**Nuclear Data Section**

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**Memo CP-D/1052**

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**To:** Distribution

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**Subject: Comparison of REACTION SF4 isomeric flag against NUBASE2020**

**Reference:** Memo CP-D/0888

As a test of a new Dictionary 227 produced from Nubase2020 (F.G. Kondev et al., Chin. Phys. **C45**(2021)030001), I checked presence of an isomeric state coded under REACTION SF4 (including ratio like M/G) of EXFOR Master 2020-08-03 against the new Dictionary 227. I found 306 cases where an isomeric state coded in SF4 is not defined in the new Dictionary 227. Three most typical isomeric states are 49-IN-116-M (45 cases), 79-AU-196-M (32 cases) and 73-TA-178-M (24 cases).

Suggestions of corrections are appended to this memo. As usual, compilers are expected to check the source article and decay scheme before correction of the EXFOR entry by themselves. (I am not a decay data expert and your feedback to my comments is welcome!)

**Some general remarks:**

* There are still many cross-section datasets where a half-life is coded under HL, HL1 etc. (309 such datasets in current EXFOR Master!). This disturbs use of decay data!
* Suggestions are mainly done only when (1) its half-life is coded, or (2) the nuclide does not have a metastable state. One may guess which metastable is considered even if the half-life is not given by the authors (e.g., 79-AU-196-M is most probably for the M2 state (9.6 hr) rather than the M1 state (8.1 sec) considering actual measurements). But I decided not to make such suggestions and leave such decision to users.
* Suggestions cannot be unique when the order of the ground state and metastable state is uncertain in NUBASE (flagged by \* in NUBASE). In this case, I put all options with the first option following ordering in NUBASE.

*Example*: 178Ta production cross sections measured with the 2.4 hr state activity most probably includes the 290 ms IT decay (100%) contribution. NuBase2020 indicates the 2.4 hr state as the ground state, but it also indicates ordering is uncertain. Therefore, my suggestion of REACTION SF4 isomeric flag attached to 73-TA-178 is “G+M1 (or M1+M2)”.

* Some (mainly) heavy nuclides have two very short-lived states (typically unstable against alpha decay or spontaneous fission). They are typically measured separately, but we can define only their ground state in Dictionary 227 because of the T1/2=0.1 sec boundary.

*Example*: 217Ac 69 nsec state (Ex=0 MeV) is defined in Dictionary 227 while its 740 nsec state (Ex=2012 keV) cannot be defined in Dictionary 227 even if the higher state has longer half-life. N.B. Nuclide Wallet Cards 2011 extends the boundary from 0.1 sec to 1 msec for some nuclides which decay by spontaneous fission, alpha or proton emission and I see its reason.

* The Formats Manual explains an isomeric flag G is “for ground state (of a nucleus which has a metastable state)”. Here I assumed “metastable state” includes quasi-metastable states in this assessment.

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**REACTION SF4 isomeric state not defined in Dictionary 227 converted from Nubase2020**

* SF4 (code): REACTION SF4
* SF4 (nuclide): An isomer coded in REACTION (SF4)
* HL in X4: Half-life coded under DECAY-DATA (or HL, HL1, HL2 if the value is followed by \*)
* Iso (ND): Number of isomeric states of the nuclide defined in Dictionary 227 (0: ground state only, M: one metastable state, M1M2: two metastable state)
* Ord (ND): Isomeric state ordering uncertain
* X4Com: Presence of a comment in EXFOR regarding currently unknown isomeric state (not exhaustive)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Dataset #** | **SF4 (code)** | **SF4 (nuclide)** | **HL in X4** | **Iso (ND)** | **Ord (ND)** | **X4Com** | **Suggestion (REACTION)** | **Suggestion (DECAY-DATA)** | **Remark** |
| C0578.002 | 9-F-18-M | 9-F-18-M | 218.E-9SEC | 0 |  |  | SF4: M -> L | M -> L |  |
