

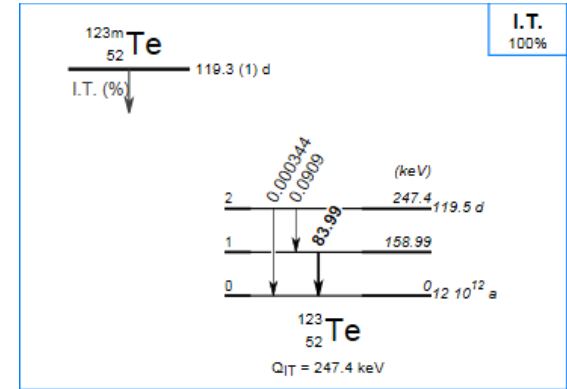
Sn-117m or Te-123m?

Half-life analysis of samples from Ringhals NPP

NKS Gamma, 25/09/2018, Linda Corneliusson

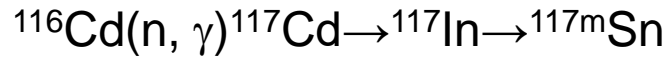
Background

- Requirement to report Te-123m in discharges
- Identification of Sn-117m to detect control rod leakage
- Te-123m and Sn-117m both have their main gamma emission at 159 keV

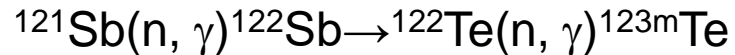


Production reactions

- Sn-117m is mainly a neutron activation product
- Sn-117m is also a fission product and a decay product



- Te-123m is an neutron activation product from Sb



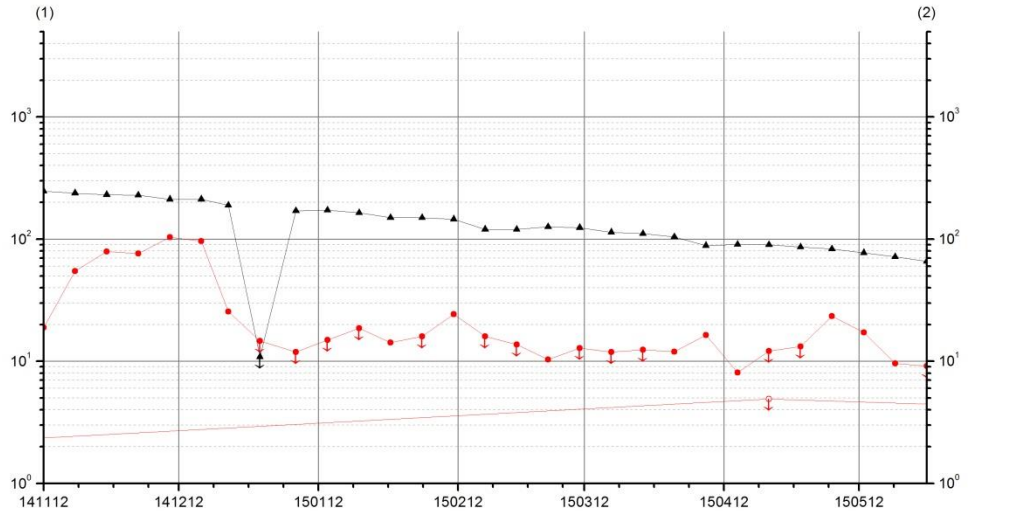
Sn-117m or Te-123m?



RINGHALS 2

Sn-117m och Ag-110m i bränslebassäng

● [1] 20-324SF FJB BRÄNSLEBASSÄNG Ag-110m Bq/kg ▲ [2] 20-324SF FJB BRÄNSLEBASSÄNG Sn-117m Bq/kg
○ [1] 20-324SF EJB BRÄNSLEBASSÄNG Ag-110m Bq/kg △ [2] 20-324SF EJB BRÄNSLEBASSÄNG Sn-117m



User: liso
Database: SQL Lims Prod
Date: 2015-01-20 12:54:39
Path: S:\OriginR3\Users\LisoR234\R2-4SFsn-117m

