



DEFENSE LOGISTICS AGENCY
DEFENSE NATIONAL STOCKPILE CENTER
8725 JOHN J. KINGMAN ROAD, SUITE 3229
FT. BELVOIR, VIRGINIA 22060-6223

AMENDMENT NO. 013
TO DLA-TANTALUM/COLUMBIUM CONCENTRATES-001
SOLICITATIONS OF OFFERS
FOR STOCKPILE TANTALUM/COLUMBIUM CONCENTRATES

The above referenced solicitation for the sale of Tantalum/Columbium Concentrates is hereby amended for the changes stated herein:

1. Amendment no. 009, 011 and 012 remain in effect except as modified herein.
2. The next offering time and date will be **Wednesday November 12, 2003 at 10:00 AM, local time, Ft. Belvoir, VA.** Accordingly, paragraph a. of Section **A.1 Introduction (JAN 03)** is revised as follows:

A.1 Introduction (MAY 03)

a. The Defense Logistics Agency (DLA), Defense National Stockpile Center (DNSC), is soliciting offers for the sale of Tantalum/Columbium Concentrates, approximately **511,905.5199 lbs bulk wt. or 237,864.3900 lbs Ta₂O₅.** This material is stored at the DLA/DNSC New Haven, IN and Binghamton, NY Depots. The offering will be held on **Wednesday, November 12, 2003 at 10:00 AM, local time, Ft. Belvoir, VA.** Offers must be received at the address in Section **B.2.a.** by the aforementioned date and time. In the event DNSC is closed at that time, offers for that day will be received at 10:00 AM, local time, Ft. Belvoir, VA on the next DNSC business day.

3. All references to Sections **I.2 and J.1 and J.4** are superceded by the attached Sections **I.2 and J.1 and J.4**, dated (**SEPT 03**) and (**AUG 03**) respectively.
4. For Tantalum/Columbium Concentrates (Category 2) listed under this solicitation with a specific activity less than 70 Bequerels/gram (Bq/g), **Section 14** of the **Material Safety Data Sheet (MSDS)** for **Tantalum Minerals (Radioactive)** is hereby modified to **delete** the following information in its entirety while the material is in domestic transport:

"U.S. DOT 49 CFR 172.101
PROPER SHIPPING NAME: Radioactive material, low specific activity, n.o.s.
ID NUMBER: UN2912
HAZARD CLASS OR DIVISION 7
LABELING REQUIREMENTS: 7"

and to substitute the attached "**Addendum to Material Safety Data Sheet**" therefor. For Tantalum/Columbium Concentrates (Category 2) listed under the BOA with a specific activity equal to or greater than 70 Bq/g, the language of the aforementioned MSDS shall remain unchanged.

5. For transportation within the United States after September 25, 2003 a Contractor must use a carrier that has an "en route security plan" conforming to the requirements of 49 CFR 172.802 for:

Tantalum/Columbium Concentrates (Category 2) with a specific activity of 70Bq/g or greater only.

**DLA-TANTALUM/COLUMBIUM CONCENTRATES-001
AMENDMENT NO. 013**

6. Offerors shall acknowledge receipt of this Amendment by signing in the space provided below and returning this form along with your offer on Section **I.2 Item Offer Page-DLA-TANTALUM/COLUMBIUM CONCENTRATES (JAN 03)** and the **“Submittals for Negotiated Offers”** found by clicking the “Getting Started” tab at the DNSC homepage on <https://www.dnsc.dla.mil>. Send to the attention of: **DNSC-XO/Bid Custodian at Facsimile No. (703) 767-5541.**

7. Section **J.2 Storage Location** is hereby amended to change the Operations and Logistics Division Point of Contact listed in Amendment 009 as follows:

Operations and Logistics Division Point of Contact:

Ms. Winnie McCray
Defense Logistics Agency
Defense National Stockpile Center
ATTN: DNSC-O
8725 John J. Kingman Road, Suite 3229
Fort Belvoir, VA 22060-6223

Telephone: 703-767-7616
FAX: 703-767-7608

8. Failure to acknowledge receipt of this Amendment, may result in the Offeror being considered ineligible to quote. Except as provided herein, all other terms and conditions of DLA-TANTALUM/COLUMBIUM CONCENTRATES-001 and Amendment Nos. 009, 011 and 012 thereto, remain unchanged and in full force and effect.

The index and the solicitation are hereby revised to reflect the latest editions and corresponding section numbers of all certification and representation clauses.

NAME OF FIRM: _____

ADDRESS: _____

TELEPHONE: _____ **FACSIMILE:** _____

COMPLETED BY: _____

SIGNATURE: _____ **DATE:** _____

TITLE: _____

WEB PAGE: _____ **E-MAIL ADDRESS:** _____

Access to Solicitation of Offers DLS-TANTALUM/COLUMBIUM CONCENTRATES—001 and Amendment nos. 009, 011, 012 and 013 (this amendment) are available at the DNSC Website: <https://www.dnsc.dla.mil>.

Section I.2

Shopping List (SEPT 03)

Tantalum/Columbium Concentrates

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<u>ITEM NO.</u>	<u>STORAGE LOCATION</u>	<u>ORIGIN</u>	<u>LOT NO.</u>	<u>NO. UNITS</u>	<u>BULK WT.(LBS.)</u>	<u>Ta₂O₅ WEIGHT</u>
Category 2		Tantalum Minerals More Than 0.05% Combined Thorium and Uranium				
155	NEW HAVEN	UNKNOWN	1 DLA300-90-C-0031	84	41,999.5000	14,918.2224
156	NEW HAVEN	UNKNOWN	2 DLA300-90-C-0031	84	41,999.5000	14,939.2222
157	NEW HAVEN	UNKNOWN	3 DLA300-90-C-0031	84	41,999.5000	18,777.9765
161	NEW HAVEN	UNKNOWN	7 DLA300-90-C-0031	59	29,499.5000	9,271.6929
162	NEW HAVEN	UNKNOWN	DMS-137	50	13,729.0000	6,661.3108
163	NEW HAVEN	BRAZIL	108	24	6,397.0000	2,752.6291
166	NEW HAVEN	UNKNOWN	1053A	8	2,183.5000	1,054.6305
167	NEW HAVEN	UNKNOWN	1053B	8	2,127.5000	1,307.7743
169	NEW HAVEN	UNKNOWN	ONSP-4E178	23	9,222.5000	3,275.8320
173	NEW HAVEN	BRAZIL	MRC-281	28	5,675.5000	2,005.1542
174	NEW HAVEN	UNKNOWN	83/113	38	2,181.5000	1,311.9541
175	NEW HAVEN	BRAZIL	MRC-264	9	4,434.5000	2,454.0523
176	NEW HAVEN	LIQUIDO BRAZIL	23	5	2,181.5000	1,386.1251
SUBTOTAL					203,630.5000	80,116.5764

<u>ITEM NO.</u>	<u>STORAGE LOCATION</u>	<u>ORIGIN</u>	<u>LOT NO.</u>	<u>NO. UNITS</u>	<u>BULK WT.(LBS.)</u>	<u>Ta₂O₅ WEIGHT</u>
Category 2		Tantalum Minerals More Than 0.05% Combined Thorium and Uranium				
177	NEW HAVEN	BRAZIL	024	05	2,199.5000	1,457.1688
179	NEW HAVEN	RHODESIA	MRC-301	01	264.5000	129.8166
180	NEW HAVEN	AUSTRALIA	MRC-299	01	276.5000	213.7069
181	NEW HAVEN	AUSTRALIA	MRC-313	01	234.5000	154.0196
182	NEW HAVEN	NIGERIA	MRC-272	07	1,319.5000	770.8519
183	NEW HAVEN	UNKNOWN	001107000G	13	8,673.5000	5,305.5800
184	NEW HAVEN	UNKNOWN	001107000F	06	3,780.5000	2,150.7265
185	NEW HAVEN	UNKNOWN	001060001	10	6,639.5000	3,665.0040
186	NEW HAVEN	UNKNOWN	0782362678	04	1,692.5000	772.1185
187	NEW HAVEN	UNKNOWN	0782362574	05	2,321.5000	985.9411
188	NEW HAVEN	UNKNOWN	0010700E	05	3,453.5000	2,257.8983
189	NEW HAVEN	UNKNOWN	001060002	13	8,764.5000	4,619.7680
198	NEW HAVEN	BELGIAN CONGO	MRC-336	04	1,220.5000	432.3011
SUBTOTAL:					40,840.5000	22,914.9013

<u>ITEM NO.</u>	<u>STORAGE LOCATION</u>	<u>ORIGIN</u>	<u>LOT NO.</u>	<u>NO. UNITS</u>	<u>BULK WT.(LBS.)</u>	<u>Ta₂O₅ WEIGHT</u>
Category 2		Tantalum Minerals More Than 0.05% Combined Thorium and Uranium				
202	NEW HAVEN	INDIA	MRC-286	07	1,908.5000	588.3906
207	NEW HAVEN	BRAZIL	Rio E	47	10,798.0000	5,568.5286
208	NEW HAVEN	UNKNOWN	1116000A	09	3,145.5000	1,524.9384
209	NEW HAVEN	UNKNOWN	0021671533	03	1,761.5000	800.7779
210	NEW HAVEN	AUSTRALIA	MRC-324	3	682.5000	264.3323
211	NEW HAVEN	BELGIAN CONGO	MRC-292	08	1,664.5000	536.9677
212	NEW HAVEN	BRAZIL	MRC-262	21	4,445.5000	1,449.6776
213	NEW HAVEN	BELGIAN CONGO	MRC-357	15	3,081.5000	939.8575
214	NEW HAVEN	RHODESIA	MRC-87	25	7,699.5000	4,197.7674
215	NEW HAVEN	BRAZIL	MRC-279	15	4,387.5000	1,775.6213
216	NEW HAVEN	BRAZIL	MRC-113	23	6,641.5000	3,439.6329
217	NEW HAVEN	LIQUIDO BRAZIL	MRC-138	10	2,852.5000	1,410.2760
218	NEW HAVEN	BRAZIL	MRC-196	08	2,249.5000	1,058.6147
219	NEW HAVEN	BRAZIL	MRC-256	09	2,193.5040	1,033.3597
220	NEW HAVEN	BELGIAN CONGO	MRC-311	03	848.5000	547.1128
SUBTOTAL					54,360.0040	25,135.8554