| 11365.002 | 11-NA-24-G | 11-NA-24-G | 15.HR\* | 0 |  |  | SF4: Delete -G. | Move HL=15.HR from COMMON. |  |
| C0700.005 | 11-NA-24-G | 11-NA-24-G |  | 0 |  |  | SF4: Delete -G. |  |  |
| P0067.005 | 11-NA-24-G | 11-NA-24-G |  | 0 |  |  | SF4: Delete -G. |  |  |
| P0124.002 | 11-NA-24-G | 11-NA-24-G |  | 0 |  |  | SF4: Delete -G. |  |  |
| T0131.019 | 11-NA-24-G | 11-NA-24-G | 15.0HR | 0 |  |  | SF4: Delete -G. | Delete -G. |  |
| T0131.044 | 11-NA-24-G | 11-NA-24-G | 15.0HR | 0 |  |  | SF4: Delete -G. | Delete -G. |  |
| 10142.002 | 13-AL-30-M | 13-AL-30-M | 72.5SEC | 0 |  | Y |  |  |  |
| 21846.018 | 13-AL-30-M | 13-AL-30-M | 72.5SEC | 0 |  | Y |  |  |  |
| F1232.005 | 21-SC-46-G+M1 | 21-SC-46-M1 |  | M |  |  | SF4: Delete -G+M1. |  |  |
| F1232.010 | 21-SC-46-G+M1 | 21-SC-46-M1 |  | M |  |  | SF4: Delete -G+M1. |  |  |
| F1305.003 | 21-SC-46-G+M1 | 21-SC-46-M1 |  | M |  |  | SF4: Delete -G+M1. |  |  |
| F1232.006 | 27-CO-58-G+M1 | 27-CO-58-M1 |  | M |  |  | SF4: Delete -G+M1. |  |  |
| F1232.011 | 27-CO-58-G+M1 | 27-CO-58-M1 |  | M |  |  | SF4: Delete -G+M1. |  |  |
| F1232.003 | 27-CO-60-G+M1 | 27-CO-60-M1 |  | M |  |  | SF4: Delete -G+M1. |  |  |
| F1232.008 | 27-CO-60-G+M1 | 27-CO-60-M1 |  | M |  |  | SF4: Delete -G+M1. |  |  |
| 11740.017 | 27-CO-64-M | 27-CO-64-M | 2.0MIN | 0 |  | Y |  |  | OUTDT coded. |
| 22338.024 | 29-CU-70-M | 29-CU-70-M |  | M1,M2 |  |  |  |  |  |
| O0348.055 | 30-ZN-73-G | 30-ZN-73-G | 23.5SEC | 0 |  |  | SF4: Delete -G. | Delete -G. |  |
| V1001.267.2 | 32-GE-71-G | 32-GE-71-G | 11.8D | 0 |  |  |  |  | Quasi-metastable state is considered. |
| 10835.004.1 | 33-AS-74-G | 33-AS-74-G | 17.5D | 0 |  | Y |  |  |  |
| O1377.003.3 | 33-AS-74-G | 33-AS-74-G |  | 0 |  | Y |  |  |  |
| 10835.004.2 | 33-AS-74-M | 33-AS-74-M | 8.SEC | 0 |  | Y |  |  |  |
| O1377.003.2 | 33-AS-74-M | 33-AS-74-M |  | 0 |  | Y |  |  |  |
| O1377.002 | 33-AS-74-M/G | 33-AS-74-G |  | 0 |  | Y |  |  |  |
| O1377.002 | 33-AS-74-M/G | 33-AS-74-M |  | 0 |  | Y |  |  |  |
| O1377.003.1 | 33-AS-74-M/G | 33-AS-74-G |  | 0 |  | Y |  |  |  |
| O1377.003.1 | 33-AS-74-M/G | 33-AS-74-M |  | 0 |  | Y |  |  |  |
| 21107.017 | 33-AS-78-G | 33-AS-78-G | 91.MIN | 0 |  | Y |  |  |  |
| 21107.016 | 33-AS-78-M | 33-AS-78-M | 6.MIN | 0 |  | Y |  |  |  |
| 21107.019 | 33-AS-78-M/G | 33-AS-78-G |  | 0 |  | Y |  |  |  |
| 21107.019 | 33-AS-78-M/G | 33-AS-78-M |  | 0 |  | Y |  |  |  |
| 21413.002 | 33-AS-78-M/G | 33-AS-78-G | 90.MIN | 0 |  | N |  |  |  |
| 21413.002 | 33-AS-78-M/G | 33-AS-78-M | 6.1MIN | 0 |  | N |  |  |  |
| G0001.005 | 34-SE-73-M1/G | 34-SE-73-M1 | 38.9MIN | M |  |  | SF4: M1/G -> M/G | M1 -> M |  |
| G0001.004 | 38-SR-85-M1/G | 38-SR-85-M1 | 69.5MIN | M |  |  | SF4: M1/G -> M/G | M1 -> M |  |
| 14211.003 | 39-Y-88-G | 39-Y-88-G |  | 0 |  |  | (ok) |  | Quasi-metastable state is considered. |
| 21300.016 | 39-Y-88-G | 39-Y-88-G | 106.6D\* | 0 |  |  | SF4: Delete -G. | Move HL=106.6D from COMMON. | "g" not mentioned in the article. |
| 10493.008.G | 39-Y-88-G | 39-Y-88-G | 107.D | 0 |  |  |  |  | Quasi-metastable state is considered. |
| 10493.011 | 39-Y-88-L1+L2/G | 39-Y-88-G | 107.D | 0 |  |  |  |  | Quasi-metastable state is considered. |
| P0008.002 | 39-Y-88-M | 39-Y-88-M |  | 0 |  |  | SF4: M -> L | Add T1/2=14.5 msec. |  |
| 30101.009 | 39-Y-88-M/G | 39-Y-88-G |  | 0 |  | N |  |  |  |
| 30101.009 | 39-Y-88-M/G | 39-Y-88-M |  | 0 |  | N |  |  |  |
| 22017.002 | 39-Y-97-M/T | 39-Y-97-M |  | M1,M2 |  |  |  |  |  |
| 23810.002 | 39-Y-97-M/T | 39-Y-97-M |  | M1,M2 |  |  | SF4: M/T -> M1+M2/T |  | Fraction of high-spin (92+) isomer |
| O2429.004 | 39-Y-97-M/T | 39-Y-97-M |  | M1,M2 |  |  |  |  |  |
| O2429.010 | 39-Y-97-M/T | 39-Y-97-M |  | M1,M2 |  |  |  |  |  |
| G0001.003 | 40-ZR-89-M1/G | 40-ZR-89-M1 | 4.18MIN | M |  |  | SF4: M1/G -> M/G | M1 -> M |  |
| 11590.053 | 41-NB-92-M2 | 41-NB-92-M2 | 13.HR | M |  | Y |  |  | OUTDT coded. |
| G0001.002 | 42-MO-91-M1/G | 42-MO-91-M1 | 65.5SEC | M |  |  | SF4: M1/G -> M/G | M1 -> M |  |