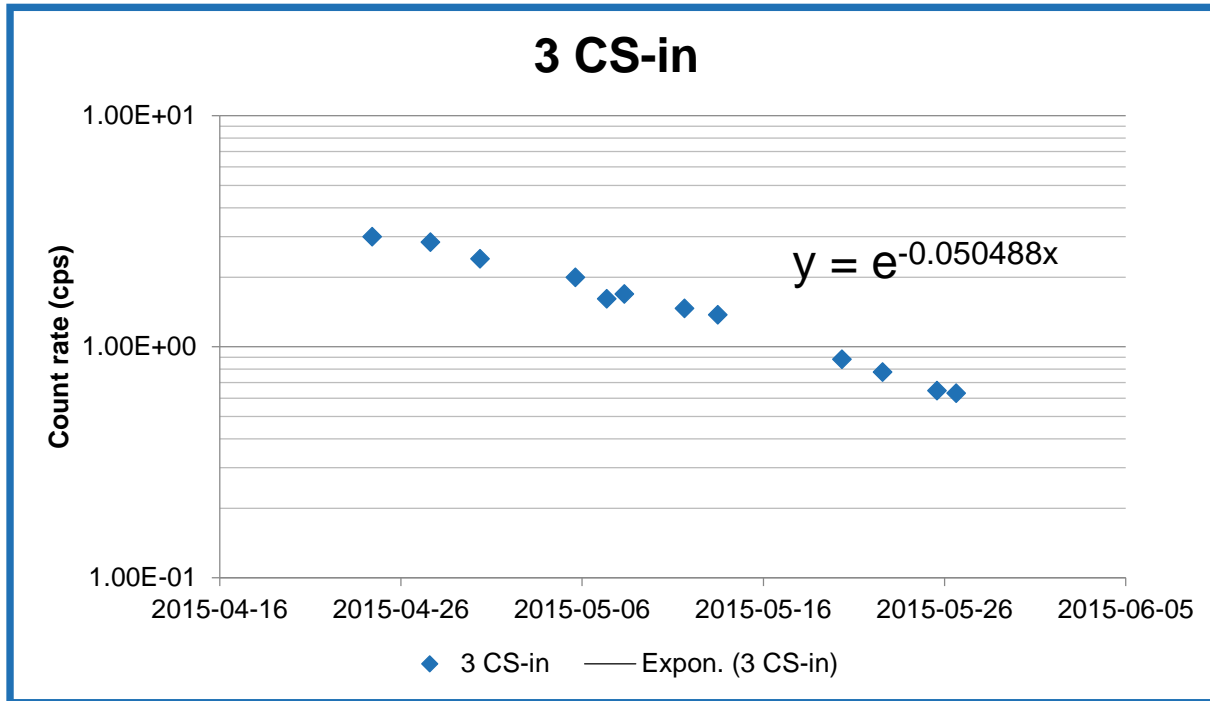
▲ Suspect/Bad × Online ↓ Detection Low
△ Out of Spec × Not Approved ↑ Detection High
* Standard settings for markers changed

- Ringhals unit 2, spent fuel pool.
- Fuel was unloaded from core in August 2014
- Was this really Sn-117m?

Half-life analysis

Date	Count time (s)	Net area (counts)	Countrate (cps)	1 σ %
2015-04-24 09:37	3000	10218	3.000	1.26%
2015-04-27 15:05	3000	8473	2.843	1.27%
2015-04-30 08:33	3000	7187	2.410	1.39%
2015-05-05 14:44	3000	5978	2.003	1.58%
2015-05-07 08:34	3000	4820	1.615	1.76%
2015-05-08 07:46	3000	5055	1.694	1.71%
2015-05-11 15:35	3000	4379	1.467	1.97%
2015-05-13 11:24	3000	4109	1.376	1.94%
2015-05-20 07:51	3000	2641	0.884	2.63%
2015-05-22 13:47	3000	2328	0.779	2.83%
2015-05-25 13:56	3000	1933	0.647	3.23%
2015-05-26 15:29	3000	1883	0.630	3.32%