<u>ITEM NO.</u>	<u>STORAGE LOCATION</u>	<u>ORIGIN</u>	<u>LOT NO.</u>	<u>NO. UNITS</u>	<u>BULK WT.(LBS.)</u>	<u>Ta₂O₅ WEIGHT</u>
Category 2 Tantalum Minerals More Than 0.05% Combined Thorium and Uranium						
221	NEW HAVEN	NIGERIA	MRC-283	04	1,040.5000	630.1268
222	NEW HAVEN	NIGERIA	MRC-323	03	780.5000	313.2927
223	NEW HAVEN	LIQUIDO BRAZIL	22	05	2,152.5000	1,010.5988
224	NEW HAVEN	LIQUIDO BRAZIL	13	16	7,664.5000	4,600.9994
225	NEW HAVEN	UNKNOWN	MRC-183	08	2,207.5000	1,447.0163
226	NEW HAVEN	LIQUIDO BRAZIL	12	09	4,378.5000	2,991.3912
227	NEW HAVEN	LIQUIDO BRAZIL	20	13	6,534.5000	3,317.5657
228	NEW HAVEN	LIQUIDO BRAZIL	15	07	3,279.5000	1,789.6232
229	NEW HAVEN	BELGIAN CONGO	MRC-126	11	2,628.5000	1,467.7544
230	NEW HAVEN	BRAZIL	MRC-199	07	2,099.5000	1,134.1499
231	NEW HAVEN	BRAZIL	MRC-129	22	6,423.5000	3,236.8017
232	NEW HAVEN	LIQUIDO BRAZIL	MRC-139	06	1,594.5000	732.5133
233	NEW HAVEN	UNKNOWN	1	10	2,999.5000	2,021.9630
234	NEW HAVEN	UNKNOWN	1A&2	03	693.5000	461.4549
235	NEW HAVEN	LIQUIDO BRAZIL	MRC-189	11	2,279.5000	1,519.7427
236	NEW HAVEN	BRAZIL	MRC-259	11	2,190.5000	1,122.4122
237	NEW HAVEN	UNKNOWN	MRC-180	11	2,195.5000	1,452.1037
238	NEW HAVEN	LIQUIDO BRAZIL	MRC-173	11	2,199.5000	1,463.7673
239	NEW HAVEN	UGANDA	MRC-275	03	558.5000	185.3662
240	NEW HAVEN	AUSTRALIA	MRC-312	01	240.5000	173.1360
241	NEW HAVEN	BRAZIL	MRC-193	10	2,077.5000	1,007.1720
242	NEW HAVEN	LIQUIDO BRAZIL	MRC-178	11	2,187.5000	1,438.7188
SUBTOTAL					58,406.0000	33,517.6702

<u>ITEM NO.</u>	<u>STORAGE LOCATION</u>	<u>ORIGIN</u>	<u>LOT NO.</u>	<u>NO. UNITS</u>	<u>BULK WT.(LBS.)</u>	<u>Ta₂O₅ WEIGHT</u>
Category 2 Tantalum Minerals More Than 0.05% Combined Thorium and Uranium						
243	NEW HAVEN	SALT LAKE CITY, UT	MRC-213	13	3,214.5000	2,353.0140
244	NEW HAVEN	AUSTRALIA	MRC-318	11	3,079.5000	1,985.9696
245	NEW HAVEN	NIGERIA	MRC-322	05	1,328.5000	533.7913
246	NEW HAVEN	RHODESIA	MRC-100	11	3,299.5000	1,671.8567
247	NEW HAVEN	LIQUIDO BRAZIL	MRC-175	08	2,265.5000	1,479.3715
248	NEW HAVEN	LIQUIDO BRAZIL	MRC-190	08	2,196.5000	1,111.6487
249	NEW HAVEN	AUSTRALIA	MRC-326	03	722.5000	391.3783
250	NEW HAVEN	LIQUIDO BRAZIL	MRC-270	16	4,790.5000	2,570.5823
251	NEW HAVEN	DIXON, NM	MRC-309	10	2,311.5000	1,674.4506
252	NEW HAVEN	BRAZIL	MRC-278	22	6,486.5000	2,791.7896
253	NEW HAVEN	NIGERIA	MRC-77	06	1,173.5000	632.6339
254	NEW HAVEN	BRAZIL	MRC-271	22	4,386.5000	2,347.2162
255	NEW HAVEN	NIGERIA	MRC-247	04	842.5000	511.3975
256	NEW HAVEN	BRAZIL	MRC-263	15	4,403.5000	2,151.9905
257	NEW HAVEN	UGANDA	MRC-274	02	521.5000	193.4765
258	NEW HAVEN	UNKNOWN	MRC-179	08	2,184.5000	1,415.5560
259	NEW HAVEN	BRAZIL	MRC-117	08	2,149.5000	1,111.7214
260	NEW HAVEN	UNKNOWN	3 NONG	03	1,187.5000	416.5760
261	NEW HAVEN	AUSTRALIA	RPS	01	1,486.5000	791.2640
262	NEW HAVEN	SOUTH RHODESIA	1138	16	2,214.5000	903.5160
263	NEW HAVEN	UNKNOWN	1107(569)	03	1,566.5000	957.7581
264	NEW HAVEN	NIGERIA	MRC-273	02	594.5000	272.4594
SUBTOTAL					52,406.0000	28,269.4181

<u>ITEM NO.</u>	<u>STORAGE LOCATION</u>	<u>ORIGIN</u>	<u>LOT NO.</u>	<u>NO. UNITS</u>	<u>BULK WT.(LBS.)</u>	<u>Ta₂O₅ WEIGHT</u>
Category 2 Tantalum Minerals More Than 0.05% Combined Thorium and Uranium						
265	NEW HAVEN	BRAZIL	MRC-86	22	4,351.5000	2,354.5967
266	NEW HAVEN	BRAZIL	MRC-94	22	4,323.5000	2,217.5232
267	NEW HAVEN	LIQUIDO BRAZIL	MRC-186	12	2,442.5000	1,534.1343
268	NEW HAVEN	AUSTRALIA	MRC-153	01	299.5000	155.2908
269	NEW HAVEN	RHODESIA	MRC-162	10	2,025.5000	1,121.1143
270	NEW HAVEN	AUSTRALIA	MRC-317	07	1,455.5060	886.1121
271	NEW HAVEN	BELGIAN CONGO	MRC-291	18	3,540.5000	1,236.3426
272	NEW HAVEN	UGANDA	MRC-333	01	159.5000	57.5476
273	NEW HAVEN	BELGIAN CONGO	MRC-343	43	8,652.5000	3,758.6460
274	NEW HAVEN	BRAZIL	MRC-223	22	4,396.5000	2,998.4130
275	NEW HAVEN	UGANDA	MRC-350	04	837.5000	498.2288
276	NEW HAVEN	BELGIAN CONGO	MRC-290	05	1,065.5000	561.5185
277	NEW HAVEN	RHODESIA	MRC-254	07	1,939.5000	985.2660
278	NEW HAVEN	BRAZIL	MRC-261	08	2,181.5000	909.4674
279	NEW HAVEN	LIQUIDO BRAZIL	MRC-174	11	2,167.5000	1,436.1855
280	NEW HAVEN	BRAZIL	MRC-195	08	2,189.5000	979.8013
281	NEW HAVEN	BRAZIL	1146B	40	4,403.5000	2,409.5952
282	NEW HAVEN	BRAZIL	1146D	40	4,380.5000	2,395.6955
283	NEW HAVEN	BRAZIL	1147	113	9,914.5000	4,858.1050
284	NEW HAVEN	GREAT BRITAIN	1105	43	3,097.5000	1,570.4325
285	NEW HAVEN	AUSTRALIA	1140	153	9,378.5090	3,863.9457
286	NEW HAVEN	ENGLAND	1165	11	4,346.5000	1,862.9099
287	NEW HAVEN	UNKNOWN	111-SWEEPINGS	02	863.5000	492.3677
SUBTOTAL					78,412.5150	39,143.2396
GRAND TOTAL					488,055.5190	229,097.6610

ITEM NO.	STORAGE LOCATION	ORIGIN	LOT NO.	NO. UNITS	BULK WT.(LBS.)	Ta2O5 WEIGHT
Category 2 Tantalum Minerals More Than 0.05% Combined Thorium and Uranium						
38	BINGHAMTON	PORTUGAL	014	25	10,989.0000	3,345.0516
39	BINGHAMTON	PORTUGAL	015	17	5,521.0000	1,641.9454
112	BINGHAMTON	BELGIAN CONGO	115	14	4,962.0000	2,397.6384
117	BINGHAMTON	BELGIAN CONGO	235	07	2,378.0000	1,382.0936
SUBTOTAL					23,850.0000	8,766.7290

Section J.1

Tantalum Analyses (SEPT 03)

TANATLUM/COLUMBIUM CONCENTRATES
CATEGORY 2 (Greater than 0.05 Combined Thorium and Uranium)

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Tantalum/Columbium Concentrates Analyses
Category 2 (greater than 0.05% combined Thorium and Uranium)