| V1001.408.1 | 43-TC-100-G | 43-TC-100-G | 15.8SEC | 0 |  |  | Delete -G. | Delete G. |  |
| 21976.038 | 47-AG-116-M | 47-AG-116-M | 10.5SEC | M1,M2 |  |  | SF4: M -> M2 | M -> M2 |  |
| O0830.004 | 47-AG-116-M/G | 47-AG-116-M |  | M1,M2 |  |  |  |  |  |
| A0272.002 | 49-IN-109-G/M | 49-IN-109-M | 1.3MIN | M1,M2 |  |  | SF4: G/M -> G+M2/M1 |  | M1 coded in DECAY-DATA |
| A0335.012 | 49-IN-109-G/M | 49-IN-109-M |  | M1,M2 |  |  |  |  |  |
| A0335.013 | 49-IN-109-G/M | 49-IN-109-M |  | M1,M2 |  |  |  |  |  |
| D4069.002 | 49-IN-109-G/M | 49-IN-109-M | 1.34MIN | M1,M2 |  |  | SF4: G/M -> G+M2/M1 | M -> M1 |  |
| O1378.002 | 49-IN-109-G/M | 49-IN-109-M | 1.34MIN | M1,M2 |  |  | SF4: G/M -> G+M2/M1 | M -> M1 |  |
| C2602.003.1 | 49-IN-109-M | 49-IN-109-M |  | M1,M2 |  |  |  |  |  |
| A0278.005 | 49-IN-109-M/T | 49-IN-109-M |  | M1,M2 |  |  |  |  |  |
| 30638.004 | 49-IN-113-M1 | 49-IN-113-M1 | 99.47MIN | M |  |  | SF4: M1 -> M | M1 -> M |  |
| 30641.013 | 49-IN-113-M1 | 49-IN-113-M1 | 99.48MIN | M |  |  | SF4: M1 -> M | M1 -> M |  |
| 30322.012.2 | 49-IN-114-M1 | 49-IN-114-M1 | 2.5SEC | M |  | Y |  |  |  |
| M0704.002.2 | 49-IN-114-M1/G | 49-IN-114-M1 | 43.MSEC | M |  |  | M1/G -> L/G | M1 -> L |  |
| 21717.002 | 49-IN-114-M1+M2 | 49-IN-114-M1 | 50.0D | M |  |  | SF4: M1 -> M | M1 -> M |  |
| 21717.003 | 49-IN-114-M1+M2 | 49-IN-114-M1 | 49.0D | M |  |  | SF4: M1 -> M | M1 -> M |  |
| 12609.002 | 49-IN-114-M2 | 49-IN-114-M2 | 42.MSEC | M |  |  | SF4: M2 -> L | M2 -> L |  |
| F0937.008 | 49-IN-116-G/M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| 11450.031 | 49-IN-116-M | 49-IN-116-M | 54.MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| 11830.002 | 49-IN-116-M | 49-IN-116-M | 54.MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| 11975.010 | 49-IN-116-M | 49-IN-116-M | 54.MIN\* | M1,M2 |  |  | SF4: M -> M1+M2 | Move HL=54.MIN from COMMON. |  |
| 12866.099 | 49-IN-116-M | 49-IN-116-M | 3.774E-02D | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| 13860.045 | 49-IN-116-M | 49-IN-116-M | 54.MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| 20229.004 | 49-IN-116-M | 49-IN-116-M | 54.MIN\* | M1,M2 |  |  | SF4: M -> M1+M2 | Move HL=54.MIN from COMMON. |  |
| 20550.002 | 49-IN-116-M | 49-IN-116-M | 54.MIN\* | M1,M2 |  |  | SF4: M -> M1+M2 | Move HL=54.MIN from COMMON. |  |
| 20633.004 | 49-IN-116-M | 49-IN-116-M | 54.MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| 20649.002 | 49-IN-116-M | 49-IN-116-M | 54.12MIN\* | M1,M2 |  |  | SF4: M -> M1+M2 | Move HL=54.12 MIN from COMMON. |
| 20649.005 | 49-IN-116-M | 49-IN-116-M | 54.12MIN\* | M1,M2 |  |  | SF4: M -> M1+M2 | Move HL=54.12 MIN from COMMON. |
| 21891.003 | 49-IN-116-M | 49-IN-116-M | 54.MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| 22234.005 | 49-IN-116-M | 49-IN-116-M | 54.MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| 23491.012 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| 30265.013 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| 30268.008 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| 30452.003 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| 30759.002 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| 31003.006 | 49-IN-116-M | 49-IN-116-M | 2.16SEC | M1,M2 |  |  | SF4: M -> M2 | M1 -> M2 |  |
| 31237.003 | 49-IN-116-M | 49-IN-116-M | 54.MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| 31712.012 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| 33092.002 | 49-IN-116-M | 49-IN-116-M | 54.29MIN | M1,M2 |  |  | SF4: M -> M1+M2 |  | M1 coded in DECAY-DATA |
