



Centers for Disease Control and Prevention
National Institute for Occupational
Safety and Health
1090 Tusculum Avenue
Cincinnati OH 45226-1998

September 14, 2015

The Health Council of the Netherlands
Committee on the Classification of Reproduction Toxic Substances
Attn: P.W. van Vliet, Ph.D.
PO Box 16052
2500 BB The Hague
the Netherlands

Dear Dr. van Vliet:

Thank you for the opportunity to review the draft report on *Uranium and its compounds* prepared by the Subcommittee on the Classification of Reproduction Toxic Substances of the Dutch Expert Committee on Occupational Safety (DECOS). Comments are enclosed that were prepared by Jeri Anderson, Health Physicist and Candice Johnson, Epidemiologist, NIOSH/Division of Surveillance, Hazard Evaluations and Field Studies (DSHEFS), 1090 Tusculum Avenue, Cincinnati, OH 45226. Also enclosed is a reference that was cited.

If you have any questions regarding the comments, please contact me at 513-533-8260 (telephone) or by Email at tbl7@cdc.gov.

Sincerely yours,

A handwritten signature in black ink, appearing to read "T. J. Lentz".

Thomas J. Lentz, Ph.D., M.P.H.
Branch Chief
Document Development Branch
Education and Information Division

2 Enclosures

Comments on DECOS draft document on Uranium and its compounds
By: Jeri Anderson, Health Physicist and Candice Johnson, Epidemiologist,
NIOSH/Division of Surveillance, Hazard Evaluations and Field
Studies (DSHEFS), 1090 Tusculum Avenue, Cincinnati, OH 45226

SECTION & PARAGRAPH	COMMENT
General Comments	The Committee's recommendations are appropriate.
Specific Comments	
Pg. 5, line 3-4	Change second sentence to read: "Natural uranium, which is found in varying concentrations in rocks and soil, consists of three isotopes, all of which are radioactive (²³⁴ U, ²³⁵ U, and ²³⁸ U).
Pg. 5, line 5	Change isotopic abundance values to 99.27% ²³⁸ U, 0.72% ²³⁵ U, and 0.0055% ²³⁴ U. Isotopic abundance varies slightly depending on geographic location.
Pg. 5, line 11	Replace "ATSDR" with "U.S. Agency for Toxic Substances and Disease Registry (ATSDR)"
Pg. 5, line 14-18	Change the two sentences on these lines to read: "Since the three uranium isotopes behave the same chemically, the chemical risks from exposure to depleted and natural uranium will be similar to those for enriched uranium. However, for enriched uranium, ionizing radiation may play a role in reproductive toxicity."
Pg. 10, Table in section 2.1	Why did you select uranyl acetate and uranyl nitrate for the table? Although these compounds are often used in animal studies, occupational exposures to uranium usually involve the uranium oxides, uranyl fluoride, uranium hexafluoride, and uranium tetrafluoride. Adding a table heading explaining the reason these compounds were included may help, or you could add the uranium compounds common in occupational exposure.
Pg. 10, Table in section 2.1	The OSHA permissible exposure limit (PEL) is 0.25 mg/m ³ for insoluble uranium compounds and 0.05 mg/m ³ for soluble uranium compounds. The TLV is a threshold limit value recommended by the American Conference of Governmental Industrial Hygienists (ACGIH).
Pg. 11, lines 6-7	Change isotopic abundances to 99.27%, 0.72%, and 0.0055% for ²³⁸ U, ²³⁵ U, and ²³⁴ U, respectively.
Pg. 12, line 3	Change "caused by the radiation of α-particles" to "caused by ionizing radiation"
Pg. 12, line 5-6	This statement is not necessarily accurate. Exposure to insoluble uranium compounds in an occupational setting, most likely via inhalation, means that the uranium will be retained for much longer periods in the lungs and less will be translocated to the bloodstream.