No.	Location	Number	Number	Units	Origin	Ta ₂ O ₅	Cb ₂ O ₅	SnO ₂	TiO ₂	Sb	Th	U	[Th+U]	Bq/g	Bulk Weight (Pounds)	Cb (Pounds)	Ta (Pounds)	Ta ₂ O ₅ (Pounds)	Cb ₂ O ₅ (Pounds)
														Percent (%) by Weight					
155	New Haven, IN	DLA300-90-C-0031	1	84	Unknown	35.52	31.54	4.82	3.08	0.01	0.046	0.060	0.106	19.5	41,999.5000	9,259.9	12217.43	14,918.2224	13,246.6
156	New Haven, IN	DLA300-90-C-0031	2	84	Unknown	35.57	31.41	4.76	2.99	0.01	0.044	0.058	0.102	18.8	41,999.5000	9,221.8	12234.63	14,939.2222	13,192.0
157	New Haven, IN	DLA300-90-C-0031	3	84	Unknown	44.71	15.96	4.72	1.28	<0.01	0.073	0.052	0.125	19.6	41,999.5000	4,685.7	15378.41	18,777.9765	6,703.1
161	New Haven, IN	DLA300-90-C-0031	7	59	Unknown	31.43	32.22	6.10	2.51	<0.01	0.102	0.055	0.157	22.8	29,499.5000	6,644.2	7593.15	9,271.6929	9,504.7
162	New Haven, IN	GS-OOP-1319-1F SCM	DMS-137	50	Unknown	48.52	29.78	0.63	0.28	<0.01	0.002	0.053	0.055	14.1	13,729.0000	2,858.0	5455.35	6,661.3108	4,088.5
163	New Haven, IN	GS-OOP-2923-2F SCM	108	24	Brazil	43.03	19.81	8.39	3.23	<0.01	0.020	0.101	0.121	28.2	6,397.0000	885.9	2254.29	2,752.6291	1,267.2
166	New Haven, IN	GS-OOP-10045 SCM 1F	1053A	8	Unknown	48.30	30.94	0.71	0.26	<0.01	0.004	0.053	0.057	19.6	2,183.5000	472.3	863.70	1,054.6305	675.6
167	New Haven, IN	GS-OOP-10045 SCM 1F	1053B	8	Unknown	61.47	12.37	3.78	2.12	0.01	0.018	0.058	0.076	16.7	2,127.5000	184.0	1071.01	1,307.7743	263.2
169	New Haven, IN	Relocation DMO-00001	ONSP-4E178	23	Unknown	35.52	43.85	0.49	0.53	<0.01	0.004	0.079	0.083	21.1	9,222.5000	2,827.0	2682.78	3,275.8320	4,044.1
173	New Haven, IN	Special Project FJO-935	MRC-281	28	Brazil	35.33	40.50	1.68	2.19	<0.01	0.004	0.098	0.102	26.1	5,675.5000	1,606.8	1642.14	2,005.1542	2,298.6
174	New Haven, IN	Special Project FJO-935	83/113	38	Unknown	60.14	16.67	3.13	1.41	<0.01	0.013	0.052	0.065	14.7	2,181.5000	254.2	1074.44	1,311.9541	363.7
175	New Haven, IN	Special Project FJO-935	MRC-264	9	Brazil	55.34	20.01	1.36	1.72	<0.01	0.014	0.118	0.132	32.1	4,434.5000	620.3	2009.77	2,454.0523	887.3
176	New Haven, IN	Special Project FJO-935	23	5	Liquido Brazil	63.54	13.42	3.61	1.63	0.01	0.031	0.044	0.075	14.1	2,181.5000	204.6	1135.18	1,386.1251	292.8
177	New Haven, IN	Special Project FJO-935	24	5	Brazil	66.25	10.95	3.47	1.44	0.01	0.036	0.031	0.067	11.1	2,199.5000	168.4	1193.36	1,457.1688	240.8
179	New Haven, IN	Special Project FJO-935	MRC-301	1	Rhodesia	49.08	21.18	6.85	1.29	0.06	0.016	0.073	0.089	20.5	264.5000	39.2	106.31	129.8166	56.0
180	New Haven, IN	Special Project FJO-935	MRC-299	1	Australia	77.29	4.15	0.18	0.90	0.06	0.021	0.031	0.052	9.9	276.5000	8.0	175.02	213.7069	11.5
181	New Haven, IN	Special Project FJO-935	MRC-313	1	Australia	65.68	2.99	<0.01	0.63	0.26	0.031	0.038	0.069	12.5	234.5000	4.9	126.14	154.0196	7.0
182	New Haven, IN	Special Project FJO-935	MRC-272	7	Nigeria	58.42	17.95	4.14	0.78	<0.01	0.085	0.035	0.120	16.1	1,319.5000	165.6	631.30	770.8519	236.9
183	New Haven, IN	Relocation DMO-00001	001107000G	13	Unknown	61.17	11.29	2.17	1.41	0.03	0.026	0.065	0.091	19.2	8,673.5000	684.5	4345.06	5,305.5800	979.2
184	New Haven, IN	Relocation DMO-00001	001107000F	6	Unknown	56.89	15.54	3.53	1.20	0.01	0.096	0.032	0.128	16.2	3,780.5000	410.7	1761.36	2,150.7265	587.5
185	New Haven, IN	Relocation DMO-00001	001060001	10	Unknown	55.20	21.43	3.14	1.73	<0.01	0.024	0.059	0.083	17.5	6,639.5000	994.6	3001.49	3,665.0040	1,422.8
186	New Haven, IN	Relocation DMO-00001	0782362678	4	Unknown	45.62	27.67	0.66	1.03	<0.01	0.005	0.050	0.055	13.5	1,692.5000	327.4	632.33	772.1185	468.3
187	New Haven, IN	Relocation DMO-00001	0782362574	5	Unknown	42.47	28.86	1.50	1.70	<0.01	0.004	0.059	0.063	15.8	2,321.5000	468.3	807.45	985.9411	670.0
188	New Haven, IN	Relocation DMO-00001	0010700E	5	Unknown	65.38	4.72	2.67	1.11	0.06	0.038	0.090	0.128	26.7	3,453.5000	113.9	1849.13	2,257.8983	163.0
189	New Haven, IN	Relocation DMO-00001	001060002	13	Unknown	52.71	21.40	3.90	2.62	<0.01	0.017	0.060	0.077	17.1	8,764.5000	1,311.1	3783.41	4,619.7680	1,875.6
198	New Haven, IN	Special Project FJO-935	MRC-336	4	Belgian Congo	35.42	36.04	1.62	1.70	<0.01	0.004	0.101	0.105	26.9	1,220.5000	307.5	354.04	432.3011	439.9
202	New Haven, IN	Special Project FJO-935	MRC-286	7	India	30.83	47.16	0.49	1.01	<0.01	0.148	0.041	0.189	22.8	1,908.5000	629.2	481.87	588.3906	900.0
207	New Haven, IN	GS-OOP-10032 SCM 1F	Rio E	47	Brazil	51.57	28.54	0.68	0.74	<0.01	0.013	0.041	0.054	11.8	10,798.0000	2,154.3	4560.40	5,568.5286	3,081.7
208	New Haven, IN	Relocation DMO-00001	1116000A	9	Unknown	48.48	26.62	2.80	0.94	<0.01	0.001	0.076	0.077	20.0	3,145.5000	585.3	1248.86	1,524.9384	837.3
209	New Haven, IN	Relocation DMO-00001	0021671533	3	Unknown	45.46	30.28	0.55	0.62	<0.01	0.002	0.056	0.058	14.9	1,761.5000	372.9	655.81	800.7779	533.4
210	New Haven, IN	Special Project FJO-935	MRC-324	40	Australia	38.73	41.64	0.22	0.32	<0.01	0.023	0.094	0.117	26.6	682.5000	198.7	216.48	264.3323	284.2
211	New Haven, IN	Special Project FJO-935	MRC-292	8	Belgian Congo	32.26	32.62	2.44	1.67	<0.01	0.004	0.092	0.096	24.5	1,664.5000	379.6	439.76	536.9677	543.0
212	New Haven, IN	Special Project FJO-935	MRC-262	21	Brazil	32.61	44.97	0.54	1.53	<0.01	0.041	0.263	0.304	72.4	4,445.5000	1,397.5	1187.23	1,449.6776	1,999.1
213	New Haven, IN	Special Project FJO-935	MRC-357	15	Belgian Congo	30.50	28.83	1.19	1.17	<0.01	0.004	0.079	0.083	21.1	3,081.5000	621.0	769.71	939.8575	888.4
214	New Haven, IN	Special Project FJO-935	MRC-87	25	Rhodesia	54.52	7.92	7.82	1.75	<0.01	0.024	0.056	0.080	16.7	7,699.5000	426.3	3437.80	4,197.7674	609.8
215	New Haven, IN	Special Project FJO-935	MRC-279	15	Brazil	40.47	30.38	4.11	3.93	<0.01	0.028	0.128	0.156	35.9	4,387.5000	931.8	1454.16	1,775.6213	1,332.9
216	New Haven, IN	Special Project FJO-935	MRC-113	23	Brazil	51.79	23.44	1.56	2.83	<0.01	0.008	0.080	0.088	21.7	6,641.5000	1,088.2	2816.92	3,439.6329	1,556.8
217	New Haven, IN	Special Project FJO-935	MRC-138	10	Liquido Brazil	49.44	24.73	2.36	3.29	<0.01	0.019	0.069	0.088	19.7	2,852.5000	493.1	1154.96	1,410.2760	705.4
218	New Haven, IN	Special Project FJO-935	MRC-196	8	Brazil	47.06	16.20	8.36	3.32	<0.01	0.024	0.047	0.071	14.3	2,249.5000	254.7	866.96	1,058.6147	364.4
219	New Haven, IN	Special Project FJO-935	MRC-256	9	Brazil	47.11	28.63	1.34	2.01	<0.01	0.003	0.131	0.134	34.7	2,193.5040	439.0	846.28	1,033.3597	628.0
220	New Haven, IN	Special Project FJO-935	MRC-311	3	Belgian Congo	64.48	13.64	2.47	0.66	<0.01	0.006	0.063	0.069	17.0	848.5000	80.9	448.06	547.1128	115.7
221	New Haven, IN	Special Project FJO-935	MRC-283	4	Nigeria	60.56	16.35	4.59	1.12	<0.01	0.039	0.021	0.060	9.0	1,040.5000	118.9	516.05	630.1268	170.1
222	New Haven, IN	Special Project FJO-935	MRC-323	3	Nigeria	40.14	35.59	3.49	1.61	<0.01	0.057	0.031	0.088	12.8	780.5000	194.2	256.57	313.2927	277.8
223	New Haven, IN	Special Project FJO-935	22	5	Liquido Brazil	46.95	25.87	2.45	2.84	<0.01	0.037	0.172	0.209	48.2	2,152.5000	389.3	827.64	1,010.5988	556.9
224	New Haven, IN	Special Project FJO-935	13	16	Liquido Brazil	60.03	14.97	3.74	1.88	<0.01	0.027	0.143	0.170	39.8	7,664.5000	802.1	3768.03	4,600.9994	1,147.4
225	New Haven, IN	Special Project FJO-935	MRC-183	8	Unknown	65.55	13.62	1.23	1.53	<0.01	0.012	0.038	0.050	11.0	2,207.5000	210.2	1185.05	1,447.0163	300.7
226	New Haven, IN	Special Project FJO-935	12	9	Liquido Brazil	68.32	10.36	2.29	1.53	0.02	0.088	0.061	0.149	23.2	4,378.5000	317.1	2449.83	2,991.3912	453.6
227	New Haven, IN	Special Project FJO-935	20	13	Liquido Brazil	50.77	19.45	1.91	1.93	<0.01	0.034	0.389	0.423	105.0	6,534.5000	888.5	2716.95	3,317.5657	1,271.0
228	New Haven, IN	Special Project FJO-935	15	7	Liquido Brazil	54.57	15.50	3.40	2.35	<0.01	0.037	0.278	0.315	76.0	3,279.5000	355.3	1465.63	1,789.6232	508.3
229	New Haven, IN	Special Project FJO-935	MRC-126	11	Belgian Congo	55.84	12.63	1.36	0.94	<0.01	0.002	0.051	0.053	13.6	2,628.5000	232.1	1202.03	1,467.7544	332.0
230	New Haven, IN	Special Project FJO-935	MRC-199	7	Brazil	54.02	22.28	2.05	2.32	<0.01	0.008	0.055	0.063	15.1	2,099.5000	327.0	928.82	1,134.1499	467.8
231	New Haven, IN	Special Project FJO-935	MRC-129	22	Brazil	50.39	23.82	1.40	3.46	<0.01	0.021	0.079	0.100	22.5	6,423.5000	1,069.6	2650.81	3,236.8017	1,530.1
232	New Haven, IN	Special Project FJO-935	MRC-139	6	Liquido Brazil	45.94	26.00	4.20	2.63	<0.01	0.040	0.054	0.094	17.4	1,594.5000	289.8	599.90	732.5133	414.6
233	New Haven, IN	Special Project FJO-935	1	10	Unknown	67.41	6.57	0.14	0.14	0.05	0.043	0.309	0.352	84.7	2,999.5000	137.8	1655.91	2,021.9630	197.1
234	New Haven, IN	Special Project FJO-935	1A&2	3	Unknown	66.54	6.90	0.09	0.15	0.05	0.047	0.280	0.327	77.4	693.5000	33.5	377.91	461.4549	47.9
235	New Haven, IN	Special Project FJO-935	MRC-189	11	Liquido Brazil	66.67	12.21	1.22	1.59	<0.01	0.015	0.038	0.053	11.2	2,279.5000	194.6	1244.61	1,519.7427	278.3
236	New Haven, IN	Special Project FJO-935	M																

