a package on an "open" flatbed, the proposed amendment would set the 10 millirem per hour limit at 2 meters from the package surface. The proposed revision also excludes the 10 millirem per hour limitations at 2 meters from the top and underside of vehicle surfaces. This is a practical consideration since it is uncommon for persons to be 2 meters above or below accessible surfaces of exclusive-use vehicles, and it would be an unreasonable burden in most facilities to obtain radiation measurements 2 meters below the underside of a vehicle and 2 meters above the top surface. The proposed revision would eliminate all reference to

vertical planes projected from vehicle surfaces. Instead, the 10 millirem per hour limit would refer directly to readily accessible external surfaces.

The radiation level limitation at two meters is intended to control radiation exposure to personnel not associated with the shipment, such as people in other vehicles moving along side the shipment, persons nearby when the vehicle is stopped temporarily, or persons refueling or servicing the vehicle. In combination with the proposed accessible surface limitation, these revisions should improve controls on radiation exposure to members of the general public.

6. Occupied Spaces Limit

The proposed revision does not change the maximum radiation level for locations normally occupied during transport. The only change is to state more clearly the intended conditions under which a private carrier is exempted from the 2 millirem per hour limit. It was previously assumed that all personnel of a private carrier involved in transporting radioactive material under exclusive-use provisions would be operating under a regulated radiation safety program. Since this is not always the case, a qualifying requirement to assure radiation safety would be added to the regulations.

It is assumed that the carrier's personnel responsible for its regulated radiation safety program will assure that all exposures are kept as low as reasonably achievable, monitor operations, and establish limits in line with appropriate radiation safety requirements.

This 2 millirem per hour limit does not apply to vehicles carrying radioactive materials packages under conditions controlled by the total transport index limit per vehicle and separation distance requirements between normally occupied areas and the nearest package. The 2 millirem per hour is not an unreasonably low upper limit for occupied spaces. It is noted that the existing transport index and separation distance tables in Parts 174 and 177 do not always result in such a limit. MTB plans to propose amendments in the near future which will assure better radiation exposure control via transport index and separation distance criteria.

7. Designated Agent Requirements

The carrier responsibilities assumed by the shipper for exclusive-use shipments include controlling certain aspects of the shipment from point of origin to destination.

As stated in the regulations, instructions provided by the shipper to the carrier for maintaining exclusive-use conditions must be included with the

shipping papers. Part of the requirements in the definition of "exclusive-use" in § 173.389(o)(2) refer to initial, final, and intermediate loading and unloading by the consignor, consignee, or designated agent. Under these proposals, it would be made clear that a designated agent must have radiological expertise appropriate for handling the radioactive material being transported for the shipper. The assurance that the designated agent has the appropriate radiological capabilities must be the responsibility of the shipper when he establishes exclusive use controls.

Consignors and consignees in nearly all cases are licensed by the NRC or a State agency, to possess, use, or transfer the radioactive materials in a consignment. To be licensed, they must demonstrate necessary capabilities for handling the radioactive materials authorized by their license. It would be inappropriate for the HMR to require all initial, intermediate, and final loading and unloading of exclusive-use shipments by the consignor, consignee or their designated agent and then be silent on requirements for designated agents. As a minimum, the radiological capabilities should include knowledge of methods and procedures for minimizing radiation exposures when handling radioactive materials shipments, and the ability to recognize and control radiological emergencies that could occur in handling the consignment. The designated agents radiation protection practices should conform to recognized national standards on such matters as probable annual radiation exposure and use of personnel radiation dosimetry equipment.

This requirement for radiological capabilities should complement radiation level limitations in assuring safety for persons involved with the shipment and the general public, for exclusive-use shipments.

II. Classification of Rule, Reporting Requirements, and Impact on Small Entities

Non-major rule

MTB has determined that this proposed rule will not result in a "major rule" under the terms of Executive Order 12291 and DOT procedures (44 FR 11034). This determination is made on the bases that (1) the rule as proposed would not have an annual effect on the nation's economy exceeding \$100 million; (2) there will be no major increase in costs or prices for consumer, individual industries, Federal, State, or local government agencies, or

geographic regions; and (3) the rule as proposed would not result in significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of United States-based enterprises to compete with foreign-based enterprises in domestic or export markets. Although a regulatory impact analysis is not required, MTB has prepared a draft regulatory evaluation and environmental assessment and made it a part in the Docket, available for inspection at the address shown above.

Paperwork Reduction Act.

Recordkeeping requirements contained in proposed § 173.393(j)(3) are subject to clearance requirements of the Paperwork Reduction Act of 1980 (44 U.S.C. 3502 et seq.). A request for approval will be submitted to the Office of Management and Budget. These requirements would not be effective until OMB approval has been obtained and the public notified to that effect through a technical amendment to this regulation. Comments on the requirement for shippers to prepare specific instructions for use by the carrier in maintaining exclusive-use shipment controls, as well as estimates of the number of shippers affected and the burden-hours imposed, are solicited.

Impact on Small Entities

Based on limited information available concerning size and nature of entities likely to be affected, I certify that this proposal will not, if promulgated, have a significant economic impact on a substantial number of small entities. The most restrictive aspect of this revision to the HMR involves the reduction of external radiation levels from the present limit of 1000 millirem per hour at one meter from any point on the external surface of the package to 1000 millirem per hour on any accessible surface of the package, and would most likely only affect operators of large reactors.

III. Thesaurus of Indexing Terms

List of Subjects in 49 CFR Part 173

Hazardous materials transportation.

In consideration of the foregoing, 49 CFR Part 173 would be amended as follows:

PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

1. In § 173.389, paragraph (o)(2) would be amended by adding a new sentence at the end of the paragraph to read as follows:

§ 173.389 Radioactive materials;

definitions.

(o) * * *

(2) * * * A designated agent must have radiological training and resources appropriate for safe handling of the consignment while in transit.

2. In § 173.393, paragraph (j) would be revised to read as follows:

§ 173.393 General packaging and shipment requirements.

(j) Packages otherwise complying with requirements of this section which, despite reasonable efforts and accepted radiation safety practices, do not comply with the radiation level limits of paragraph (i) of this section, and packages provided for under § 173.392(c) or § 173.396(f), may be transported in a vehicle (except aircraft) which as been consigned as exclusive-use if:

(1) The maximum radiation level on the external surface of a package does not exceed 1000 millirem per hour;

(2) The maximum radiation level for locations readily accessible during transport does not exceed—

(i) 200 millirem per hour on the external surface of the vehicle or load;

(ii) 10 millirem per hour, two (2) meters from external surfaces of the

vehicle or load (excluding the top and underside of the vehicle or load); and
(iii) 2.0 millirem per hour, in normally occupied spaces, except for private carriers if exposed personnel under their control wear radiation dosimetry devices and operate under provisions of a State or Federally regulated radiation protection program; and

(3) The shipper must provide the carrier with specific instructions for maintaining controls for exclusive-use shipments. These instructions shall be sufficient to assure that the carrier will not unnecessarily delay or take unnecessary actions while in transit that result in increased radiation levels or radiation exposures. These instructions must be included with the shipping paper information.

[49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53 App. A to Part 1, and paragraph (a)(4) of App. A to Part 106]

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Regulation, Materials Transportation Bureau*

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