

NUCLEAR REGULATORY COMMISSION

10 CFR Part 20

[Docket No. PRM-20-26]

James Salsman, Receipt of Petition for Rulemaking

AGENCY: Nuclear Regulatory Commission.

ACTION: Petition for rulemaking; notice of receipt.

SUMMARY: The Nuclear Regulatory Commission (NRC) is publishing for public comment a notice of receipt of a petition for rulemaking, dated May 6, 2005, which was filed with the Commission by James Salsman. The petition was docketed by the NRC on May 13, 2005, and has been assigned Docket No. PRM-20-26. The petitioner requests that the NRC amend its regulations to modify exposure and environmental limits of heavy metal radionuclides.

DATE: Submit comments by (insert date 75 days after publication in the Federal Register). Comments received after this date will be considered if it is practical to do so, but the Commission is able to assure consideration only for comments received on or before this date.

ADDRESSES: You may submit comments by any one of the following methods. Please include the following number PRM-20-26 in the subject line of your comments. Comments on petitions submitted in writing or in electronic form will be made available for public inspection. Because your comments will not be edited to remove any identifying or contact information, the NRC cautions you against including any information in your submission that you do not want to be publicly disclosed.

Mail comments to: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, ATTN: Rulemakings and Adjudications Staff.

E-mail comments to: [SECY@nrc.gov](mailto:SECY@nrc.gov). If you do not receive a reply e-mail confirming that we have received your comments, contact us directly at (301) 415-1966. You may also submit comments via the NRC's rulemaking web site at <http://ruleforum.llnl.gov>. Address questions about our rulemaking website to Carol Gallagher (301) 415-5905; email [cag@nrc.gov](mailto:cag@nrc.gov). Comments can also be submitted via the Federal eRulemaking Portal <http://www.regulations.gov>.

Hand deliver comments to: 11555 Rockville Pike, Rockville, Maryland 20852, between 7:30 am and 4:15 pm Federal workdays. (Telephone (301) 415-1966).

Fax comments to: Secretary, U.S. Nuclear Regulatory Commission at (301) 415-1101.

Publicly available documents related to this petition may be viewed electronically on the public computers located at the NRC's Public Document Room (PDR), O1 F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. The PDR reproduction contractor will copy documents for a fee. Selected documents, including comments, may be viewed and downloaded electronically via the NRC rulemaking web site at <http://ruleforum.llnl.gov>.

Publicly available documents created or received at the NRC after November 1, 1999, are available electronically at the NRC's Electronic Reading Room at <http://www.nrc.gov/reading-rm/adams.html>. From this site, the public can gain entry into the NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents. If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737 or by email to [pdr@nrc.gov](mailto:pdr@nrc.gov).

FOR FURTHER INFORMATION CONTACT: Michael T. Lesar, Chief, Rules and Directives Branch, Division of Administrative Services, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, Telephone: 301-415-7163 or Toll Free: 800-368-5642.

#### SUPPLEMENTARY INFORMATION:

##### Background

The NRC has established standards for protection against ionizing radiation resulting from activities conducted by licensees and has issued these standards in the regulations codified in 10 CFR part 20. These regulations are intended to control the receipt, possession, use, transfer, and disposal of licensed material by its licensees. Licensed material is any source, byproduct, or special nuclear material received, possessed, used, transferred, or disposed of under a general or specific license issued by the NRC.

Appendix B to part 20 lists the Annual Limits on Intake (ALIs) and Derived Air Concentrations of radionuclides for occupational exposure, effluent concentrations, and concentrations for release to sewerage.

##### The Petitioner's Discussion

The petitioner believes that the current regulations allow more soluble compounds than insoluble compounds. The petitioner states that the regulations were designed to address only the radiological hazard of uranium, and not the heavy metal toxicity, which is known to be about six orders of magnitude worse. The petitioner asserts, in practice, that the soluble compounds are far more toxic than the insoluble compounds. The petitioner states that this should indicate that the long half-life uranium isotope regulation standards need to be completely revised.

The petitioner states that in the current regulations, an annual inhalation of more than two grams of uranium is allowed. The petitioner states that because the LD50/30 of uranyl nitrate (which has considerably less uranyl ion per unit of mass than uranium trioxide) is 2.1 mg/kg in rabbits, 12.6 mg/kg in dogs, 48 mg/kg in rats, and 51 mg/kg in guinea pigs and albino mice, two grams of UO<sub>3</sub> seems very likely to comprise a fatal dose for a 200 pound human (Gmelin Handbook of Inorganic Chemistry, 8th edition, English translation (1982), vol. U-A7, pp. 312-322).