Tantalum/Columbium Concentrates Analyses
Category 2 (greater than 0.05% combined Thorium and Uranium)

Item No.	Storage Location	Contract Number	Lot Number	No. of Units	Country of Origin	Percent (%) by Weight										Bq/g	Bulk Weight (Pounds)	Cb (Pounds)	Ta (Pounds)	Ta ₂ O ₅ (Pounds)	Cb ₂ O ₅ (Pounds)
						Ta ₂ O ₅	Cb ₂ O ₅	SnO ₂	TiO ₂	Sb	Th	U	[Th+U]								
237	New Haven, IN	Special Project FJO-935	MRC-180	11	Unknown	66.14	13.62	1.13	1.54	<0.01	0.016	0.037	0.053	11.0	2,195.5000	209.0	1189.21	1,452.1037	299.0		
238	New Haven, IN	Special Project FJO-935	MRC-173	11	Liquido Brazil	66.55	12.40	1.16	1.61	<0.01	0.020	0.034	0.054	10.6	2,199.5000	190.7	1198.77	1,463.7673	272.7		
239	New Haven, IN	Special Project FJO-935	MRC-275	3	Uganda	33.19	15.39	<0.01	0.71	0.13	0.008	0.162	0.170	43.2	558.5000	60.1	151.81	185.3662	86.0		
240	New Haven, IN	Special Project FJO-935	MRC-312	1	Australia	71.99	2.72	0.09	0.52	0.44	0.015	0.038	0.053	11.2	240.5000	4.6	141.79	173.1360	6.5		
241	New Haven, IN	Special Project FJO-935	MRC-193	10	Brazil	48.48	14.32	7.75	3.41	<0.01	0.023	0.064	0.087	18.7	2,077.5000	208.0	824.83	1,007.1720	297.5		
242	New Haven, IN	Special Project FJO-935	MRC-178	11	Liquido Brazil	65.77	13.71	1.23	1.49	<0.01	0.015	0.039	0.054	11.5	2,187.5000	209.6	1178.25	1,438.7188	299.9		
243	New Haven, IN	Special Project FJO-935	MRC-213	13	Salt Lake City UT	73.20	6.35	<0.01	0.16	0.03	0.037	0.172	0.209	48.2	3,214.5000	142.7	1927.02	2,353.0140	204.1		
244	New Haven, IN	Special Project FJO-935	MRC-318	11	Australia	64.49	13.29	3.37	0.57	<0.01	0.016	0.041	0.057	12.1	3,079.5000	286.1	1626.43	1,985.9696	409.3		
245	New Haven, IN	Special Project FJO-935	MRC-322	5	Nigeria	40.18	35.46	4.65	1.20	0.01	0.055	0.033	0.088	13.1	1,328.5000	329.3	437.15	533.7913	471.1		
246	New Haven, IN	Special Project FJO-935	MRC-100	11	Rhodesia	50.67	4.68	7.50	2.83	<0.01	0.036	0.046	0.082	15.0	3,299.5000	107.9	1369.18	1,671.8567	154.4		
247	New Haven, IN	Special Project FJO-935	MRC-175	8	Liquido Brazil	65.30	13.66	1.24	1.54	<0.01	0.021	0.036	0.057	11.2	2,265.5000	216.3	1211.55	1,479.3715	309.5		
248	New Haven, IN	Special Project FJO-935	MRC-190	8	Liquido Brazil	50.61	16.08	5.24	3.32	0.01	0.023	0.065	0.088	18.9	2,196.5000	246.9	910.40	1,111.6487	353.2		
249	New Haven, IN	Special Project FJO-935	MRC-326	3	Australia	54.17	7.26	7.33	1.61	<0.01	0.133	0.025	0.158	17.4	722.5000	36.7	320.52	391.3783	52.5		
250	New Haven, IN	Special Project FJO-935	MRC-270	16	Liquido Brazil	53.66	20.31	4.21	1.98	<0.01	0.010	0.064	0.074	17.6	4,790.5000	680.1	2105.20	2,570.5823	973.0		
251	New Haven, IN	Special Project FJO-935	MRC-309	10	Dixon NM	72.44	6.16	<0.01	0.16	0.03	0.018	0.132	0.150	36.1	2,311.5000	99.5	1371.31	1,674.4506	142.4		
252	New Haven, IN	Special Project FJO-935	MRC-278	22	Brazil	43.04	27.68	4.59	3.49	<0.01	0.020	0.098	0.118	27.4	6,486.5000	1,255.1	2286.36	2,791.7896	1,795.5		
253	New Haven, IN	Special Project FJO-935	MRC-77	6	Nigeria	53.91	17.35	7.67	2.20	<0.01	0.015	0.055	0.070	15.7	1,173.5000	142.3	518.10	632.6339	203.6		
254	New Haven, IN	Special Project FJO-935	MRC-271	22	Brazil	53.51	21.85	1.75	2.15	<0.01	0.011	0.092	0.103	25.1	4,386.5000	670.0	1922.28	2,347.2162	958.5		
255	New Haven, IN	Special Project FJO-935	MRC-247	4	Nigeria	60.70	11.67	8.08	2.12	<0.01	0.052	0.035	0.087	13.4	842.5000	68.7	418.81	511.3975	98.3		
256	New Haven, IN	Special Project FJO-935	MRC-263	15	Brazil	48.87	28.09	1.13	1.70	<0.01	0.021	0.138	0.159	38.0	4,403.5000	864.7	1762.39	2,151.9905	1,236.9		
257	New Haven, IN	Special Project FJO-935	MRC-274	2	Uganda	37.10	32.34	11.29	0.17	<0.01	0.027	0.030	0.057	10.1	521.5000	117.9	158.45	193.4765	168.7		
258	New Haven, IN	Special Project FJO-935	MRC-179	8	Unknown	64.80	14.34	1.28	1.52	<0.01	0.009	0.043	0.052	12.0	2,184.5000	219.0	1159.28	1,415.5560	313.3		
259	New Haven, IN	Special Project FJO-935	MRC-117	8	Brazil	51.72	13.76	6.89	3.98	<0.01	0.025	0.062	0.087	18.3	2,149.5000	206.8	910.46	1,111.7214	295.8		
260	New Haven, IN	Relocation DMO-00001	3 NONG	3	Unknown	35.08	31.48	0.01	1.54	<0.01	0.024	0.107	0.131	30.1	1,187.5000	261.3	341.16	416.5750	373.8		
261	New Haven, IN	GS-OOP-1087-1F SCM	RPS	1	Australia	53.23	12.99	6.63	0.26	<0.01	0.010	0.093	0.103	25.2	1,486.5000	135.0	648.01	791.2640	193.1		
262	New Haven, IN	GS-OOP-10717 SCM	1138	16	South Rhodesia	40.80	34.56	3.02	0.32	<0.01	0.006	0.050	0.056	13.6	2,214.5000	535.0	739.94	903.5160	765.3		
263	New Haven, IN	Relocation DMO-00001	1107(569)	3	Unknown	61.14	15.18	2.36	1.12	0.01	0.016	0.050	0.066	14.4	1,566.5000	166.2	784.37	957.7581	237.8		
264	New Haven, IN	Special Project FJO-935	MRC-273	2	Nigeria	45.83	29.66	3.95	1.31	<0.01	0.061	0.034	0.095	13.9	594.5000	123.3	223.13	272.4594	176.3		
265	New Haven, IN	Special Project FJO-935	MRC-86	22	Brazil	54.11	20.47	2.88	2.81	<0.01	0.010	0.069	0.079	18.9	4,351.5000	622.7	1928.32	2,354.5967	890.8		
266	New Haven, IN	Special Project FJO-935	MRC-94	22	Brazil	51.29	21.56	1.80	3.81	<0.01	0.013	0.059	0.072	16.6	4,323.5000	651.6	1816.06	2,217.5232	932.1		
267	New Haven, IN	Special Project FJO-935	MRC-186	12	Liquido Brazil	62.81	14.01	1.89	1.42	0.02	0.032	0.031	0.163	18.9	2,442.5000	239.2	1256.39	1,534.1343	342.2		
268	New Haven, IN	Special Project FJO-935	MRC-153	1	Australia	51.85	23.47	6.56	0.12	<0.01	0.009	0.057	0.066	15.7	299.5000	49.1	127.18	155.2908	70.3		
269	New Haven, IN	Special Project FJO-935	MRC-162	10	Rhodesia	55.35	6.17	14.51	1.53	<0.01	0.038	0.058	0.096	18.3	2,025.5000	87.4	918.15	1,121.1143	125.0		
270	New Haven, IN	Special Project FJO-935	MRC-317	7	Australia	60.88	5.51	6.09	1.53	<0.01	0.097	0.023	0.120	13.9	1,455.5060	56.1	725.69	886.1121	80.2		
271	New Haven, IN	Special Project FJO-935	MRC-291	18	Belgian Congo	34.92	22.73	2.41	2.97	<0.01	0.008	0.059	0.067	16.2	3,540.5000	562.6	1012.52	1,236.3426	804.8		
272	New Haven, IN	Special Project FJO-935	MRC-333	1	Uganda	36.08	19.01	32.16	0.13	0.02	0.047	0.017	0.064	8.3	159.5000	21.2	47.13	57.5476	30.3		
273	New Haven, IN	Special Project FJO-935	MRC-343	43	Belgian Congo	43.44	32.54	1.83	1.20	<0.01	0.009	0.134	0.143	35.9	8,652.5000	1,968.2	3078.18	3,758.6460	2,815.5		
274	New Haven, IN	Special Project FJO-935	MRC-223	22	Brazil	68.20	10.67	1.51	1.61	<0.01	0.026	0.027	0.053	9.0	4,396.5000	327.9	2455.58	2,998.4130	469.1		
275	New Haven, IN	Special Project FJO-935	MRC-350	4	Uganda	59.49	8.65	6.99	0.19	<0.01	0.013	0.081	0.094	22.3	837.5000	50.6	408.03	498.2288	72.4		
276	New Haven, IN	Special Project FJO-935	MRC-290	5	Belgian Congo	52.70	16.80	0.78	0.70	<0.01	0.003	0.070	0.073	18.6	1,065.5000	125.1	459.86	561.5185	179.0		
277	New Haven, IN	Special Project FJO-935	MRC-254	7	Rhodesia	50.80	25.48	1.86	1.63	0.03	0.022	0.097	0.119	27.3	1,939.5000	345.5	806.89	985.2660	494.2		
278	New Haven, IN	Special Project FJO-935	MRC-261	8	Brazil	41.69	29.16	4.64	2.70	<0.01	0.045	0.083	0.128	25.5	2,181.5000	444.7	744.82	909.4674	636.1		
279	New Haven, IN	Special Project FJO-935	MRC-174	11	Liquido Brazil	66.26	12.54	1.39	1.60	<0.01	0.016	0.039	0.055	11.5	2,167.5000	190.0	1176.18	1,436.1855	271.8		
280	New Haven, IN	Special Project FJO-935	MRC-195	8	Brazil	44.75	14.30	12.67	3.56	<0.01	0.018	0.055	0.073	15.9	2,189.5000	218.9	802.42	979.8013	313.1		
281	New Haven, IN	GS-OOP-D 18002	1146B	40	Brazil	54.72	18.94	2.25	2.91	0.02	0.026	0.096	0.122	27.3	4,403.5000	583.0	1973.36	2,409.5952	834.0		
282	New Haven, IN	GS-OOP-D 18002	1146D	40	Brazil	54.69	19.35	3.07	2.79	<0.01	0.022	0.091	0.113	25.7	4,380.5000	592.5	1961.98	2,395.6955	847.6		
283	New Haven, IN	GS-OOP-D 18002	1147	113	Brazil	49.00	25.94	1.94	1.16	<0.01	0.023	0.042	0.065	12.9	9,914.5000	1,797.8	3978.59	4,858.1050	2,571.8		
284	New Haven, IN	GS-OOP-D 18002	1105	43	Great Britain	50.70	26.51	1.26	0.62	<0.01	0.014	0.038	0.052	11.1	3,097.5000	574.0	1286.12	1,570.4325	821.1		
285	New Haven, IN	GS-OOP-D 18002	1140	153	Australia	41.20	29.86	1.41	1.18	<0.01	0.025	0.055	0.080	16.5	9,378.5090	1,957.6	3164.42	3,863.9457	2,800.4		
286	New Haven, IN	GS-OOP-10717 SCM	1165	11	England	42.86	29.17	3.14	0.87	<0.01	0.015	0.069	0.084	19.3	4,346.5000	886.3	1525.65	1,862.9099	1,267.9		
287	New Haven, IN	Relocation DMO-00001	111-Sweepings	2	Unknown	57.02	19.67	1.98	1.87	<0.01	0.009	0.067	0.076	12.5	863.5000	118.7	403.23	492.3677	169.9		

