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June 1, 2007

Post Docket
40-6563

Mr. Amir Kouhestani
U.S. Nuclear Regulatory Commission
Two White Flint North Building
11545 Rockville Pike
Rockville, MD 20852-2738

Subject: License Number STB-401
Soil release per 10 CFR Part 40.13

Dear Mr. Kouhestani:

Mallinckrodt has requested NRC authorization to release certain solid wastes, resulting from maintenance of its St. Louis downtown site operations for transfer to a state-regulated disposal facility. The wastes contain less than 0.05 wt% source material and thus are an unimportant quantity according to 10 CFR Part 40.13(a). Mallinckrodt has successfully exercised such disposal previously with NRC authorization.

You have asked for additional clarifying description of the wastes that are subject of the current request for release for transfer. A revised tabulation of the wastes and associated notes to further clarify the table are attached hereto.

If additional information is needed, please contact Karen Burke at Mallinckrodt, Inc.

Sincerely yours,



Henry Morton

cc: Patricia Duft, esq.
Karen Burke
enc.: table and notes

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6.12.07
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Table 1. Soil, Sediment, and Pavement Rubble from Mallinckrodt St. Louis Downtown Plant Site

Container Identification	Waste Volume (cu ft)	Radionuclide Concentration							Fraction of 10CFR40.13(a) Limit	Fraction of USEcology 10CFR40.13(a) Limit	Fraction of USEcology 2000 pCi/g Limit	Comment
		U-234 (pCi/g)	U-238 (pCi/g)	Th-228 (pCi/g)	Th-230 (pCi/g)	Th-232 (pCi/g)	Ra-226 (pCi/g)	Ra-228 (pCi/g)				
1108	270	4.38	4.44	1.04	4.52	1.19	2.6	1.15	0.05	0.05	0.04	
119	270	6.05	5.45	1.16	4.6	1.03	2.26	1.36	0.05	0.06	0.05	
121	270	10.7	10.2	1.34	7.25	1.32	3.11	1.17	0.09	0.10	0.08	
122	270	4.51	4.7	1.2	5.4	1.33	3.47	1.91	0.05	0.06	0.04	
127	270	5.11	5	1.34	5.53	1.2	4.34	1.67	0.05	0.06	0.04	
282	270	12.6	14.7	1.41	9.6	1.32	3.19	1.36	0.11	0.12	0.10	
105	270	5.39	5.15	1.2	4.13	1.19	2.56	0.91	0.05	0.06	0.04	
106	270	5.39	5.15	1.2	4.13	1.19	2.56	0.91	0.05	0.06	0.04	
107	270	3.16	3.15	1.37	3.16	1.19	2.61	1.28	0.04	0.05	0.03	
108	270	3.16	3.15	1.37	3.16	1.19	2.61	1.28	0.04	0.05	0.03	
109	270	2.37	2.77	1.41	2.09	1.15	2.36	1.17	0.04	0.04	0.02	
110	270	2.37	2.77	1.41	2.09	1.15	2.36	1.17	0.04	0.04	0.02	
112	270	2.37	2.77	1.41	2.09	1.15	2.36	1.17	0.04	0.04	0.02	
20126	270	5.59	5.31	1.08	8.1	1.13	6.98	1.15	0.05	0.06	0.04	
20335	270	5.59	5.31	1.08	8.1	1.13	6.98	1.15	0.05	0.06	0.04	
20446	270	3.48	3.71	1.13	4	0.99	3.48	1.36	0.04	0.04	0.03	
20453	270	1.84	1.98	1.16	2.07	0.9	1.47	0.93	0.03	0.03	0.02	
149	270	4.6	4.4		2.88	1.19	2.15	1.88	0.04	0.04	0.04	
10	270	25.4	26.3		40	10.3	46.5	8	0.25	0.28	0.23	
107	270	9.6	9.8		21.1	3.13	50.4	5.4	0.09	0.10	0.08	
124	270	4.9	4.9		6.3	1.8	13.2	1.77	0.05	0.05	0.04	
171A	270											Composited with 124, 107
20139	270	2.06	1.8		2.91	1.09	1.46	1.48	0.02	0.02	0.02	
20365	270											Composited with 124, 107
20519	270	8.4	9.2		5.1	6.5	18	6.49	0.11	0.12	0.09	
209	270											Concrete
300	270	2.23	2.07		8	13.1	6.93	13.4	0.13	0.13	0.08	
CT-B2	270											Concrete
CT-B3	270											Concrete
175A	270											Concrete/asphalt
14944	270	5.5	4.3		27		3.19	6.77	0.03	0.03	0.03	
20371	270	3.98	4.1	1.21	2.82	0.94	2.23	1.66	0.04	0.05	0.03	

Waste volume estimates 10 cubic yards of solid waste in each container.