The petitioner believes that these values seem much too high. He believes that they were derived to avoid immediate kidney failure only, without regard to reproductive toxicity. The petitioner does not believe they were derived with sufficient care to avoid allowing lethal exposures. The petitioner states that the explicit limit to 10 mg/day of soluble uranium compounds (or about half a gram per year) in 10 CFR 20.1201(e) seems likely to allow substantial kidney damage and certain reproductive toxicity.

The petitioner states that a urine study performed (see [http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list\\_uids=12943033](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=12943033)) calculates an average initial lung burden of 0.34 milligrams elemental uranium for those with isotopic signatures consistent with exposure to depleted uranium in what he believes were symptomatic exposure victims. The petitioner believes that this study is flawed, as it assumes a uranium compound biological half-time of 3.85 years in the lungs. The petitioner states that the primary mode of uranium toxicity involves much greater solubility. The petitioner believes that monomeric uranium trioxide will turn out to be absorbed more rapidly in the mammalian lung than uranyl nitrate, because of its monomolecular gas nature, and not merely about as rapidly as the studies of granular uranium trioxide by P.E. Morrow, et al., indicate ("Inhalation Studies of Uranium Trioxide," Health Physics, vol. 23 (1972), pp. 273-280).

The petitioner states that even Class D may not be appropriate for monomolecular uranium trioxide gas.

The petitioner believes the correct way to determine these values, to account for the reproductive toxicity, is probably to measure resulting mutations of mammalian peripheral lymphocytes, such as was done in this study of Gulf War veterans ([http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list\\_uids=11765683](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=11765683)).

#### The Petitioner's Request

The petitioner requests that the NRC revise its regulations in 10 CFR part 20 that specify limits for ingestion and inhalation occupational values, effluent concentrations, and releases to sewers, for all heavy metal radionuclides with nonradiological chemical toxicity hazards exceeding that of their radiological hazards so that those limits properly reflect the hazards associated with reproductive toxicity, danger to organs, and all other known nonradiological aspects of heavy metal toxicity. The petitioner states that many of these limits consider the radiological hazard of certain chemically toxic radionuclides with slight radiological dangers (e.g., Uranium-238), without regard to their greater nonradiological hazard. The petitioner notes that this petition does not request increasing the permissible quantities given by any of those limits specified. The petitioner also states that, for example, the soluble forms of Uranium-238 compounds, which are more toxic if inhaled than the insoluble compounds, are allowed in greater quantities than their insoluble compounds. Other examples may include, but are not necessarily limited to, Uranium-232, Plutonium-239, and other long half-life isotopes of the heavy metal elements. The petitioner also requests that the classification for uranium trioxide within Class W, given in the Class column of the table for Uranium-230 in Appendix B to 10 CFR part 20, be amended to Class D in light of P.E. Morrow, et al., "Inhalation Studies of

Uranium Trioxide" (Health Physics, vol. 23 (1972), pp. 273-280), which states: "inhalation studies with uranium trioxide (UO<sub>3</sub>) indicated that the material was more similar to soluble uranyl salts than to the so-called insoluble oxides ... UO<sub>3</sub> is rapidly removed from the lungs, with most following a 4.7 day biological half time."

The petitioner also requests that monomeric (monomolecular) uranium trioxide gas, as produced by the oxidation of U<sub>3</sub>O<sub>8</sub> at temperatures above 1000 Celsius, be assigned its own unique solubility class if necessary, at such time in the future that its solubility characteristics become known (R.J. Ackermann, R.J. Thorn, C. Alexander, and M. Tetenbaum, in "Free Energies of Formation of Gaseous Uranium, Molybdenum, and Tungsten Trioxides," Journal of Physical Chemistry, vol. 64 (1960) pp. 350-355: "gaseous monomeric uranium trioxide is the principal species produced by the reaction of U<sub>3</sub>O<sub>8</sub> with oxygen" at 1200 Kelvin and above).

#### Conclusion

The petitioner requests that 10 CFR part 20 be revised in accordance with the proposed revisions as set forth above.

Dated at Rockville, Maryland, this 9<sup>th</sup> day of June 2005.

For the Nuclear Regulatory Commission.

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Annette Vietti-Cook,  
Secretary of the Commission.