| 40421.019 | 49-IN-116-M | 49-IN-116-M | 54.0MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| 40944.002 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| 20643.055.1 | 49-IN-116-M | 49-IN-116-M | 54.MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| 31099.005.2 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| 31472.004.2 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| A0931.196 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| A0931.314 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| A0931.440 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| C0488.020 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| C0488.092 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| D0467.005 | 49-IN-116-M | 49-IN-116-M | 54.29MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| D4231.012 | 49-IN-116-M | 49-IN-116-M | 54.29MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| D6006.025 | 49-IN-116-M | 49-IN-116-M | 54.29MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| D6046.023 | 49-IN-116-M | 49-IN-116-M | 54.15MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| D6060.025 | 49-IN-116-M | 49-IN-116-M | 54.29MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| D6077.018 | 49-IN-116-M | 49-IN-116-M | 54.29MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| K2027.147 | 49-IN-116-M | 49-IN-116-M | 54.15MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| O0841.035 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| O1586.003 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| V0102.230 | 49-IN-116-M | 49-IN-116-M |  | M1,M2 |  |  |  |  |  |
| K2027.261 | 49-IN-116-M/G | 49-IN-116-M |  | M1,M2 |  |  | SF4: M/G -> M1+M2/G |  |  |
| K2027.270 | 49-IN-116-M/G | 49-IN-116-M |  | M1,M2 |  |  | SF4: M/G -> M1+M2/G |  |  |
| M0704.003.1 | 49-IN-116-M/G | 49-IN-116-M | 54.1MIN | M1,M2 |  |  | SF4: M/G -> M1+M2/G | M -> M1 |  |
| 30388.005 | 49-IN-116-M/T | 49-IN-116-M | 54.0MIN | M1,M2 |  |  | SF4: M/T -> M1+M2/T |  | M1 coded in DECAY-DATA |
| 30202.014 | 49-IN-118-M | 49-IN-118-M |  | M1,M2 | \* |  |  |  |  |
| O0841.036 | 49-IN-118-M | 49-IN-118-M |  | M1,M2 | \* |  |  |  |  |
| 20540.013 | 49-IN-120-M | 49-IN-120-M | 3.2SEC | M1,M2 | \* |  | SF4: M -> G (or M1 or M2) | M -> G (or M1 or M2) |  |
| 22415.016 | 49-IN-120-M | 49-IN-120-M | 44.4SEC | M1,M2 | \* |  | SF4: M -> M1 or M2 (or G) | M -> M1 or M2 (or G) |  |
| 40798.005 | 49-IN-120-M | 49-IN-120-M | 51.SEC | M1,M2 | \* |  | SF4: M -> M1 or M2 (or G) | M -> M1 or M2 (or G) |  |
| 12003.004 | 49-IN-120-M/G | 49-IN-120-M | 44.SEC | M1,M2 | \* |  | SF4: M -> M1 or M2 (or G) | M -> M1 or M2 (or G) |  |
| O0320.027 | 51-SB-120-M1 | 51-SB-120-M1 |  | M | \* |  |  |  |  |
| 11274.083 | 51-SB-124-M | 51-SB-124-M | 20.MIN | M1,M2 |  |  | SF4: M -> M2 | M -> M2 |  |
| 11997.002 | 51-SB-124-M | 51-SB-124-M | 1.3MIN | M1,M2 |  |  | SF4: M -> M1. SF5: Add (M). | M -> M1 | T1/2(M1)<T1/2(M2) |
| 31080.008 | 51-SB-124-M | 51-SB-124-M | 21.3MIN | M1,M2 |  |  | SF4: M -> M2 | M -> M2 |  |
| O0562.006.2 | 51-SB-124-M | 51-SB-124-M |  | M1,M2 |  |  |  |  |  |
| A0950.098 | 51-SB-124-M/G | 51-SB-124-M |  | M1,M2 |  |  |  |  |  |
| O2028.008 | 51-SB-124-M/G | 51-SB-124-M | 20.2MIN | M1,M2 |  |  | SF4: M/G -> M2/G or M2/G+M1? | M -> M2 | IT=75% for the m1 state |
| O2028.009 | 51-SB-126-G/M | 51-SB-126-M | 19.0MIN | M1,M2 |  |  | SF4: G/M -> G/M1+M2 | M -> M1 |  |
| 30286.008 | 51-SB-126-M | 51-SB-126-M | 1.9000E+01MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| 31563.009 | 51-SB-126-M | 51-SB-126-M | 19.03MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| 40029.011.1 | 51-SB-126-M | 51-SB-126-M | 19.1MIN | M1,M2 |  |  | SF4: M -> M1+M2 |  | M1 in DECAY-DATA |
| C0710.006 | 51-SB-126-M | 51-SB-126-M | 18.7MIN | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| O0562.009.2 | 51-SB-126-M | 51-SB-126-M |  | M1,M2 |  |  |  |  |  |
| G0070.007 | 51-SB-126-M/T | 51-SB-126-M |  | M1,M2 |  |  |  |  |  |
| 41163.011 | 51-SB-130-M1 | 51-SB-130-M1 | 6.3MIN | M |  |  | SF4: M1 -> M | M1 -> M |  |
| 41163.012 | 51-SB-130-M1 | 51-SB-130-M1 | 40.0MIN | M |  |  | SF4: M1 -> G | M1 -> G |  |
| O0348.026 | 51-SB-132-M1 | 51-SB-132-M1 | 4.2MIN | M |  |  | SF4: M1 -> M | M1 -> M |  |
| 12020.002 | 53-I-126-M | 53-I-126-M | 2.6HR | 0 |  | Y |  |  |  |
| 22637.064 | 63-EU-150-M1 | 63-EU-150-M1 | 12.55HR | M |  |  | SF4: M1 -> M | M1 -> M |  |
| 10783.003 | 64-GD-155-L/G | 64-GD-155-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| D4267.005 | 65-TB-154-M | 65-TB-154-M | 22.7HR | M1,M2 | \* |  |  |  |  |