NOTES TO TABLE 1

Fraction of 10 CFR 40.13(a) Limit

Entries in Table 1, column labeled "Fraction of 10 CFR 40.13(a) Limit" are the fraction of an "unimportant quantity" of source material, specified in 10 CFR Part 40.13(a) as < 0.05 wt% source material. A concentration of 0.05 wt% source material may be interpreted as 166 pCi U²³⁸/g material or 55 pCi Th²³²/g material. The average of measurements of the concentration of key, long-lived radionuclides, U²³⁸ and U²³⁴ best represent U²³⁸ concentration. The average of measurements of Th²³² and Th²²⁸ best represent Th²³² concentration. A sum-of-fractions of the limit equation is used to derive the fraction of 0.05 wt% source material specified in 10 CFR Part 40.13(a). The equation applied is:

$$\text{SOF} = \frac{C(\text{U}^{238}) + C(\text{U}^{234})}{2 \times 166} + \frac{C(\text{Th}^{232}) + C(\text{Th}^{228})}{2 \times 55}$$

where: SOF = sum-of-fractions of maximum concentration of an unimportant concentration, must be ≤ 1.0

C(U²³⁸) = concentration of U²³⁸ in solid waste (pCi/g)

C(U²³⁴) = concentration of U²³⁴ in solid waste (pCi/g)

C(Th²³²) = concentration of Th²³² in solid waste (pCi/g)

C(Th²²⁸) = concentration of Th²²⁸ in solid waste (pCi/g)

166 = U²³⁸ concentration equivalent to 0.05 wt% source material in solid waste when the uranium series is in radioactive equilibrium (pCi/g)

55 = Th²³² concentration equivalent to 0.05 wt% source material in solid waste when the thorium series is in radioactive equilibrium (pCi/g)

Fraction of USEcology 10CFR 40.13(a) Limit

USEcology in Idaho has waste acceptance criteria for natural uranium in equilibrium with its progeny, natural thorium, and for any mixture of thorium and uranium. Those criteria are interpreted in the following manner:

$$\text{SOF} = \frac{C(\text{U}^{238}) + C(\text{U}^{234})}{2 \times 141} + \frac{C(\text{Th}^{232}) + C(\text{Th}^{228})}{2 \times 55}$$

where 141 = USEcology interpretation of U²³⁸ concentration equivalent to 0.05 wt% source material in solid waste when the uranium series is in radioactive equilibrium (pCi/g)

Fraction of USEcology 2000 pCi/g Limit

USEcology in Idaho has waste acceptance criteria for total radioactivity of natural uranium in equilibrium with its progeny and for any mixture of thorium and uranium. Those criteria are interpreted in the following manner:

$$\text{SOF} = \left[\left(\frac{C(\text{U}^{238}) + C(\text{U}^{234})}{2} \times 14 \right) + \left(\frac{C(\text{Th}^{232}) + C(\text{Th}^{228})}{2} \times 10 \right) \right] \times \frac{1}{2000}$$

where 14 = number of radionuclides in serial decay of the uranium series
10 = number of radionuclides in serial decay of the thorium series
2000 = maximum acceptable radioactivity concentration of all radionuclides in the uranium series and thorium series in solid waste (pCi/g)

Containers 107, 124, 171A, and 20365

Soil excavated in the same location on the same day was put into containers 107, 124, 171A, and 20365. Multiple samples of the soil were collected to represent the entire lot of excavated soil and were composited into two samples for analysis. Those two composite samples contained 0.09 and 0.05 of 0.05 wt% source material. Even if all source material in a composite sample were to have originated from within a single container, the concentration in that container would be confirmed to be < 0.4 of the unimportant concentration limit.

In order to avoid skewing statistical representation of the data for all containers in Table 1, the concentration represented by a composite sample was assigned to just one of the containers it represents in Table 1; although it applies to two.

Containers 209, CT-B2, CT-B3, and 175A

Containers 209, CT-B2, CT-B3, and 175A contain concrete and or asphalt. The surfaces were surveyed in the field and were observed to be at background level for the St. Louis site. Since potential contamination would be surficial, radiation survey of the surface verifies absence of significant contamination and thus verifies mass concentration of source material to be insignificant relative to 0.05 wt%, the unimportant concentration described in 10 CFR Part 40.13(a).

Volume of Solid Waste.

Solid waste volume in each container is estimated to be 10 cubic yards, or 270 cubic feet. The total volume of solid waste represented in Table 1 is approximately 320 cubic yards.