



NUCLEAR CONTAINERS, INC.

Chemical & Nuclear - Engineering and Equipment Fabrication

Route 9, Box 2237 — Elizabethton, Tennessee 37643
Telephone: 615/543-4211 Fax: 615/543-6007

July 21, 1994

United States Nuclear Regulatory Commission
Washington, DC 20555

Attention: Mr. Cass R. Chappell, M/S T-8F5
Section Leader, Cask Certification Section
Storage & Transport Systems Branch
Division of Industrial & Medical Nuclear Safety

Reference: Docket Number 71-9234

Gentlemen:

Please amend Certificate of Compliance No. 9234, Rev. 3, to allow a U-232 concentration not to exceed 0.05 micrograms per gram U.

As discussed yesterday with Nancy Osgood, the maximum A_1 calculation in Appendix 1A3 (Safety Analysis Report for NCI-21PF-1 PSP's, Rev. 1 dated January 11, 1993) is based on maximum radioisotope concentrations given in ASTM C-996 which lists a maximum U-232 concentration of 0.05 micrograms per gram uranium. This concentration of U-232 was correctly used in the A_1 calculations tabulated on page 1A3-4 but was incorrectly listed as 0.005 micrograms U-232 per gram uranium on page 1A3-1 in Appendix 1A3. This typographical error was then repeated on page 1-4 in Section 1.2.3 of the SARP and again in Section 6(e) of the Certificate of Compliance. Corrected pages 1-4 and 1A3-1 are enclosed for insertion into your copies of NCI Safety Analysis Report, Revision No. 1 dated January 11, 1993 (please complete and return the attached Transmittal Sheet).

Your assistance is urgently requested in this matter because shipments are being delayed where the U-232 concentrations exceed 0.005 micrograms per gram U. Please call if you have any questions or need any further information from me.

Very truly yours,

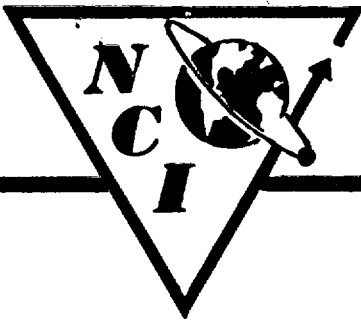
William R. Housholder
President

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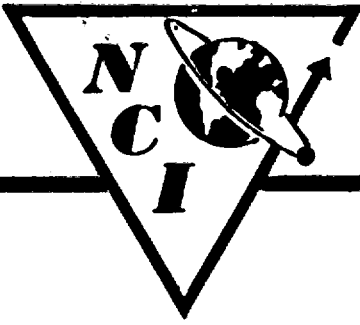
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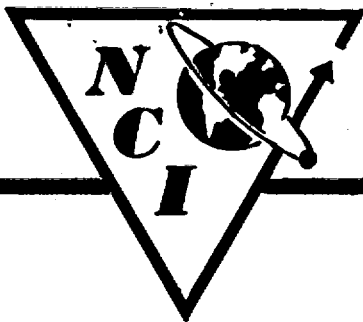
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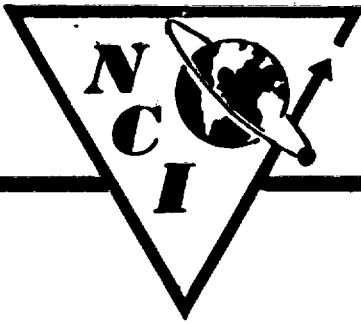
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1- DEFINITION OF CONTENT

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- Uranium radioisotope composition:

232U	:	0.05 µg/gU
234U	:	2.000 µg/gU
235U	:	0.05 g/gU
236U	:	0.025 g/gU
238U	:	0.923 g/gU

The 236U content is not indicated in standard C 996. COGEMA uses a realistic figure of 0.025 g/gU corresponding to a standard fuel enriched to 5%.

- Transuranics:

Maximum alpha activity for Pu and Np is 3.3 Bq/g U. This activity results practically from the isotopes 238 Pu, 239 Pu, 240 Pu and 237 Np.