| 31565.002 | 65-TB-156-M | 65-TB-156-M | 5.0HR | M1,M2 |  |  | SF4: M -> M2 | M -> M2 |  |
| A0904.047 | 67-HO-160-M | 67-HO-160-M | 5.02HR | M1,M2 |  |  | SF4: M -> M1 | M -> M1 |  |
| A0904.237 | 67-HO-160-M | 67-HO-160-M | 5.02HR | M1,M2 |  |  | SF4: M -> M1 | M -> M1 |  |
| D6196.010 | 67-HO-160-M | 67-HO-160-M | 5.02HR | M1,M2 |  |  | SF4: M -> M1 | M -> M1 |  |
| D6323.012 | 67-HO-160-M | 67-HO-160-M | 5.02HR | M1,M2 |  |  | SF4: M -> M1 | M -> M1 |  |
| 22499.032.1 | 70-YB-173-G/T | 70-YB-173-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| 22499.032.3 | 70-YB-173-L/G | 70-YB-173-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| 22499.033.1 | 70-YB-174-G/T | 70-YB-174-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| 22499.033.3 | 70-YB-174-L/G | 70-YB-174-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| 22499.034.1 | 70-YB-175-G/T | 70-YB-175-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| 22499.034.3 | 70-YB-175-L/G | 70-YB-175-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| 12088.002.1 | 71-LU-177-G/M1 | 71-LU-177-M1 | 161.0D | M |  |  | SF4: G/M1 -> G/M | M1 -> M |  |
| 20625.026 | 71-LU-177-M1 | 71-LU-177-M1 | 155.D | M |  |  | SF4: M1 -> M | M1 -> M |  |
| 20625.027 | 71-LU-177-M1 | 71-LU-177-M1 | 155.D | M |  |  | SF4: M1 -> M | M1 -> M |  |
| 12088.002.2 | 71-LU-177-M1 | 71-LU-177-M1 | 161.0D | M |  |  | SF4: M1 -> M | M1 -> M |  |
| A0598.002 | 71-LU-177-M1 | 71-LU-177-M1 | 160.D | M |  |  | SF4: M1 -> M | M1 -> M |  |
| V1002.352.2 | 71-LU-177-M1 | 71-LU-177-M1 | 160.4D | M |  |  | SF4: M1 -> M | M1 -> M |  |
| V1002.354.2 | 71-LU-177-M1 | 71-LU-177-M1 | 160.4D | M |  |  | SF4: M1 -> M | M1 -> M |  |
| 30605.005 | 71-LU-178-M1 | 71-LU-178-M1 | 20.MIN | M |  |  | SF4: M1 -> G or M | M1 -> G or M | Half-life does not help to identify G or M. |
| D6086.010 | 72-HF-177-M | 72-HF-177-M | 51.4MIN | M1,M2 |  |  | SF4: M -> M2 | M -> M2 |  |
| A0822.009 | 72-HF-178-M/G | 72-HF-178-M |  | M1,M2 |  |  |  |  |  |
| A0822.013 | 72-HF-178-M/G | 72-HF-178-M |  | M1,M2 |  |  |  |  |  |
| 22926.025 | 72-HF-178-M/T | 72-HF-178-M |  | M1,M2 |  |  |  |  |  |
| 11850.010 | 72-HF-179-M | 72-HF-179-M | 18.7SEC | M1,M2 |  |  | SF4: M -> M1 | M -> M1 |  |
| 30248.011 | 72-HF-179-M | 72-HF-179-M |  | M1,M2 |  |  |  |  |  |
| G4020.008 | 72-HF-179-M | 72-HF-179-M | 18.68SEC | M1,M2 |  |  | SF4: M -> M1 | M -> M1 |  |
| V1002.371.2 | 72-HF-179-M | 72-HF-179-M | 18.67SEC | M1,M2 |  |  | SF4: M -> M1 | M -> M1 |  |
| A0822.010 | 72-HF-179-M/G | 72-HF-179-M |  | M1,M2 |  |  |  |  |  |
| A0822.014 | 72-HF-179-M/G | 72-HF-179-M |  | M1,M2 |  |  |  |  |  |
| 23260.135 | 72-HF-181-G | 72-HF-181-G | 42.39D | 0 |  |  | SF4: Delete -G. |  |  |
| 23260.136 | 72-HF-181-G | 72-HF-181-G | 42.39D | 0 |  |  | SF4: Delete -G. |  |  |
| 33004.016 | 73-TA-178-M | 73-TA-178-M | 2.36HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| A0431.113 | 73-TA-178-M | 73-TA-178-M |  | M1,M2 | \* |  |  |  |  |
| A0598.006 | 73-TA-178-M | 73-TA-178-M | 2.5HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| B0032.002.2 | 73-TA-178-M | 73-TA-178-M | 2.1HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| D0995.005 | 73-TA-178-M | 73-TA-178-M | 2.36HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| D4233.013 | 73-TA-178-M | 73-TA-178-M | 2.36HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| D4254.003 | 73-TA-178-M | 73-TA-178-M | 2.36HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| D4305.009 | 73-TA-178-M | 73-TA-178-M | 2.36HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| D6181.012 | 73-TA-178-M | 73-TA-178-M | 2.50HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| D6303.012 | 73-TA-178-M | 73-TA-178-M | 2.36HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| D6303.024 | 73-TA-178-M | 73-TA-178-M | 2.36HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| D7006.014 | 73-TA-178-M | 73-TA-178-M | 2.36HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| D7006.028 | 73-TA-178-M | 73-TA-178-M |  | M1,M2 | \* |  |  |  |  |