140,277.5150 20,263.4 59,892.94 73,132.9217 28,987.5

NOTE A: The analysis results included in this Subsection J.1 are for informational purpose only. See Subsection A.2., paragraph b.

NOTE B: These items are Category 2 - Tantalum Minerals More Than 0.05% Combined Thorium and Uranium

GRAND TOTAL DEPOT

488,055.5190

187,621.82

229,097.6610

NOTE C: Activity is based on chemical analyses and 49 CFR 173.345 values for natural U and natural Th.

Tantalum/Columbium Concentrates Analyses

Item No.	Storage Location	Contract Number	Lot Number	No. of Units	Country of Origin	Ta ₂ O ₅	Cb ₂ O ₅	SnO ₂	TiO ₂ Percent (%) by Weight	Sb	Th	U	[Th+U]	Bq/g	Bulk Weight (Pounds)	Cb (Pounds)	Ta (Pounds)	Ta ₂ O ₅ (Pounds)	Cb ₂ O ₅ (Pounds)
NOTE B: These items are Category 2 - Tantalum Minerals More Than 0.05% Combined Thorium and Uranium																			
38	Binghamton, NY	GS-OOP-3894-SCM-13	014	25	Portugal	30.4400	32.93	4.06	4.26	<0.01	0.044	0.097	0.141	29.1	10,989.00	2,529.6	2739.46	3,345.0516	3,618.7
39	Binghamton, NY	GS-OOP-3894-SCM-14	015	17	Portugal	29.7400	31.70	5.88	4.42	<0.01	0.049	0.092	0.141	28.2	5,521.00	1,223.4	1344.69	1,641.9454	1,750.2
112	Binghamton, NY	GS-OOP-10714-SCM	115	14	Belgian Congo	48.3200	25.20	0.73	1.14	<0.01	0.013	0.049	0.062	13.9	4,962.00	874.1	1963.57	2,397.6384	1,250.4
117	Binghamton, NY	GS-OOP-10714-SCM	235	7	Belgian Congo	58.1200	18.97	1.06	0.81	<0.01	0.002	0.064	0.066	17.0	2,378.00	315.3	1131.88	1,382.0936	451.1
															23,850.0000	4942.47	7179.60	8,766.7290	7070.37

NOTE A: The analysis results included in this Subsection J.1 are for *informational purpose only*. See Subsection A.2., paragraph b.

NOTE B: These items are Category 2 - Tantalum Minerals More Than 0.05% Combined Thorium and Uranium

NOTE C: Activity is based on chemical analyses and 49 CFR 173.345 values for natural U and natural Th.

Section J.4

Material Safety Data Sheets (AUG 03)

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MATERIAL SAFETY DATA SHEET

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

DEFENSE LOGISTICS AGENCY	EMERGENCY TELEPHONE NUMBER:
DEFENSE NATIONAL STOCKPILE CENTER	1-800-424-9300 (NORTH AMERICA)
8725 JOHN J. KINGMAN ROAD	1-703-527-3887 (INTERNATIONAL)
SUITE 3339	
FORT BELVOIR, VA 22060-6223	

SUBSTANCE: TANTALUM MINERALS (RADIOACTIVE)

TRADE NAMES/SYNONYMS:
00229896

CREATION DATE: May 28 2003
REVISION DATE: Jun 20 2003

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: TITANIUM DIOXIDE
CAS NUMBER: 13463-67-7
EC NUMBER (EINECS): 236-675-5
PERCENTAGE: <20.0

COMPONENT: STANNIC OXIDE
CAS NUMBER: 18282-10-5
EC NUMBER (EINECS): 242-159-0
PERCENTAGE: <20.0

COMPONENT: TANTALUM PENTOXIDE
CAS NUMBER: 1314-61-0
EC NUMBER (EINECS): 215-238-2
PERCENTAGE: >1.0

COMPONENT: NIOBIUM OXIDE
CAS NUMBER: 1313-96-8
EC NUMBER (EINECS): 215-213-6

PERCENTAGE: >1.0

COMPONENT: URANIUM OCTAOXIDE
CAS NUMBER: 1344-59-8
EC NUMBER (EINECS): 215-702-4
PERCENTAGE: <0.8

COMPONENT: THORIUM DIOXIDE
CAS NUMBER: 1314-20-1
EC NUMBER (EINECS): 215-225-1
PERCENTAGE: <0.5

COMPONENT: ANTIMONY
CAS NUMBER: 7440-36-0
EC NUMBER (EINECS): 231-146-5
PERCENTAGE: <0.01

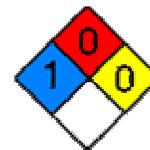
SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=0 REACTIVITY=0

EMERGENCY OVERVIEW:

PHYSICAL FORM: granules

MAJOR HEALTH HAZARDS: radiation sickness, cancer hazard (in humans)



POTENTIAL HEALTH EFFECTS:

INHALATION:

SHORT TERM EXPOSURE: irritation, radiation sickness, loss of appetite, nausea, vomiting, diarrhea, blood disorders, internal bleeding, hair loss, bone disorders, tremors, convulsions, loss of coordination, lung damage, death

LONG TERM EXPOSURE: same as effects reported in short term exposure, cancer

SKIN CONTACT:

SHORT TERM EXPOSURE: radiation burns, skin disorders, radiation sickness, same as effects reported in short term inhalation

LONG TERM EXPOSURE: radiation burns, skin disorders, radiation sickness, same as effects reported in short term inhalation, cancer

EYE CONTACT:

SHORT TERM EXPOSURE: irritation, eye damage, cataracts, radiation sickness, same as effects reported in short term inhalation

LONG TERM EXPOSURE: irritation, eye damage, cataracts, radiation sickness, same as effects reported in short term inhalation, cancer

INGESTION:

SHORT TERM EXPOSURE: radiation sickness, same as effects reported in short term inhalation

LONG TERM EXPOSURE: radiation sickness, same as effects reported in short term

inhalation, cancer

CARCINOGEN STATUS:

OSHA: No

NTP: Yes

IARC: No

SECTION 4 FIRST AID MEASURES

INHALATION: Protective equipment required. Remove from exposure. Use a bag valve mask or similar device to perform artificial respiration (rescue breathing) if needed. Get medical attention immediately.

SKIN CONTACT: If contaminated, remove and discard clothing and shoes. Wash skin with soap and copious amounts of lukewarm water for a minimum of 15 minutes. Do not rub hard or scrub with abrasives; this may break the surface of the skin. Get immediate medical attention.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: Never make an unconscious person vomit or drink fluids. Allow vomiting to occur. When vomiting occurs, keep head lower than hips to help prevent aspiration. Retain any fluids for examination and monitoring. Get medical attention immediately.

NOTE TO PHYSICIAN: For inhalation, consider need for decontamination.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire hazard.

EXTINGUISHING MEDIA: carbon dioxide, regular dry chemical, regular foam, water

FIRE FIGHTING: Move undamaged containers from fire area. Only personnel trained for the hazards of this material should perform clean up and disposal. Use extinguishing agents appropriate for surrounding fire. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Keep unnecessary people away, isolate hazard area and deny entry.

SECTION 6 ACCIDENTAL RELEASE MEASURES

WATER RELEASE:

Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986

(Proposition 65). Keep out of water supplies and sewers.

OCCUPATIONAL RELEASE:

Do not touch spilled material. Small liquid spills: Absorb with sand or other non-combustible material. Large liquid spills: Dike for later disposal. Powder spills: Cover with plastic sheet or tarp to minimize spreading and protect from contact with water. Evacuation radius: 150 feet. Keep unnecessary people away, isolate hazard area and deny entry. Only personnel trained for the hazards of this material should perform clean up and disposal. Decontaminate personnel, spill area and all tools and equipment. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

SECTION 7 HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 10 CFR 20. Store radioactive materials in containers that will not break or spill. See original container for storage recommendations. Keep separated from incompatible substances.