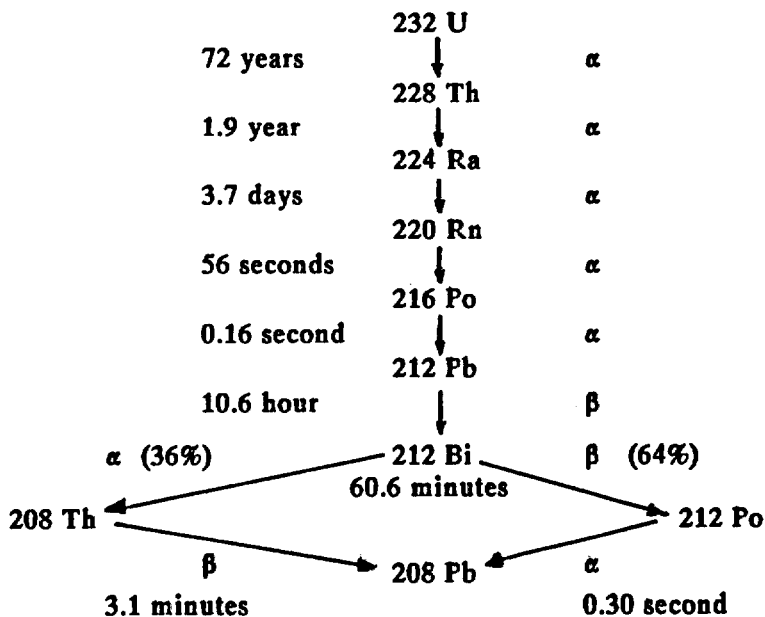
Activity of 237 Np is about half of the total transuranics alpha activity.

- Technetium:

Standard ASTM C 996 specifies a 99 Tc upper limit of 5 µg/gU in the enriched UF₆.

- 232U decay chain:

232U daughters are shown on the following diagram:



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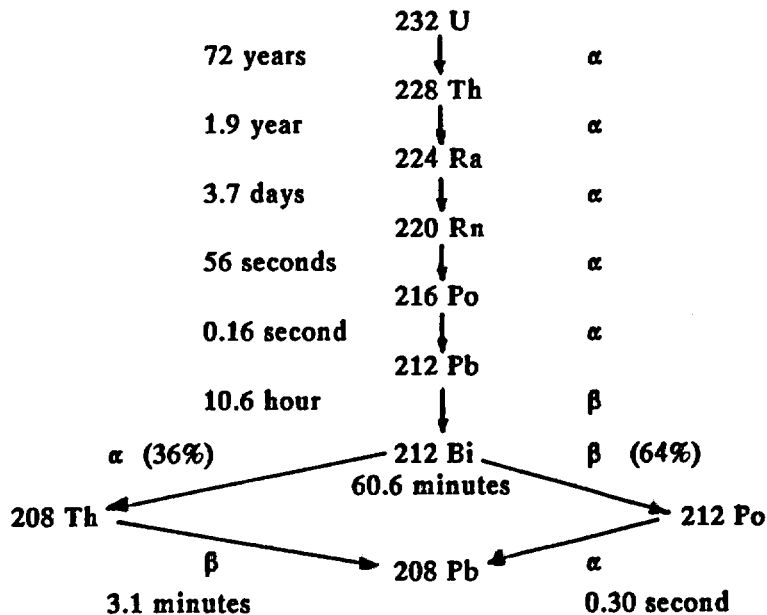
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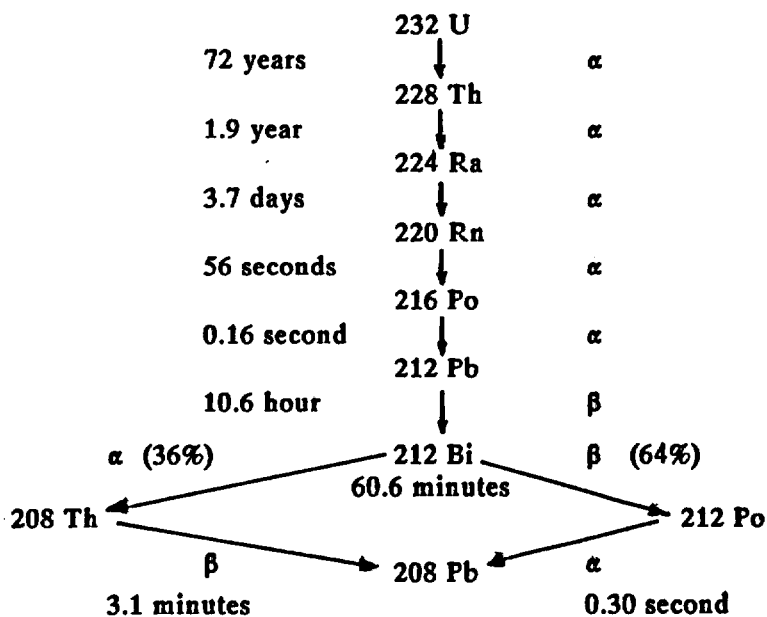
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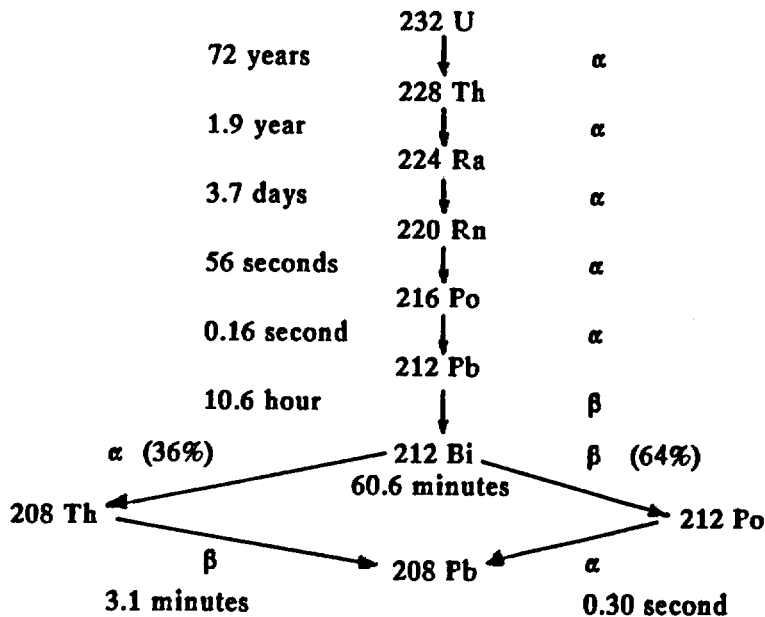