| E2466.014 | 73-TA-178-M | 73-TA-178-M | 2.36HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| G4094.002 | 73-TA-178-M | 73-TA-178-M | 2.36HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| G4098.002 | 73-TA-178-M | 73-TA-178-M | 2.36HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| M1031.002.1 | 73-TA-178-M | 73-TA-178-M |  | M1,M2 | \* |  |  |  |  |
| M1031.002.2 | 73-TA-178-M | 73-TA-178-M |  | M1,M2 | \* |  |  |  |  |
| M1031.004 | 73-TA-178-M | 73-TA-178-M |  | M1,M2 | \* |  |  |  |  |
| O0768.184 | 73-TA-178-M | 73-TA-178-M | 2.36HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| A0635.003 | 73-TA-178-M/G | 73-TA-178-M | 2.45HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| G4094.005 | 73-TA-178-M/G | 73-TA-178-M |  | M1,M2 | \* |  |  |  |  |
| G4098.005 | 73-TA-178-M/G | 73-TA-178-M | 2.36HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| M0936.002 | 73-TA-178-M/G | 73-TA-178-M | 2.4HR | M1,M2 | \* |  | SF4: M -> G+M1 (or M1+M2) | M -> G (or M1) |  |
| C2325.014 | 73-TA-182-M | 73-TA-182-M |  | M1,M2 |  |  |  |  |  |
| 23495.002.1 | 76-OS-193-M | 76-OS-193-M | 17.MIN | 0 |  | Y |  |  |  |
| O0690.059 | 77-IR-188-G | 77-IR-188-G | 41.5HR | 0 |  |  | SF4: Delete -G. | Delete -G. |  |
| G4017.002 | 77-IR-190-M/G | 77-IR-190-M | 3.25HR | M1,M2 |  |  | SF4: M/G -> M2/G+M1 | M -> M2 |  |
| K2027.282 | 77-IR-190-M/G | 77-IR-190-M |  | M1,M2 |  |  | SF4: M/G -> M2/G+M1 |  | T1/2(m2)=3.1 hr in K2027.225. |
| 11817.019 | 77-IR-191-M | 77-IR-191-M | 4.9SEC | M1,M2 |  |  | SF4: M -> M1. SF5: Add (M). |  | Uncertain if M2 has IT branch to M1 state |
| 11850.011 | 77-IR-191-M | 77-IR-191-M | 4.9SEC | M1,M2 |  |  | SF4: M -> M1. SF5: Add (M). | M -> M1 | Uncertain if M2 has IT branch to M1 state |
| 14041.002 | 77-IR-191-M | 77-IR-191-M |  | M1,M2 |  |  | SF4: M -> M1 |  | Detection of prompt gamma to m1 state |
| 14041.007 | 77-IR-191-M | 77-IR-191-M |  | M1,M2 |  |  | SF4: M -> M1 |  | Detection of prompt gamma to m1 state |
| 14255.014 | 77-IR-191-M | 77-IR-191-M | 4.94SEC | M1,M2 |  |  | SF4: M -> M1; SF5: Add (M). | M -> M1 | Uncertain if M2 has IT branch to M1 state |
| 30338.003 | 77-IR-191-M | 77-IR-191-M | 4.9SEC | M1,M2 |  |  | SF4: M -> M1; SF5: Add (M). | M -> M1 | Uncertain if M2 has IT branch to M1 state |
| G4020.004 | 77-IR-191-M | 77-IR-191-M | 4.94SEC | M1,M2 |  |  | SF4: M -> M1; SF5: Add (M). | M -> M1 | Uncertain if M2 has IT branch to M1 state |
| 14255.017 | 77-IR-191-M/G | 77-IR-191-M | 4.94SEC | M1,M2 |  |  |  | M -> M1 | Uncertain if M2 has IT branch to M1 state |
| 40171.003 | 77-IR-192-G+M | 77-IR-192-M |  | M1,M2 |  |  | SF4: G+M -> G+M1 |  |  |
| 11748.022 | 77-IR-192-M | 77-IR-192-M | 1.45MIN | M1,M2 |  |  | SF4: M -> M1 | M -> M1 |  |
| 12166.002 | 77-IR-192-M | 77-IR-192-M | 600.YR\* | M1,M2 |  |  | SF4: M -> M2? | Move HL=600.MIN from COMMON. | M2 (241 yr)? |
| F1226.004 | 77-IR-194-M2/G | 77-IR-194-M2 | 171.D | M |  |  | SF4: M2/G -> M/G | M2 -> M |  |
| 21627.006 | 79-AU-196-M | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M -> M2 | M -> M2 |  |
| 22335.016 | 79-AU-196-M | 79-AU-196-M | Uwamino | M1,M2 |  |  |  |  |  |
| C2273.006 | 79-AU-196-M | 79-AU-196-M |  | M1,M2 |  |  |  |  |  |
| E1306.010 | 79-AU-196-M | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M -> M2 | M -> M2 |  |
| E1306.012 | 79-AU-196-M | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M -> M2 | M -> M2 |  |
| E1306.014 | 79-AU-196-M | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M -> M2 | M -> M2 |  |
| F1320.012 | 79-AU-196-M | 79-AU-196-M | 9.6HR | M1,M2 |  |  | SF4: M -> M2 | M -> M2 |  |
| O2014.004.1 | 79-AU-196-M | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M -> M2 | M -> M2 |  |
| R0050.004.2 | 79-AU-196-M | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M -> M2 | M -> M2 |  |
| 21627.007 | 79-AU-196-M/G | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M/G -> M2/G+M1 | M -> M2 |  |