Half-life analysis

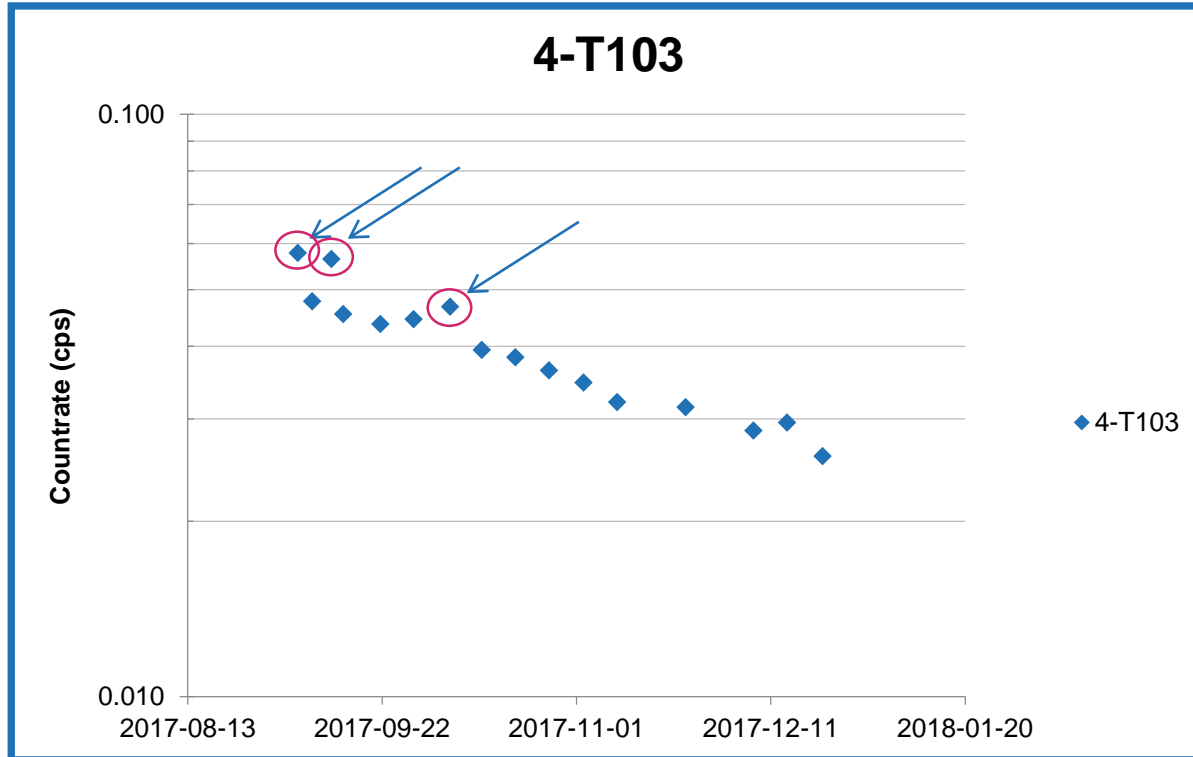


- $T_{1/2}$ was calculated to 13,7 days

Half-life analysis

Date	Count time (s)	Net area (counts)	Countrate (cps)	1 σ %
2017-09-04 14:37	57556	3329	0.058	2.64%
2017-09-07 14:23	57124	2729	0.048	2.93%
2017-09-11 12:35	57535	3248	0.056	2.85%
2017-09-14 00:00	57040	2593	0.045	2.99%
2017-09-21 14:54	56962	2487	0.044	3.22%
2017-09-28 11:25	57081	2540	0.044	3.01%
2017-10-06 00:00	57535	2690	0.047	3.45%
2017-10-12 12:46	57032	2250	0.039	4.72%
2017-10-19 10:36	57122	2189	0.038	3.54%
2017-10-26 07:57	57175	2078	0.036	3.64%
2017-11-02 10:29	57105	1979	0.035	3.61%
2017-11-09 08:18	57045	1829	0.032	3.90%
2017-11-23 10:53	57069	1794	0.031	4.06%
2017-12-07 10:15	57055	1635	0.029	4.39%
2017-12-14 07:39	56813	1681	0.030	4.13%
2017-12-21 14:56	56915	1475	0.026	4.62%

Half-life analysis



- $T_{1/2}$ was calculated to 119 days

Results this far

- In Ringhals the 159 keV peak may come from either Sn-117m or Te-123m
- In the reactor coolant the main contributor to the 159 keV peak is Sn-117m
- In the spent fuel pool and in the discharges it is Te-123m
- To the Swedish authority Ringhals will continue to report the discharged activity from the 159 keV peak as Te-123m

Thank you for your attention!