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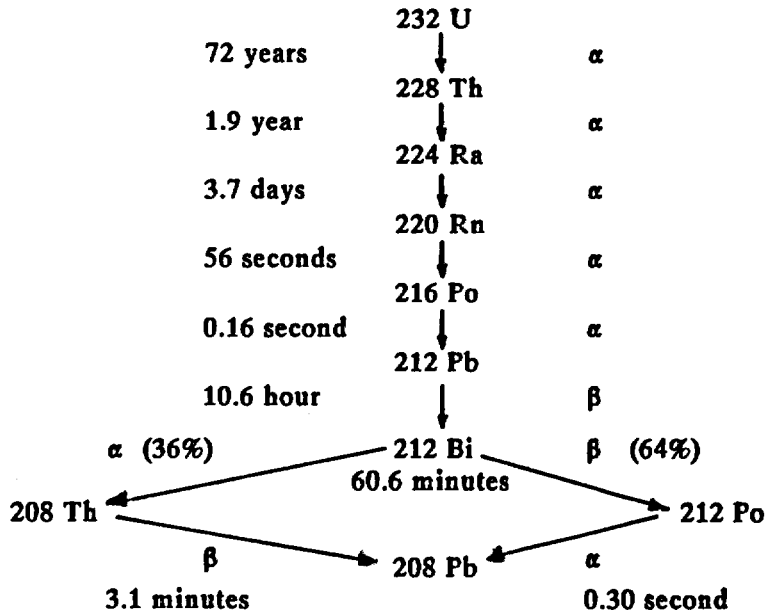
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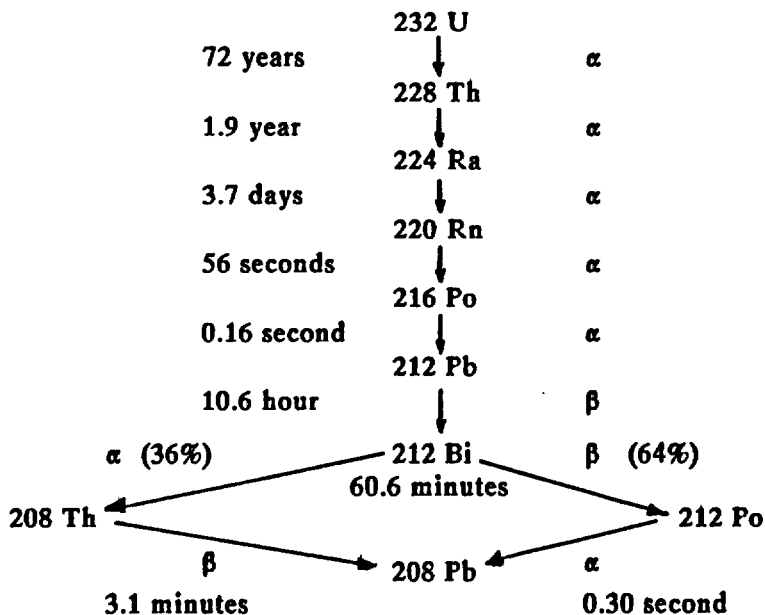
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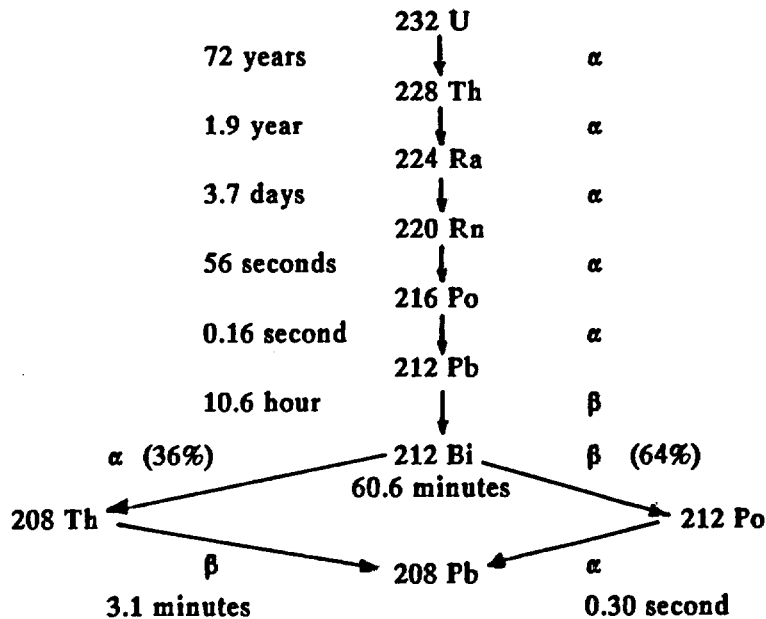
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1.2.3 Contents of Package

