



U.S. Department  
of Transportation

**Pipeline and  
Hazardous Materials Safety  
Administration**

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

JUL 1 2005

Mr. Kurt Colborn  
Director, Technical Services  
MHF Logistical Solutions  
800 Cranberry Woods Drive  
Suite 450  
Cranberry Township, PA 16066

Ref. No. 05-0145

Dear Mr. Colborn,

This responds to your June 7, 2005, letter requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to radioactive materials. Specifically, you ask if waste material transported from a defunct tungsten processing facility satisfies the exception for natural material and ores in § 173.401. You state that the material contains natural uranium and thorium, which represent the residual natural activity remaining after the tungsten extraction process. Based on your calculations, the maximum activity level of the material is less than or equal to 9 times the exemption limits in § 173.436. The material is being transported for disposal and will not be processed for use of the radionuclides.

Section 173.401(b)(4) provides an exception from Part 173, Subpart I for natural material and ores containing naturally occurring radionuclides if: (1) the material is not intended to be processed for use of these radionuclides; and (2) the activity concentration of the material does not exceed 10 times the exemption limits specified in § 173.436.

In order to determine whether the material to be shipped satisfies the conditions in § 173.401(b)(4) to be exempt from Class 7 transport requirements, one must compare the actual activity concentration of the material (defined as the sum of the activity concentrations of the parents, i.e., of  $U^{238}$ ,  $Th^{232}$ , and  $K^{40}$  in your case) with 10 times the calculated activity concentration limit for the mixture. The calculated activity concentration limit for the mixture, as described in 173.433(d)(6), requires that one form ratios by dividing the fractions of the actual  $U^{238}$  (for  $U_{nat}$ ),  $Th^{232}$  (for  $Th_{nat}$ ), and  $K^{40}$  concentrations by the individual exemption activity concentrations for  $U_{nat}$ ,  $Th_{nat}$ , and  $K^{40}$  listed in § 173.436. The sum of these ratios is to be used in the expression in § 173.433(d)(6) to determine the calculated activity concentration limit for the mixture. If the activity concentration of the material is less than 10 times the calculated activity concentration limit for the mixture, then the material meets the exception in § 173.401(b)(4).



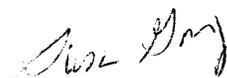
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173.401(b)(4)

Note that, the exception in § 173.401(b)(4) provides relief from the requirements of Part 173, Subpart I for radioactive materials. However, your material may be regulated as a Class 9 (Miscellaneous hazardous material) if it meets the definition of a hazardous substance, hazardous waste or marine pollutant in § 171.8.

I hope this information is helpful.

Sincerely,



John A. Gale

Chief, Standards Development  
Office of Hazardous Materials Standards

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Eichenlaub  
§173.401(b)(4)  
RAM  
05-0145



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Mr. Edward Mazzullo  
Director of Hazmat Standards  
USDOT/RSPA DHM-10 Suite 8422  
400 7<sup>th</sup> Street, SW  
Washington, DC 20590-3012

June 10, 2005

SUBJECT: Interpretation for the Natural Material Exemption of 49 CFR 173.401(b)(4)

Dear Mr. Mazzullo,

The purpose of this letter is to request confirmation of the applicability of the natural materials exemption of 49 CFR 173.401(b)(4). Please confirm or clarify our understanding of the exemption. We believe the information in this letter provides a basis for US DOT compliant shipping of materials from a defunct tungsten processing facility. Natural uranium and thorium are present in the materials, which represent the residual natural activity remaining after the tungsten extraction process. Hence, the most attractive, and most directly applicable shipping option is to ship under the new exemption in 49 CFR 173.401(b)(4) which exempts from regulation some natural material and ores containing naturally occurring radionuclides.