Pg. 12, line 5-6 (con't)	This results in much lower exposure potential (if any) for the reproductive organs, less potential for transfer to the embryo/fetus, and less potential for exposure of progeny via lactation.
Pg. 12, line 6-7	This document would be improved by a brief paragraph discussing the biokinetics of uranium in the human body as well as maternal/fetal transfer. A good reference for this information is Leggett RW. Basis for the ICRP's Age-Specific Biokinetic Model for Uranium. Health Phys 67(6): 589-610; 1994 (attached). For information on maternal/fetal transfer see NUREG/CR 5631 "Contribution of Maternal Radionuclide Burdens to Prenatal Radiation Doses" found here: https://www.orau.org/PTP/PTP%20Library/library/Subject/Dosimetry/maternal.pdf
Pg. 12, line 27	The heading "Inhalation Studies" should be deleted because only one of the cohorts in the studies cited is exposed by inhalation. Most of the DU cohort in McDiarmid's studies are exposed by absorption of uranium from depleted uranium shrapnel embedded in tissue/muscle.
Pg. 12, lines 28-34 and Pg. 13, lines 18-20	The primary exposure for uranium miners is radon and radon decay products. The uranium exposure is relatively insignificant. This should be mentioned either here or in the first paragraph of the conclusion on pg. 19.
Pg. 14, line 13	The citation appears to be incorrect. Should it refer to reference #21?
Pg. 15, line 18	Insert "no observed adverse effect level" before "NOAEL" and enclose "NOAEL" in parentheses.
Pg. 15, lines 20-21	It is unclear what is meant by the phrase "28 days range finding study." Please explain, reword, or delete the phrase.
Pg. 15, line 32	Insert "lowest observed adverse effect level" before "LOAEL" and enclose "LOAEL" in parentheses.
Pg. 19, Section 2.4.1	It should also be pointed out here that the exposure pathway for the Gulf War Veterans is unique (embedded fragments) and not the normal pathway for occupational (inhalation pathway) or environmental (ingestion pathway) exposure. Also, based on the measured urine uranium concentrations, their exposures are lower than those found in historical cohorts at uranium processing facilities.
Pg. 20, lines 9-13 and 27-28	The language in these statements is confusing and seemingly contradictory. Is the Committee recommending that uranium be classified as Category 2? Why does it then say that the Committee recommends not to classify uranium due to lack of data?

E-mail

Datum: woensdag 19 augustus 2015
Aan: GR_draftOSH@gr.nl
Subject: Commentaar

Geachte auteur(s),

Dank voor het openstellen van uw draftdocument over 'Uranium and its compounds' voor commentaar. Hieronder per pagina commentaar en suggesties. Het commentaar kan inhoudelijk en hier en daar politiek van aard zijn.

Page 3, line 3-4: Remark: to prevent contradiction with line 14-16, one could emphasize the 'amount' of radioactivity.
Suggestion: "Uranium komt in de natuur voor als mengsel van verschillende uraniumisotopen (U-234, U-235 en U-238) die elk in meer of mindere mate radioactief zijn."

Page 3, line 12: ATSDR stands for ...

Page 3, line 22-27: Remark: To be clear; the Dutch commercial nuclear industry doesn't produce HEU for use in navy ships nor weapons.
Neither will the DU, produced as a by-product of LEU, be used for armour-piercing ammunition for the Dutch military.
It might be useful to perform an analysis of Dutch industries using uranium or uranium compounds in its facilities instead of using USA (nuclear) industrial examples.

Page 3, line 22-25: Remark: The translation to Dutch is incorrect. Suggestion: "helikopters en vliegtuigen, als afschermingsmateriaal en in Röntgenapparatuur."

Verder, het ATSDR-rapport "Toxicological profile for Uranium" uit februari 2013 concludeert op pagina 6 dat "We do not know whether uranium can harm an unborn child. No scientifically strong human study that has shown birth defects due to uranium exposure has been identified." Hoe kan de Gezondheidsraad, op basis van dezelfde informatie als het ATSDR, tot een andere conclusie komen, namelijk een Cat 2 classificering? Waarschijnlijk lees ik iets over het hoofd en kunt u mij hierop wijzen.

Met vriendelijke groet,

T.P. (Tjerk) Kuipers
Senior adviseur straling

.....
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