



U.S. Department
of Transportation

**Pipeline and
Hazardous Materials Safety
Administration**

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

OCT 13 2006

Mr. James M. Shuler
Department of Energy
Washington, D.C. 20585

Ref. No.: 06-0100

Dear Mr. Shuler:

This is in response to your April 20, 2006 letter requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to radioactive materials. Specifically, you request clarification of the exception in § 173.453(f) for fissile material. You request additional clarification of a response we provided to Dennis Ashworth in a letter of interpretation issued on January 17, 2006 (Ref. No. 05-0254) regarding this topic. Your questions are summarized and answered as follows:

Q1. How is a shipment of plutonium defined?

A1. For the purposes of the exception in § 173.453(f), a "shipment of plutonium" is the shipment of a material where plutonium is the primary radionuclide present, with only trace amounts of other radionuclides.

Q2. How much plutonium must be present for the exception to apply?

A2. The exception in § 173.453(f) applies to packages containing, individually, a total plutonium mass of not more than 1000 grams. The exception does not specify a minimum amount of plutonium; however, only trace amounts of other radionuclides may be present to qualify for the exception.

Q3. How much plutonium must be fissile plutonium for the exception?

A3. None of the plutonium "must" be fissile, but not more than 20 percent by mass may consist of plutonium-239, plutonium-241, or any combination of these.

Q4. The January 17, 2006 letter of interpretation issued to Dennis Ashworth stated that the exception in § 173.453(f) is not intended to apply to shipments of large quantities of uranium with some plutonium present. How much uranium is considered to be "large quantities"?

A4. As you noted in your letter, it is not possible to have fissile plutonium without some fissile uranium present. The scenario you presented of 1E-06 grams of plutonium-238 and 100 kg of uranium-235 as package contents is not the type of shipment that is intended to be covered by the exception. To satisfy the exception in § 173.453(f) only



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173.453 (f)

trace amounts of uranium may be present; we interpret a trace amount of uranium to be less than or equal to 1% of the mass of the fissile plutonium present in the package.

Q5. How much fissile uranium may be included in a shipment to qualify for the exception?

A5. An acceptable level of uranium is less than or equal to 1% of the mass of the fissile plutonium present in the package. See A4.

Q6. Could 850 g of plutonium-238 and 100 g of uranium-235 in a single package qualify for the exception?

A6. The answer is no. The exception is intended to apply to those shipments of plutonium that contain only trace quantities of uranium. See A4 and A5.

Note that our January 17th letter referenced a proposal before the International Atomic Energy Agency to expand the scope of the exception to permit 20% of fissile nuclides by mass; however, the current exception in § 173.453(f) applies specifically to plutonium.

I hope this information is helpful. If you have further questions, please do not hesitate to contact this office.

Sincerely,



John A. Gale

Chief, Standards Development
Office of Hazardous Materials Standards



Department of Energy
Washington, DC 20585

APR 20 2006

Referford
§ 173.453 (f)
Fissile Materials
Exceptions
06-0100

Mr. Edward T. Mazzullo, Director
Office of Hazardous Material Standards, PHH-10
Pipeline and Hazardous Materials Safety Administration
U.S. Department of Transportation
Attention: DHM-10
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The purpose of this letter is to request an interpretation of the Department of Transportation (DOT) Fissile Material Exception requirements as mentioned in the Title 49, Part 173.453. The relevant portions of 49 Code of Federal Regulations (CFR) 173.453 read as follows:

Sec. 173.453 Fissile materials--exceptions.

Fissile materials meeting the requirements of at least one of the paragraphs (a) through (f) of this section are excepted from the requirements of this subpart for fissile materials . . .

(f) Packages containing, individually, a total plutonium mass of not more than 1000 grams, of which not more than 20 percent by mass may consist of plutonium-239, plutonium-241, or any combination of these radionuclides.

Because paragraph (f) is silent on the presence of uranium, packages containing fissile uranium (including large quantities of fissile uranium) could be shipped as fissile excepted and meet paragraph (f), even in the absence of any plutonium (fissile or nonfissile). Clearly it is not the intent of this paragraph to allow shipment of large and potentially unsafe quantities of uranium.

As an example, assume a payload contains 1E-06g of ²³⁸Pu and 100 kg of ²³⁵U. This payload contains a total plutonium mass of not more than 1000 g of which not more than 20 percent by mass is fissile plutonium.

In a letter of interpretation signed by John Gale to Dennis Ashworth, dated January 17, 2006 (Reference 05-0254), it indicates "this exception is intended for shipments of plutonium" and "this exception is NOT intended to allow shipments of large quantities of uranium with 'some' plutonium included."

1. How is a "shipment of plutonium" defined?
2. How much plutonium must be present for this exception to apply?
3. How much of the plutonium must be fissile plutonium?
4. How much uranium is considered to be "large quantities"?

Because ^{239}Pu quickly decays to ^{235}U and ^{241}Pu decays to ^{233}U , it is not physically possible to have a fissile plutonium shipment in which there is no fissile uranium. The quantities of fissile uranium remain small for some time but they are greater than 0. The regulations do not define a *de minimus* quantity of fissile uranium.

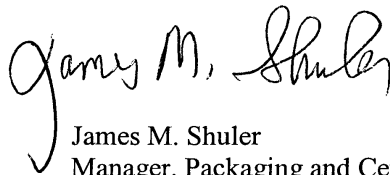
5. How much fissile uranium may be included in the shipment?

A potential inconsistency occurs in that under the existing regulations a package with 850 g ^{238}Pu and 100 g ^{239}Pu could be shipped as fissile excepted under paragraph (f); however, depending on whether DOT intends to allow shipments of fissile uranium under this rule, a package containing 850 g ^{238}Pu and 100 g of ^{235}U , which is of lesser concern than ^{239}Pu from a criticality perspective, could not be shipped fissile excepted.

6. Could 850 g ^{238}Pu and 100 g of ^{235}U qualify for an exception under paragraph (f)?

If you need any additional information, please contact me at (301) 903-5513 or by (e-mail: james.shuler@em.doe.gov).

Sincerely,



James M. Shuler
Manager, Packaging and Certification Program
Office of Licensing
Environmental Cleanup and Acceleration
Office of Environmental Management