The NCI-21PF-1 package is used for the safe transport of uranium hexafluoride enriched in the U-235 isotope; the UF₆ must be packaged in Model 30B UF₆ cylinders which have been fabricated, inspected, tested, and maintained in accordance with the requirements of ANSI N14.1. The package contents are limited to a maximum of 5,020 pounds UF₆ enriched to not more than 5 w/o U-235. The UF₆, which may contain either virgin and recycled uranium, must meet the requirements of ASTM C-787 for feed materials and ASTM C996 for UF₆ which has been processed through an enrichment plant. In the case of recycled uranium, the package contents must not exceed 1,150 A; quantities of radioactive materials as determined per 10CFR71, Appendix A and must not contain more than the following maximum quantities of radionuclides and impurities:

U-232	0.05 µg/gU
U-234	2000 µg/gU
U-235	0.05 g/gU
U-236	0.025 g/gU
U-238	balance of total uranium content
Pu + Np	Alpha activity not exceeding 3.3 Bq/gU
Tc-99	5 µg/gU
Th-228	1.17×10^{-1} µg/gU (other U-232 daughters are ignored because of very short half-lives)
Fission Products	4.4×10^5 Mev Bq/d kgU (total contribution from gamma emitting fission products); this results in the following individual maximum activities:
	Ru-106/Rh-106 2095 Bq/gU
	Ru-103/Rh-103 885 Bq/gU
	Ce-144/Pr-144/Pr-144 ^a 8349 Bq/gU
	Sb-125 1030 Bq/gU
	Cs-134 283 Bq/gU
	Cs-137/Ba-137 ^a 778 Bq/gU
	Zr-95 598 Bq/gU
	Nb-95 574 Bq/gU

From ASTM C-787, the total concentration of elements that form non-volatile fluorides (including Al, Ba, Be, Bi, Cd, Co, Cr, Cu, Fe, Pb, Li, Mg, Mn, Ni, K, Ag, Na, Sr, Th, Sn, Zn, and Zr) must not exceed 300 µg/gU.

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Pu + Np	Alpha activity not exceeding 3.3 Bq/gU	
Tc-99	5 µg/gU	
Th-228	1.17 x 10 ⁻³ µg/gU (other U-232 daughters are ignored because of very short half-lives)	
Fission Products	4.4 x 10 ⁵ Mev Bq/d kgU (total contribution from gamma emitting fission products); this results in the following individual maximum activities:	
	Ru-106/Rh-106	2095 Bq/gU
	Ru-103/Rh-103	885 Bq/gU
	Ce-144/Pr-144/Pr-144 ^a	8349 Bq/gU
	Sb-125	1030 Bq/gU
	Cs-134	283 Bq/gU
	Cs-137/Ba-137 ^a	778 Bq/gU
	Zr-95	598 Bq/gU
	Nb-95	574 Bq/gU

From ASTM C-787, the total concentration of elements that form non-volatile fluorides (including Al, Ba, Be, Bi, Cd, Co, Cr, Cu, Fe, Pb, Li, Mg, Mn, Ni, K, Ag, Na, Sr, Th, Sn, Zn, and Zr) must not exceed 300 µg/gU.

1.2.3 Contents of Package

The NCI-21PF-1 package is used for the safe transport of uranium hexafluoride enriched in the U-235 isotope; the UF₆ must be packaged in Model 30B UF₆ cylinders which have been fabricated, inspected, tested, and maintained in accordance with the requirements of ANSI N14.1. The package contents are limited to a maximum of 5,020 pounds UF₆ enriched to not more than 5 w/o U-235. The UF₆, which may contain either virgin and recycled uranium, must meet the requirements of ASTM C-787 for feed materials and ASTM C996 for UF₆ which has been processed through an enrichment plant. In the case of recycled uranium, the package contents must not exceed 1,150 A, quantities of radioactive materials as determined per 10CFR71, Appendix A and must not contain more than the following maximum quantities of radionuclides and impurities:

U-232	0.05 µg/gU	
U-234	2000 µg/gU	
U-235	0.05 g/gU	
U-236	0.025 g/gU	
U-238	balance of total uranium content	
Pu + Np	Alpha activity not exceeding 3.3 Bq/gU	
Tc-99	5 µg/gU	
Th-228	1.17 x 10 ⁻³ µg/gU (other U-232 daughters are ignored because of very short half-lives)	
Fission Products	4.4 x 10 ⁵ Mev Bq/d kgU (total contribution from gamma emitting fission products); this results in the following individual maximum activities:	
	Ru-106/Rh-106	2095 Bq/gU
	Ru-103/Rh-103	885 Bq/gU
	Ce-144/Pr-144/Pr-144 ^a	8349 Bq/gU
	Sb-125	1030 Bq/gU
	Cs-134	283 Bq/gU
	Cs-137/Ba-137 ^a	778 Bq/gU
	Zr-95	598 Bq/gU
	Nb-95	574 Bq/gU

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	Ru-106/Rh-106 2095 Bq/gU
	Ru-103/Rh-103 885 Bq/gU
	Ce-144/Pr-144/Pr-144 ^m 8349 Bq/gU
	Sb-125 1030 Bq/gU
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