



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 20, 2020

Mr. Clayton Manning, Health Physicist
U.S. Geological Survey TRIGA Reactor
Department of the Interior
U.S. Geological Survey
Box 25046 MS-974
Denver CO, 80225

SUBJECT: APPROVAL OF ALTERNATE A2 VALUE

Dear Mr. Manning:

This is in response to your request dated August 9, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18236A551), requesting the authority to use an alternate A₂ value for Bromine-80 metastable (Br-80m) than the general A₂ value in Table A-3, Appendix A to Title 10 of the *Code of Federal Regulations* Part 71. In accordance with Section II.a in Appendix A to 10 CFR Part 71, the U.S. Nuclear Regulatory Commission is authorizing the U.S. Geological Survey to use 0.40 Terabecquerel (11.0 Curies) as the A₂ value for Br-80m for domestic transport. This approval expires on November 1, 2023.

If you have any questions regarding this certificate, please contact Bernard White of my staff at (301) 415-6577.

Sincerely,

John B. McKirgan, Chief
Storage and Transportation Licensing Branch
Division of Fuel Management
Office of Nuclear Material Safety
and Safeguards

CAC No. A33010
Docket No.: 50-274
EPID: L-2020-LLA-0106

Enclosures:

1. DOT Approval
2. Safety Evaluation Report

cc w/encls. 1& 2: R. Boyle, DOT
J. Shuler, U.S. DOE c/o L. F. Gelder

SUBJECT: APPROVAL OF ALTERNATE A2 VALUE

DATED: July 20, 2020

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DSFM r/f NMSS r/f D. Marcano G. Warnick, RIV

Closes EPID No. L-2020-LLA-0106

ADAMS Package No.: ML20199M166**Letter Accession No.: ML20199M167****DOT Letter Accession No.: ML20199M168***** via email**

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| OFFICE: | NMSS/DFM | NMSS/DFM | NMSS/DFM | NMSS/DFM | NMSS/DSFM |
| NAME: | BWhite | SFigueroa* | MCall* | RChang* | JMcKirgan |
| DATE: | 7/6/2020 | 7/6/2020 | 7/6/2020 | 7/7/2020 | 7/20/2020 |

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**U.S. Geological Survey TRIGA Reactor
Docket No. 50-274
Safety Evaluation Report for
Alternate A₂ Value for Domestic Transportation**

The U.S. Geological Survey (USGS) submitted a request to approve use of 0.40 Terabecquerel (TBq) (11.0 Curies) as the A₂ value for the radionuclide Bromine-80 metastable (Br-80m). Appendix A of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 71 does not include a specific A₂ value for this nuclide (neither do the standards of the International Atomic Energy Agency in "Regulations for the Safe Transport of Radioactive Material," Specific Safety Requirements No. 6, 2018 Edition). In its place, the U.S. Nuclear Regulatory Commission authorizes, by rule in Appendix A to 10 CFR Part 71, "Determination of A₁ and A₂," use of a generic A₂ value in Table A-3, "General Values for A₁ And A₂," of 0.02 TBq (0.54 Curies) for nuclides that only emit beta or gamma radiation. The USGS stated that this value, 0.02 TBq (0.54 Curies), is too limiting for its needs and has proposed a value that is equal to the value for Br-82. The USGS produces Br-82 in its TRIGA reactor for industrial purposes. This process also results in some amount of Br-80m also being produced. Since the product is shipped in Type A containers, the A₂ value is important.

The USGS referred to the NRC's 10 CFR Part 20 Appendix B, "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage," for both the Br-82 and Br-80m nuclides. The ALIs for Br-82 are more limiting than the limits for Br-80m, by a factor of 2 to 3 (i.e., the Br-80m limits are about 2 to 3 times higher than the Br-82 limits). The USGS also noted the differences in the half life and gamma energies for each nuclide; Br-80m has a noticeably shorter half-life and emits significantly lower energy gammas. Based on these arguments, the USGS proposed that using the Br-82 A₂ value for Br-80m would be conservative.

For its evaluation of the USGS's proposed A₂ value, the staff considered several factors. These include the information in Appendix B to 10 CFR Part 20; consideration of any radioactive progeny of the two nuclides and their potential contributions; data available to the staff regarding the radiations emitted by these two nuclides and any progeny; and data available to the staff indicative of the relative significance of the doses from these nuclides and any progeny. The data included information related to external and internal doses from the nuclides. Based on this information, the staff found that the Br-82 would be bounding in terms of dose for nearly every scenario the staff considered.

In some limited cases, however, the information indicated that Br-82 may not be bounding. However, the U.S. Department of Transportation also completed its own review of this same request. For that review, calculations of an A₂ value for Br-80m resulted in a value that equals the A₂ value for Br-82. For such calculations, the appropriate considerations for internal and external doses and for any progeny of Br-80m would have been addressed. This would include appropriate inclusion of factors that would encompass or address the limited cases that the staff's evaluation indicated that Br-82 may not be bounding.

Thus, based on its own evaluation and the evaluation that supported the U.S. Department of Transportation's review, the staff finds the use of the proposed A₂ value of 0.40 TBq (11.0 Curies) for Br-80m to be acceptable.