HANDLING: Do not eat, drink or smoke in radiation use, storage, or disposal areas. Use methods to minimize dust.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:**TANTALUM MINERALS (RADIOACTIVE):**

See U.S. NRC 10 CFR 20 and U.S. OSHA 29 CFR 1910.1096.

TITANIUM DIOXIDE:

15 mg/m³ OSHA TWA (total dust)

10 mg/m³ OSHA TWA (total particulate) (vacated by 58 FR 35338, June 30, 1993)

10 mg/m³ ACGIH TWA

1.5 mg/m³ DFG MAK (respirable dust fraction)

10 mg/m³ UK OES TWA (total inhalable dust)

4 mg/m³ UK OES TWA (respirable dust)

MEASUREMENT METHOD: Particulate filter; Acid; Flame atomic absorption spectrometry; NIOSH II(3) # S385

STANNIC OXIDE:**TIN AND INORGANIC TIN COMPOUNDS (as Sn):**

2 mg/m³ OSHA TWA

2 mg/m³ ACGIH TWA
2 mg/m³ NIOSH recommended TWA 10 hour(s)
2 mg/m³ EC OEL
2 mg/m³ UK OES TWA
4 mg/m³ UK OES STEL

MEASUREMENT METHOD: Particulate filter; Acid; Inductively coupled plasma;
NIOSH IV # 7300, Elements

**TANTALUM PENTOXIDE:
TANTALUM METAL AND OXIDE DUSTS (as Ta):**

5 mg/m³ OSHA TWA
5 mg/m³ ACGIH TWA
5 mg/m³ NIOSH recommended TWA 10 hour(s)
10 mg/m³ NIOSH recommended STEL
4 mg/m³ DFG MAK (inhalable dust fraction)
1.5 mg/m³ DFG MAK (respirable dust fraction)
5 mg/m³ UK OES TWA (metal)
10 mg/m³ UK OES STEL (metal)

MEASUREMENT METHOD: Particulate filter; Gravimetric; NIOSH IV # 0500,
Nuisance Dust (total)

**NIOBIUM OXIDE:
NUISANCE PARTICULATES (NUISANCE DUST):**

5 mg/m³ OSHA TWA (respirable dust fraction)
15 mg/m³ OSHA TWA (total dust)
10 mg/m³ ACGIH TWA (inhalable particulate)
3 mg/m³ ACGIH TWA (respirable particulate)
4 mg/m³ DFG MAK (inhalable dust fraction)
1.5 mg/m³ DFG MAK (respirable dust fraction)

MEASUREMENT METHOD: Particulate filter; Gravimetric; NIOSH IV # 0500,
Nuisance Dust (total), # 0600 (respirable)

VENTILATION: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Contact lenses should not be worn. Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing and turnout gear.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before use.

Any dust, mist, and fume respirator.

Any air-purifying respirator with a high-efficiency particulate filter.

Any powered, air-purifying respirator with a dust, mist, and fume filter.

Any powered, air-purifying respirator with a high-efficiency particulate filter.

For Unknown Concentrations or Immediately Dangerous to Life or Health -

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Any self-contained breathing apparatus with a full facepiece.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: solid

PHYSICAL FORM: granules

ODOR: Not available

BOILING POINT: Not applicable

MELTING POINT: Not available

VAPOR PRESSURE: Not applicable

VAPOR DENSITY: Not applicable

SPECIFIC GRAVITY: Not available

WATER SOLUBILITY: Not available

PH: Not applicable

VOLATILITY: Not applicable

ODOR THRESHOLD: Not available

EVAPORATION RATE: Not applicable

COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition.

INCOMPATIBILITIES: metals, halogens, reducing agents

TITANIUM DIOXIDE:

ALUMINUM: Reaction is accompanied by incandescence.

CALCIUM: Reaction is accompanied by incandescence.

LITHIUM: Reaction occurs around 200 C, with incandescence.

MAGNESIUM: Reaction is accompanied by incandescence.

POTASSIUM: Reaction is accompanied by incandescence.

SODIUM: Reaction is accompanied by incandescence.

ZINC: Reaction is accompanied by incandescence.

STANNIC OXIDE:

CHLORINE TRIFLUORIDE: Violent reaction, ignition often occurring.

HYDROGEN TRISULFIDE: Possible ignition.

MAGNESIUM: Explodes when heated.

POTASSIUM: Reduced with incandescence.

SODIUM: Reduced with incandescence.

ALUMINUM: Reduced violently or explosively.

TANTALUM PENTOXIDE:

BROMINE TRIFLUORIDE: React vigorously.

CHLORINE TRIFLUORIDE: Reacts violently, producing flame.

LITHIUM: Reaction occurs around 410 C with consequent temperature rise to 595 C.

NIOBIUM OXIDE:

CHLORINE TRIFLUORIDE: Incompatible.

LITHIUM: Reacts violently and exothermically at 320 C to 490 C.

HAZARDOUS DECOMPOSITION:

Radioactive decomposition products: alpha radiation, beta radiation, gamma radiation

Thermal decomposition products: miscellaneous decomposition products

POLYMERIZATION: Will not polymerize.

[SECTION 11 TOXICOLOGICAL INFORMATION](#)

TITANIUM DIOXIDE:

IRRITATION DATA:

300 ug/3 day(s)-intermittent skin-human mild

TOXICITY DATA:

6820 mg/m³/4 hour(s) inhalation-rat LC50; >24000 mg/kg oral-rat LD50; >100 ug/kg intratracheal-rat LD; 250 mg/m³/6 hour(s)-4 week(s) intermittent inhalation-rat TCLo; 50 mg/m³/6 hour(s)-13 week(s) intermittent inhalation-rat TCLo; 10 mg/m³/6 hour(s)-13 week(s) intermittent inhalation-mouse TCLo; 250 mg/m³/6 hour(s)-13 week(s) intermittent inhalation-hamster TCLo

CARCINOGEN STATUS: IARC: Human Inadequate Evidence, Animal Limited Evidence, Group 3; ACGIH: A4 -Not Classifiable as a Human Carcinogen
Increased incidences of lung adenomas in rats of both sexes and of cystic keratinizing lesions diagnosed as squamous-cell carcinomas in female rats were observed in animals that had inhaled high but not low doses of titanium dioxide. Intratracheal administration

of titanium dioxide in combination with benzo(a)pyrene to hamsters resulted in an increase in the incidence of benign and malignant tumors of the larynx, trachea and lungs over that in benzo(a)pyrene-treated controls.

ACUTE TOXICITY LEVEL:

Moderately Toxic: inhalation

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: respiratory disorders

TUMORIGENIC DATA:

250 mg/m³ inhalation-rat TCLo/6 hour(s)-2 year(s) intermittent; 360 mg/kg intramuscular-rat TDLo/2 year(s) intermittent; 260 mg/kg intramuscular-rat TD/84 week(s) intermittent; 10 mg/m³ inhalation-rat TC/18 hour(s)-2 year(s) intermittent

MUTAGENIC DATA:

micronucleus test - mouse intraperitoneal 3 gm/kg 3 day(s)-continuous; micronucleus test - hamster ovary 5 umol/L; DNA inhibition - hamster lung 500 mg/L; sister chromatid exchange - hamster ovary 1 umol/L

STANNIC OXIDE:**TOXICITY DATA:**

>20 gm/kg oral-rat LD50; >6600 mg/kg intraperitoneal-rat LD50; >20 gm/kg oral-mouse LD50; >6600 mg/kg intraperitoneal-mouse LD50

ACUTE TOXICITY LEVEL: Insufficient Data.

TANTALUM PENTOXIDE:**TOXICITY DATA:**

8 gm/kg oral-rat LD50; >5 gm/kg intraperitoneal-rat LD; >4 gm/kg oral-mouse LD50

ACUTE TOXICITY LEVEL:

Slightly Toxic: ingestion

NIوبيUM OXIDE:**TOXICITY DATA:**

>10 gm/kg oral-rat LD; >10 gm/kg intraperitoneal-rat LD; >4 gm/kg oral-mouse LD50; >10 gm/kg intraperitoneal-mouse LD; 60 gm/kg/6 week(s) intermittent oral-rat TDLo

ACUTE TOXICITY LEVEL: Insufficient Data.

ADDITIONAL DATA: In vitro studies indicate that the inhibition of adenosine triphosphatase may be involved with the biological activity of niobium.

THORIUM DIOXIDE:**TOXICITY DATA:**

>1140 mg/kg intratracheal-rat LD50

CARCINOGEN STATUS: NTP: Known Human Carcinogen; EC: Category 1
Intravascular injection in humans produced tumors of the liver, including hepatocellular carcinomas, cholangiocellular carcinomas, carcinomas of the extra-hepatic biliary system, sarcomas, hemangioendotheliomas, reticulum cell sarcomas, carcinomas of the common hepatic duct, adenocarcinomas, liver cell carcinomas, undifferentiated carcinomas, hepatomas, tumors of the kidney, including carcinomas of the renal parenchyma, and sarcomas and carcinomas of the renal pelvis. In addition, carcinomas of the maxillary sinuses, spindle cell sarcomas in the later cervical region, leukemias, and

other hematologic disorders have been related to intravascular injection of thorium dioxide. Studies suggest a latency of 21-36 years. A variety of carcinomas have been induced in animals following intravenous, subcutaneous, and submucosal administration.

ACUTE TOXICITY LEVEL: Insufficient Data.

TUMORIGENIC DATA:

1 gm/kg parenteral-woman TDLo; 2880 mg/kg unreported-human TDLo; 490 mg/kg intraarterial-human TDLo; 160 mg/kg intravenous-rat TDLo; 20 gm/kg subcutaneous-mouse TDLo; 10 gm/kg intravenous-mouse TDLo; 400 mg/kg intramuscular-mouse TDLo; 1500 mg/kg intravenous-rabbit TDLo; 4 gm/kg parenteral-guinea pig TDLo/15 week(s) intermittent; 2 gm/kg unreported-hamster TDLo; 3600 mg/kg intravenous-rabbit TD; 300 mg/kg intravenous-rabbit TD/2 year(s) intermittent; 700 mg/kg parenteral-human TD; 1260 mg/kg parenteral-human TD; 2 gm/kg intraarterial-woman TD; 10 mg/kg intravenous-mouse TD; 2350 mg/kg parenteral-woman TD; 1190 mg/kg intraarterial-man TD; 1302 mg/kg intraarterial-human TD

ADDITIONAL DATA: Radioactive.

HEALTH EFFECTS:

INHALATION:

TANTALUM MINERALS (RADIOACTIVE): See information on alpha, beta, and gamma radiation. Also see information on radiation sickness.