| 21847.003 | 79-AU-196-M/G | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M/G -> M2/G+M1 | M -> M2 |  |
| 30101.015 | 79-AU-196-M/G | 79-AU-196-M |  | M1,M2 |  |  |  |  |  |
| 41346.002 | 79-AU-196-M/G | 79-AU-196-M |  | M1,M2 |  |  |  |  |  |
| 31490.004.1 | 79-AU-196-M/G | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M/G -> M2/G+M1 | M -> M2 |  |
| 31490.004.2 | 79-AU-196-M/G | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M/G -> M2/G+M1 | M -> M2 |  |
| A0461.002.4 | 79-AU-196-M/G | 79-AU-196-M |  | M1,M2 |  |  |  |  |  |
| C2548.012 | 79-AU-196-M/G | 79-AU-196-M |  | M1,M2 |  |  |  |  |  |
| E1306.020 | 79-AU-196-M/G | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M/G -> M2/G+M1 | M -> M2 |  |
| E1306.021 | 79-AU-196-M/G | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M/G -> M2/G+M1 | M -> M2 |  |
| E1306.022 | 79-AU-196-M/G | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M/G -> M2/G+M1 | M -> M2 |  |
| F0835.005 | 79-AU-196-M/G | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M/G -> M2/G+M1 | M -> M2 |  |
| F1299.009 | 79-AU-196-M/G | 79-AU-196-M |  | M1,M2 |  |  |  |  |  |
| F1320.013 | 79-AU-196-M/G | 79-AU-196-M |  | M1,M2 |  |  | SF4: M/G -> M2/G+M1 |  |  |
| G3101.002 | 79-AU-196-M/G | 79-AU-196-M | 9.6HR | M1,M2 |  |  | SF4: M/G -> M2/G+M1 | M -> M2 |  |
| G4017.003 | 79-AU-196-M/G | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M/G -> M2/G+M1 | M -> M2 |  |
| G4027.004 | 79-AU-196-M/G | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M/G -> M2/G+M1 | M -> M2 |  |
| M0061.002 | 79-AU-196-M/G | 79-AU-196-M |  | M1,M2 |  |  |  |  |  |
| O0189.004 | 79-AU-196-M/G | 79-AU-196-M | 9.7HR | M1,M2 |  |  | SF4: M/G -> M2/G+M1 | M -> M2 |  |
| 31254.010 | 79-AU-196-M/T | 79-AU-196-M | 10.HR | M1,M2 |  |  | SF4: M/T -> M2/T |  |  |
| 41240.136 | 79-AU-196-M/T | 79-AU-196-M |  | M1,M2 |  |  |  |  |  |
| D6011.002 | 79-AU-196-M/T | 79-AU-196-M |  | M1,M2 |  |  |  |  |  |
| D6011.005 | 79-AU-196-M/T | 79-AU-196-M |  | M1,M2 |  |  |  |  |  |
| 10493.018.G | 81-TL-202-G | 81-TL-202-G | 12.5D | 0 |  |  |  |  | Quasi-metastable state is considered. |
| 10493.020 | 81-TL-202-L/G | 81-TL-202-G | 12.5D | 0 |  |  |  |  | Quasi-metastable state is considered. |
| 10361.006 | 81-TL-204-M | 81-TL-204-M | 67.MICROSEC | 0 |  |  | SF4: M -> L | M -> L |  |
| 21503.008 | 82-PB-203-M | 82-PB-203-M | 5.9SEC | M1,M2 |  |  | SF4: M -> M1+M2 |  |  |
| 30069.006 | 82-PB-203-M | 82-PB-203-M |  | M1,M2 |  |  |  |  |  |
| 30156.011 | 82-PB-203-M | 82-PB-203-M | 6.1SEC | M1,M2 |  |  | SF4: M -> M1+M2 | M -> M1 |  |
| 30101.016 | 82-PB-203-M/G | 82-PB-203-M |  | M1,M2 |  |  |  |  |  |
| 10361.005 | 82-PB-205-M | 82-PB-205-M | 5.54MSEC | 0 |  |  | SF4: M -> L | M -> L |  |
| 31492.012 | 82-PB-205-M | 82-PB-205-M | 5.5MSEC | 0 |  |  | SF4: M -> L | M -> L |  |
| 31492.008.2 | 82-PB-205-M | 82-PB-205-M | 5.5MSEC | 0 |  |  | SF4: M -> L | M -> L |  |
| 31492.003 | 82-PB-206-M | 82-PB-206-M | .124MSEC | 0 |  |  | SF4: M -> L | M -> L |  |
| 31492.013 | 82-PB-206-M | 82-PB-206-M | .124MSEC | 0 |  |  | SF4: M -> L | M -> L |  |
| 31492.002.2 | 82-PB-206-M | 82-PB-206-M | .124MSEC | 0 |  |  | SF4: M -> L | M -> L |  |
| 31492.004.2 | 82-PB-206-M | 82-PB-206-M | .124MSEC | 0 |  |  | SF4: M -> L | M -> L |  |
| 31492.006.2 | 82-PB-206-M | 82-PB-206-M | .124MSEC | 0 |  |  | SF4: M -> L | M -> L |  |
| 31492.007.2 | 82-PB-206-M | 82-PB-206-M | .124MSEC | 0 |  |  | SF4: M -> L | M -> L |  |
| D5082.019 | 83-BI-200-M | 83-BI-200-M | 31.MIN | M1,M2 | \* |  | SF4: M -> M1 (or G or M2) | M -> M1 (or G or M2) |  |
| D6317.003 | 83-BI-200-M | 83-BI-200-M | 31.MIN | M1,M2 | \* |  | SF4: M -> M1 (or G or M2) | M -> M1 (or G or M2) |  |
| 10361.002 | 83-BI-208-M | 83-BI-208-M | 2.65MSEC | 0 |  |  | SF4: M -> L | M -> L |  |
| A0208.003.B | 84-PO-212-M1 | 84-PO-212-M1 | 45.1SEC | M |  |  | SF4: M1 -> M | M1 -> M |  |
| A0208.003.D | 84-PO-212-M1/G | 84-PO-212-M1 | 45.1SEC | M |  |  | SF4: M1/G -> M/G | M1 -> M |  |
| A0208.003.C | 84-PO-212-M2 | 84-PO-212-M2 | 14.NSEC | M |  |  | SF4: M2 -> L | M2 -> L |  |