Basis for Applicability of Exemption: The historical analytical data from the site indicate that maximum activity levels are generally 1.0 to 4.0 times, and in no case more than 9 times the exemption limit for the materials (when evaluated against the concentration limits for  $Th_{nat}$ ,  $U_{nat}$ , and  $K^{40}$  in 173.436). The  $Th_{nat}$  and  $U_{nat}$  are present as natural components of the processed tungsten ore. The  $K^{40}$  is present at levels averaging <10 pCi/g; and is believed to be of natural origin [natural levels of  $K^{40}$  range from 0 to 30 pCi/g; so concentrations in the material for shipment are at the low end of the naturally expected range]. We believe the materials meet the requirements of 49 CFR 173.401(b)(4) which exempts

*natural material and ores containing naturally occurring radionuclides which are not intended to be processed for use of these radionuclides, provided the activity concentration does not exceed 10 times the values specified in 173.436.*

The history of the site suggests the contamination is from naturally-occurring radionuclides that remain from activities related to tungsten extraction; not as a result of activity designed to extract radionuclides. Further, the materials are being shipped as waste for disposal; hence, no future extraction of radionuclides is planned.

The preamble to the new regulation states it is “*intended to exempt ores and materials that contain naturally occurring radionuclides, but whose benefits lie in their non-radiological qualities (such as... non-radioactive metals...)*”. These materials were processed to extract non-radioactive metals, and have never been subjected to any known processing related to their radionuclide content. Hence the 10x exemption appears to apply, and the materials appear exempt from DOT classification as radioactive material.

The exemption does not specifically mention waste products, but it seems reasonable to expect that the waste materials from beneficial extraction of non-radioactive metals would qualify for the exemption, since the intent of the regulation is to permit their “*continued use in commerce without making their use economically unfeasible*”. Additional support of the applicability of the 10x concentration exemption can be found in the IAEA Advisory Guide paragraph 107.4. This guidance explains that the IAEA regulations now reflected in 49 CFR *do not apply to other* [non-fuel cycle] *ores which may contain naturally occurring radionuclides or processed materials... where the processing was not for the purpose of extracting radionuclides*. Finally, the 2007 proposed language for TS-R-1 offers clarification that the exemption applies to post-processed material, stating the exemption applies to materials that “*have only been processed for purposes other than extraction of the radionuclides, and which are not intended to be processed for the use of these radionuclides*”.

Determining Concentration for Comparison to Exemption Values from Data: Isotopic data from the site includes spectroscopy data reported as  $\text{Th}^{228}$ ,  $\text{Th}^{230}$ , and  $\text{Th}^{232}$ ; as well as  $\text{U}^{233/234}$ ,  $\text{U}^{235/236}$ , and  $\text{U}^{238}$ . Based on the Table in 49 CFR 173.436 and its associated footnotes, concentrations can be assessed as follows:

- $\text{U}_{\text{nat}}$  activity is the lab reported  $\text{U}^{238}$  activity
- $\text{Th}_{\text{nat}}$  activity is the lab reported  $\text{Th}^{232}$  activity
- $\text{K}^{40}$  activity is as reported for  $\text{K}^{40}$

49 CFR 173.436 lists decay chains in footnote (b). We understand from the table that  $\text{U}^{234}$  activity is already considered in the  $\text{U}_{\text{nat}}$  exemption values, along with  $\text{Th}^{230}$ . In addition,  $\text{Th}^{228}$  activity is considered in the  $\text{Th}_{\text{nat}}$  exemption values. Hence, the reported activity of these isotopes ( $\text{U}^{234}$ ,  $\text{Th}^{230}$ , and  $\text{Th}^{228}$ ) need not be added to the activity of the isotopes we consider in our determination of  $\text{U}_{\text{nat}}$  and  $\text{Th}_{\text{nat}}$  activity in the bullets above. The  $\text{U}^{235}$  contribution to  $\text{U}_{\text{nat}}$  activity is considered negligible.

The  $\text{U}_{\text{nat}}$ ,  $\text{Th}_{\text{nat}}$ , and  $\text{K}^{40}$  concentrations will each be compared to the individual exemption values for these materials as listed in 173.436. The sum of the fractions of these comparisons will then be used to determine if the material meets the 10x concentration requirement for exemption in 49 CFR 173.401(b)(4).

Summary: This letter requests confirmation of our regulatory interpretation that the materials described herein and destined for disposal, are exempt from regulation in accordance with 49 CFR 173.401(b)(4).

Please feel free to contact me at (724) 772-9800, ext. 5560 if you have any questions about this request. Thank you for your assistance.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Kurt Colborn', written in a cursive style.

Kurt Colborn  
Director, Technical Services  
MHF Logistical Solutions