STANNIC OXIDE: May cause chest pain, dyspnea, rales, and leukocytosis. Repeated exposure may cause stannosis, a benign pneumoconiosis, without symptoms of interference of pulmonary function. See information on inorganic tin compounds and metal fume fever.

ACUTE EXPOSURE:

ALPHA RADIATION: Alpha particle radiation is densely ionizing and energetic, but can travel only a few centimeters in air. It will kill cells immediately adjacent to the source of contact. Being relatively non-penetrating, the greatest threat from alpha emissions is through inhalation of either dust coated with the emitter or the emitter itself. Depending on the solubility and particle size of the specific radioactive compound, it may be absorbed directly into the bloodstream, irradiating the entire body as it continues to decay. Insoluble compounds and heavier particles usually remain at or near the site of deposition and may be brought back up the throat via ciliary action and consequently swallowed. Lighter particles may penetrate deeply into the alveolar sacs and remain in contact with lung tissue. Cellular damage depends on susceptibility of tissue, the dose, and the speed at which it was delivered. A single large dose may lead to radiation sickness.

BETA RADIATION: Depending on the energy level of the particular beta emitter, particles may travel up to several meters in air. Being relatively non-penetrating, the greatest threat from beta emissions is through inhalation of either dust coated with the emitter or the emitter itself. Depending on the solubility and particle size of the specific radioactive compound, it may be absorbed directly into the bloodstream, irradiating the

entire body as it continues to decay. Insoluble compounds and heavier particles usually remain at or near the site of deposition and may be brought back up the throat via ciliary action and consequently swallowed. Lighter particles may penetrate deeply into the alveolar sacs and remain in contact with lung tissue. Cellular damage depends on susceptibility of tissue, the dose, and the speed at which it was delivered. A single large dose may lead to radiation sickness.

GAMMA RADIATION: Gamma rays are photons of highly energetic and penetrating electromagnetic radiation, but because they lose energy slowly, they are able to travel much greater distances, up to a mile in air. Because of their ability to deeply penetrate all but very dense materials, inhalation of radioactive particulates is not necessary in order to cause extensive internal damage to any part of the body. Depending on the solubility and particle size of the specific radioactive compound, it may be absorbed directly into the bloodstream, irradiating the entire body as it continues to decay. Insoluble compounds and heavier particles usually remain at or near the site of deposition and may be brought back up the throat via ciliary action and consequently swallowed. Lighter particles may penetrate deeply into the alveolar sacs and remain in contact with lung tissue. Cellular damage depends on susceptibility of tissue, the dose, and the speed at which it was delivered. A single large dose may lead to radiation sickness. A single exposure to 300-400 rem can cause sterilization in women.

RADIATION SICKNESS: Whole body doses of 100-200 rem may cause anorexia, nausea, vomiting, diarrhea, and reduction in leukocytes within a few hours. An asymptomatic period of 24-36 hours may be followed by lymphopenia and slowly developing neutropenia. Thrombocytopenia may become prominent within 3-4 weeks. Doses of 200-400 rem may cause hemorrhaging and hair loss. Damage to the lymph nodes, spleen, and bone marrow may occur. If bone marrow depression reaches a critical level, death may occur from overwhelming infection. Nausea, vomiting, and diarrhea leading to severe dehydration, vascular collapse, and death may also occur. Whole body doses of 400 or more rem may be fatal due to gastrointestinal or hematopoietic malfunction. With whole body absorption in the 400 rem range, 50-70% will die within 30 days. Exposure to 400-1000 rem will produce death in 60-95% of those exposed within 30 days. With doses greater than 1000 rem, nausea, vomiting, listlessness, prostration, tremors, convulsions, ataxia, and death are likely. Exposure to 1000-5000 rem produces death within 10 days in 100% of those exposed. Doses greater than 5000 rem may cause death within hours. The gonads are particularly sensitive to radiation. A single dose of 50 rem may produce temporary sterility in men. A dose 300-400 rem may result in permanent sterility among women.

TITANIUM DIOXIDE: Inhalation may cause irritation and coughing. Nuisance dusts may cause unpleasant deposits in the nasal passages.

INORGANIC TIN COMPOUNDS: Exposure to some inorganic tin compounds may result in irritation of the mucous membranes, nose, and throat.

METAL FUME FEVER: Metal fume fever, an influenza-like illness, may occur due to

the inhalation of freshly formed metal oxide particles sized below 1.5 microns and usually between 0.02-0.05 microns. Symptoms may be delayed 4-12 hours and begin with a sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms may include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalized feeling of malaise. Fever, chills, muscular pain, mild to severe headache, nausea, occasional vomiting, exaggerated mental activity, profuse sweating, excessive urination, diarrhea and prostration may also occur. Tolerance to fumes develops rapidly, but is quickly lost. All symptoms usually subside within 24-36 hours.

TANTALUM PENTOXIDE: Tantalum dust has a low order of toxicity and is relatively inert. It has produced transient inflammatory lesions in the lungs of animals after severe exposure.

NIOBIUM OXIDE: Dust may cause respiratory irritation.

CHRONIC EXPOSURE:

ALPHA RADIATION: The damaging effects of all types of radiation, including alpha particles, are cumulative. If enough exposure occurs over time, radiation sickness may occur.

BETA RADIATION: The damaging effects of all types of radiation, including beta particles, are cumulative. If enough exposure occurs over time, radiation sickness may occur.

GAMMA RADIATION: The damaging effects of all types of radiation, including gamma rays, are cumulative. If enough exposure occurs over time, radiation sickness may occur.

RADIATION SICKNESS: Delayed effects of radiation may be due either to a single large overexposure or cumulative low-level exposure and may include various cancers, genetic effects, and cataracts. Cancer is observed most frequently in the hematopoietic system, thyroid, bone, and skin. Lung cancer may occur due to inhalation of radioactive particulates which then remain in the lungs. Genetic effects may range from point mutations to severe chromosome damage such as strand breakage, translocations, and deletions. If the germ cells have been affected, the effects of the mutation may not become apparent until the next generation, or even later.

TITANIUM DIOXIDE: A few cases of slight fibrosis without disabling injury have been reported from occupational exposure. Rats repeatedly exposed to concentrations of 10-328 million particles/ft³ for as long as 13 months showed small focal areas of emphysema which were attributed to large deposits of dust. Rats exposed to concentrations of 10, 50, and 250 mg/m³ for 6 hours/day, 5 days/week for 2 years showed no abnormal clinical signs, body weight changes, or excess mortality in any exposed group. There were however dose-dependent increases in the incidence of pneumonia, tracheitis and rhinitis with squamous metaplasia in the anterior nasal cavity. At 10 mg/m³, the pulmonary response satisfied the criteria for a nuisance dust.

Bronchioalveolar adenomas and cystic keratinizing squamous cell carcinomas occurred only at the 250 mg/m³ level, twenty-five times the threshold limit value. These lung tumors were different from common human lung cancers in terms of tumor type, location, and tumorigenesis, and were devoid of tumor metastasis.

INORGANIC TIN COMPOUNDS: No data available.

METAL FUME FEVER: There is no form of chronic metal fume fever, however, repeated bouts with symptoms as described above are quite common. Resistance to the condition develops after a few days of exposure, but is quickly lost in 1 or 2 days.

TANTALUM PENTOXIDE: Repeated or prolonged exposure of tantalum dust may cause bronchitis.

NIOBIUM OXIDE: None known in humans.

SKIN CONTACT:

TANTALUM MINERALS (RADIOACTIVE): See information on alpha, beta, and gamma radiation. Also see information on radiation sickness.

ACUTE EXPOSURE:

ALPHA RADIATION: Because it has little penetrating ability and can travel only a few centimeters in air, alpha particle radiation is not usually an external hazard. It will kill cells immediately adjacent to the source of contact, and local damage may occur at the site of a wound. Absorption or penetration through damaged skin may result in radiation sickness.

BETA RADIATION: Because it can travel a few meters in air, beta particle radiation is slightly more penetrating and thus somewhat more of an external hazard than alpha particles. It will kill cells immediately adjacent to the source of contact, and local damage may occur at the site of a wound. Absorption or penetration through damaged skin may result in radiation sickness.

GAMMA RADIATION: There are three distinct stages of skin damage due to acute gamma radiation exposure. Radiodermatitis erythematosa begins with a reddening of the skin four to seven days post-exposure. Hair may be lost from exposed areas within two or three weeks. Skin may begin to regain its normal appearance three to four weeks later, but until then, the skin remains temporarily colored, peels easily, and is dry. Radiodermatitis bullosa occurs after larger doses causing the skin to become dark violet in color and form water blisters similar to those from second degree thermal burns. Between the second and fifth days after exposure, the skin itches, burns, and is quite painful. Within two or three weeks, hair is lost, mostly permanently. Healing is slow, and the skin remains dry, whitish, and crossed with bright-red blood vessels. Radiodermatitis escharotica occurs after extremely high doses. The skin reddens as early as the second or third day post-exposure, followed by deep, painful ulcers and abscesses. Healing is slow, and scars, interwoven with with large blood vessels, remain. Destruction of sebaceous

and sweat glands causes the skin to remain dry. This damage may lead to cancer. Because gamma radiation is very penetrating, exposure may also result in damage to internal organs, resulting in general radiation sickness.

RADIATION SICKNESS: The clinical course of radiation sickness depends upon the dose, dose rate, area of body affected, and time after exposure. Although external radiation of any type can cause radiation sickness, the penetrating nature of gamma rays makes them the greatest threat. External irradiation from gamma rays may cause effects consisting of three clearly defined syndromes. Please refer to gamma rays for a more detailed description of symptoms.

TITANIUM DIOXIDE: Topically it is reported to be devoid of toxicity and chemically non-irritating. However, titanium dioxide may occasionally be so occlusive that it produces miliaria.

STANNIC OXIDE: It is not absorbed and is relatively innocuous to the skin.

TANTALUM PENTOXIDE: Some tantalum compounds have been suspected of causing skin irritation.

NIOBIUM OXIDE: No irritating effects have been reported in humans. Some niobium compounds may irritate the skin.

CHRONIC EXPOSURE:

ALPHA RADIATION: The damaging effects of all types of radiation, including alpha particles, are cumulative. Sufficient exposure may lead to radiation sickness.

BETA RADIATION: The damaging effects of all types of radiation, including beta particles, are cumulative. Sufficient exposure may lead to radiation sickness.

GAMMA RADIATION: The damaging effects of all types of radiation, including gamma rays, are cumulative. The penetrating nature of gamma rays make them the greatest external hazard of the three main types of radiation. Please see acute exposure for a detailed description of symptoms. Sufficient exposure may lead to radiation sickness.

RADIATION SICKNESS: Effects of chronic radiation exposure are cumulative. Sufficient exposure may lead to symptoms as detailed in acute radiation sickness.