| A0208.003.E | 84-PO-212-M2/G | 84-PO-212-M2 | 14.NSEC | M |  |  | SF4: M2/G -> L/G | M2 -> L |  |
| S0111.003.3 | 87-FR-214-M | 87-FR-214-M |  | 0 |  |  |  |  | Short-lived alpha quasi-metastable state exists. |
| E1522.007 | 89-AC-217-G | 89-AC-217-G | 111.NSEC | 0 |  |  |  |  | Short-lived alpha quasi-metastable state exists. |
| O1647.004 | 90-TH-213-G | 90-TH-213-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| O1647.006 | 90-TH-214-G | 90-TH-214-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| C2563.007 | 92-U-236-L/G | 92-U-236-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| 30459.003.1 | 92-U-238-L/G | 92-U-238-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| C2563.006 | 92-U-238-L/G | 92-U-238-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| B0139.003 | 94-PU-235-G | 94-PU-235-G | 25.6MIN | 0 |  |  | SF4: Delete -G. | Delete -G. |  |
| B0139.007 | 94-PU-235-G | 94-PU-235-G | 25.6MIN | 0 |  |  | SF4: Delete -G. | Delete -G. |  |
| B0139.011 | 94-PU-235-G | 94-PU-235-G | 25.6MIN | 0 |  |  | SF4: Delete -G. | Delete -G. |  |
| B0139.002 | 94-PU-236-G | 94-PU-236-G | 2.85YR | 0 |  |  | SF4: Delete -G. | Delete -G. |  |
| B0139.006 | 94-PU-236-G | 94-PU-236-G | 2.85YR | 0 |  |  | SF4: Delete -G. | Delete -G. |  |
| B0139.010 | 94-PU-236-G | 94-PU-236-G | 2.85YR | 0 |  |  | SF4: Delete -G. | Delete -G. |  |
| A0119.003 | 95-AM-238-G | 95-AM-238-G |  | 0 |  |  |  |  | Short-lived SF quasi-metastable state exists. |
| A0119.002.1 | 95-AM-239-G | 95-AM-239-G |  | 0 |  |  |  |  | Short-lived SF quasi-metastable state exists. |
| 41216.002.2 | 95-AM-240-G | 95-AM-240-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| A0119.002.2 | 95-AM-240-G | 95-AM-240-G |  | 0 |  |  |  |  | Short-lived SF quasi-metastable state exists. |
| 41216.002.3 | 95-AM-240-L/G | 95-AM-240-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| M0018.003 | 95-AM-240-L/G | 95-AM-240-G |  | 0 |  |  |  |  | Quasi-metastable state is considered. |
| V1002.643.2 | 95-AM-242-M1 | 95-AM-242-M1 | 152.YR | M |  |  | SF4: M1 -> M | M1 -> M |  |
| V1002.646.2 | 95-AM-242-M1 | 95-AM-242-M1 | 152.YR | M |  |  | SF4: M1 -> M | M1 -> M |  |
| 40504.003.1 | 95-AM-244-M1 | 95-AM-244-M1 | 1.1E-3SEC | M |  |  | SF4: M1 -> L | M1 -> L |  |
| A0071.003 | 97-BK-242-G | 97-BK-242-G | 7.MIN | 0 |  |  |  |  | Short-lived SF quasi-metastable state exists. |
| F1329.002 | 102-NO-250-G | 102-NO-250-G | 5.1MICROSEC | 0 |  |  |  |  | Short-lived SF quasi-metastable state exists. |
| E2438.002 | 104-RF-261-M1 | 104-RF-261-M1 | 68.SEC | M | \* |  | SF4: M1 -> M (or G) | M1 -> M (or G) |  |
| E2324.003 | 104-RF-261-M1/M2 | 104-RF-261-M1 | 68.SEC | M | \* |  | SF4: M1/M2 -> M/G (or G/M) | M1 -> M (or G) |  |
| E2324.003 | 104-RF-261-M1/M2 | 104-RF-261-M2 | 1.9SEC | M | \* |  | SF4: M1/M2 -> M/G (or G/M) | M2 -> G (or M) |  |
| E2438.006 | 104-RF-261-M1+M2 | 104-RF-261-M1 | 68.SEC | M | \* |  | Delete -M1+M2. | M1 -> M (or G) |  |
| E2438.006 | 104-RF-261-M1+M2 | 104-RF-261-M2 | 1.9SEC | M | \* |  | SF4: Delete -M1+M2. | M2 -> G (or M) |  |
| E2324.002 | 104-RF-261-M2 | 104-RF-261-M2 | 1.9SEC | M | \* |  | SF4: M2 -> G (or M) | M2 -> G (or M) |  |
| E2438.003 | 104-RF-261-M2 | 104-RF-261-M2 | 1.9SEC | M | \* |  | SF4: M2 -> G (or M) | M2 -> G (or M) |  |
| E2371.002 | 106-SG-265-M1 | 106-SG-265-M1 | 8.5SEC | M | \* |  | SF4: M1 -> G (or M) | M2 -> G (or M) |  |
| E2371.004 | 106-SG-265-M1+M2 | 106-SG-265-M1 | 8.5SEC | M | \* |  | SF4: Delete -M1+M2. | M2 -> G (or M) |  |
| E2371.004 | 106-SG-265-M1+M2 | 106-SG-265-M2 | 14.4SEC | M | \* |  | SF4: Delete -M1+M2. | M2 -> M (or G) |  |
| E2371.003 | 106-SG-265-M2 | 106-SG-265-M2 | 14.4SEC | M | \* |  | SF4: M2 -> M (or G) | M2 -> M (or G) |  |
| C1735.002 | 107-BH-262-G | 107-BH-262-G | 84.MSEC | 0 |  |  |  |  | Short-lived alpha quasi-metastable state exists. |
| F1273.002 | 114-FL-285-M | 114-FL-285-M | 0.15SEC | 0 |  |  | SF4: Delete -M. | Delete -M. |  |
| F1336.002 | 114-FL-285-M | 114-FL-285-M |  | 0 |  |  | SF4: Delete -M. |  |  |