TITANIUM DIOXIDE: Application of 300 ug for 3 days intermittently to human skin produced mild irritation.

STANNIC OXIDE: No data available.

TANTALUM PENTOXIDE: No data available.

NIOBIUM OXIDE: No data available.

EYE CONTACT:

TANTALUM MINERALS (RADIOACTIVE): See information on alpha, beta, and gamma radiation. Also see information on radiation sickness.

ACUTE EXPOSURE:

ALPHA RADIATION: Exposure of the eye to alpha particle emissions may result in corneal inflammation and conjunctivitis. A single exposure of 100 rem of alpha radiation may cause conjunctivitis and keratitis, inducing cataract formation later. Cataract formation may begin anywhere from six months to several years post-exposure, although growth of the opacity may stop at any point. The rate of growth and the degree of opacity are dose dependent.

BETA RADIATION: Exposure of the eye to beta particle emissions may result in corneal inflammation and conjunctivitis. A single exposure of 100 rem of beta radiation may cause conjunctivitis and keratitis, inducing cataract formation later. Cataract formation may begin anywhere from six months to several years post-exposure, although growth of the opacity may stop at any point. The rate of growth and the degree of opacity are dose dependent.

GAMMA RADIATION: Radiation affects the eye by inducing acute inflammation of the conjunctiva and the cornea. Cataract formation may begin anywhere from six months to several years post-exposure. The rate of growth and the degree of opacity are dependent upon the dose as well as the type of radiation. Growth of the opacity may stop at any point. Approximately 200 rem of gamma radiation in a single dose is required to produce opacities in the human lens.

RADIATION SICKNESS: The deleterious effects of overexposure to radiation occur as whole body effects regardless of entry point into the body. It is unlikely that a dose sufficient to cause radiation sickness occurred if only the eyes were irradiated. However, the eye is sensitive to radiation, especially gamma and beta. If eye damage occurs from irradiation, it may be best to assume that other parts of the body have also been affected.

TITANIUM DIOXIDE: Introduction by tattooing into the cornea of rabbit eyes and patients with corneal scars resulted in permanent white coloration, but no irritation.

STANNIC OXIDE: Particulates in the eye may cause lacrimation.

TANTALUM PENTOXIDE: May cause slight irritation but not known to be an irritant.

NIOBIUM OXIDE: May cause irritation.

CHRONIC EXPOSURE:

ALPHA RADIATION: Repeated or prolonged exposure to alpha particle radiation may result in cataract formation as described above. Of the well-documented late effects of

radiation on man, leukemia and cataracts have been observed at doses lower than those producing skin scarring, cancer, or bone tumors.

BETA RADIATION: Repeated or prolonged exposure to beta particle emissions may cause cataracts as described above. Of the well-documented late effects of radiation on man, leukemia and cataract formation have been observed at lower doses than those required to cause skin scarring, cancer, or bone tumors.

GAMMA RADIATION: Chronic exposure to gamma rays may cause cataracts, as described above. Cumulative exposure of 400 to 550 rem is required to produce detectable opacities, depending on the rate at which it is delivered. Of the well-documented late effects of radiation on man, leukemia and cataracts have been observed at doses lower than those required to produce skin scarring and cancer or bone tumors.

RADIATION SICKNESS: Effects from all forms of radiation are cumulative. See acute radiation sickness.

TITANIUM DIOXIDE: No data available.

STANNIC OXIDE: No data available.

TANTALUM PENTOXIDE: No data available.

NIOBIUM OXIDE: No effects reported, may cause conjunctivitis.

INGESTION:

TANTALUM MINERALS (RADIOACTIVE): See information on alpha, beta, and gamma radiation. Also see information on radiation sickness.

ACUTE EXPOSURE:

ALPHA RADIATION: Ingestion often occurs through ciliary action on inhaled particulates. Depending on the solubility and particle size of the radioactive compound, alpha particles may be absorbed directly into the bloodstream. As they continue to decay, whole body irradiation may occur. If the exposure is sufficient, radiation sickness may occur.

BETA RADIATION: Ingestion often occurs through ciliary action on inhaled particulates. Depending on the solubility and particle size of the radioactive compound, beta particles may be absorbed directly into the bloodstream. As they continue to decay, whole body irradiation may occur. If the exposure is sufficient, radiation sickness may occur.

GAMMA RADIATION: Gamma rays are a form of electromagnetic energy and cannot be ingested directly. Internal exposure can take place, however, through ingestion of a gamma ray emitting compound. Ingestion often occurs through ciliary action on inhaled radioactive particulates, although this is by no means necessary for internal damage to

occur due to the deep penetrating nature of gamma rays. Depending on the solubility and particle size of the radioactive compound, the gamma ray emitter may be absorbed directly into the bloodstream, where, as it continues to decay, whole body irradiation may occur. If the dose is sufficient, radiation sickness may occur.

RADIATION SICKNESS: Ingestion often occurs through ciliary action on inhaled radioactive particulates. Effects of radiation may be due either to a single large overexposure or cumulative low-level exposure and may include effects such as cancer, genetic effects, and cataracts, which may be delayed months or years. Cancer is observed most frequently in the hematopoietic system, thyroid, bone, and skin. Lung cancer may occur due to inhalation of radioactive particulates which remain in the lungs as they continue to decay. Genetic effects may range from point mutations to severe chromosome damage such as strand breakage, translocations, and deletions. If the germ cells have been affected, the effects of the mutation may not become apparent until the next generation, or even later.

TITANIUM DIOXIDE: Titanium dioxide has been reported to be physiologically inert. Ingestion of large quantities may cause intestinal obstruction. However, a pound has been ingested without apparent harm or distress.

STANNIC OXIDE: Most tin salts are relatively non-toxic and poorly absorbed through the gastrointestinal tract.

TANTALUM PENTOXIDE: The lethal dose reported in rats is 4500 mg/kg.

NIOBIUM OXIDE: No specific data available. Metallic niobium has a low order of toxicity because it is poorly absorbed in the stomach and intestines.

CHRONIC EXPOSURE:

ALPHA RADIATION: The damaging effects of all types of radiation, including alpha particles, are cumulative. Effects as described in acute ingestion may appear if enough exposure occurs over time. See also radiation sickness.

BETA RADIATION: The damaging effects of all types of radiation, including beta particles, are cumulative. Effects as described in acute ingestion may appear if enough exposure occurs over time. See also radiation sickness.

GAMMA RADIATION: Gamma rays are a form of electromagnetic energy and cannot be ingested directly. Internal exposure can take place, however, through ingestion of a gamma ray emitting compound. The damaging effects of all types of radiation, including gamma rays, are cumulative. Effects as described in acute ingestion may occur if a high enough dose is received over time. See also acute radiation sickness.

RADIATION SICKNESS: Please see acute radiation sickness.

TITANIUM DIOXIDE: Mice and rats fed 50,000 and 25,000 ppm for 103 weeks showed

no evidence of toxicity and no increased incidence of tumors.

STANNIC OXIDE: Rat feeding studies for 4-13 weeks at levels of 0.03, 0.10, 0.30 and 1.0 percent or for any level up to 7900 ppm, resulted in no adverse effects.

TANTALUM PENTOXIDE: No data available.

NIOBIUM OXIDE: Niobium in the drinking water at 5 ppm plus 1.62 mg/kg in the diet caused liver degeneration.

SECTION 12 ECOLOGICAL INFORMATION

Not available

SECTION 13 DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. DOE 10 CFR 20 and 10 CFR 60.

SECTION 14 TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:

PROPER SHIPPING NAME: Radioactive material, low specific activity, n.o.s

ID NUMBER: UN2912

HAZARD CLASS OR DIVISION: 7

LABELING REQUIREMENTS: 7



INTERNATIONAL U.S. DOT 49 CFR 172.101:

PROPER SHIPPING NAME: Radioactive material, low specific activity (LSA-I)

ID NUMBER: UN2912

HAZARD CLASS OR DIVISION: 7

LABELING REQUIREMENTS: 7



CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

SHIPPING NAME: RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I)

UN NUMBER: UN2912

CLASS: 7

LAND TRANSPORT ADR:

PROPER SHIPPING NAME: RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I)

UN NUMBER: UN2912

CLASS: 7
LABELS: 7X

LAND TRANSPORT RID:

PROPER SHIPPING NAME: Radioactive material, low specific activity (LSA-I)

UN NUMBER: UN2912

CLASS: 7

LABELS: 7X

AIR TRANSPORT IATA:

PROPER SHIPPING NAME: Radioactive material, low specific activity (LSA-I) non fissile or fissile-excepted

UN/ID NUMBER: UN2912

CLASS OR DIVISION: 7

HAZARD LABELS: 7

AIR TRANSPORT ICAO:

PROPER SHIPPING NAME: Radioactive material, low specific activity (LSA-I), non-fissile or fissile excepted

UN NUMBER: UN2912

CLASS OR DIVISION: 7

LABELS: 7

MARITIME TRANSPORT IMDG:

PROPER SHIPPING NAME: Radioactive material, low specific activity (lsa), non-fissile or fissile excepted

UN NUMBER: UN2912

CLASS OR DIVISION: 7

[SECTION 15 REGULATORY INFORMATION](#)

U.S. REGULATIONS:

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):

ANTIMONY: 5000 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):

ACUTE: Yes

CHRONIC: Yes

FIRE: No
REACTIVE: No
SUDDEN RELEASE: No

**SARA TITLE III SECTION 313 (40 CFR 372.65):
THORIUM DIOXIDE**

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:

California Proposition 65:

Known to the state of California to cause the following:

RADIONUCLIDES

Cancer (Jul 01, 1989)

THORIUM DIOXIDE

Cancer (Feb 27, 1987)

CANADIAN REGULATIONS:

WHMIS CLASSIFICATION: Not determined.

EUROPEAN REGULATIONS:

EC CLASSIFICATION (CALCULATED): Not determined.

NATIONAL INVENTORY STATUS:

U.S. INVENTORY (TSCA): All the components of this substance are listed on or are exempt from the inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

[SECTION 16 OTHER INFORMATION](#)

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ADDENDUM TO MATERIAL SAFETY DATA SHEET

- SUBSTANCE:** **COLUMBIUM CONCENTRATES, RADIOACTIVE**
- TANTALUM MINERALS (RADIOACTIVE)**
- TUNGSTEN ORES & CONCENTRATES**
(RADIOACTIVE)

Radioactive source material, as defined by the Nuclear Regulatory Commission, whose specific activity is less than 70 Bequerels/gram (Bq/g) is not regulated by the Department of Transportation while in domestic transport. For such material, section 14 "TRANSPORT INFORMATION" shall read "U.S. DEPARTMENT OF TRANSPORTATION: No classification assigned in domestic transport."

The material in this shipment has a specific activity of _____ Bq/g.