

## Suspicious use of REACTION SF3=X for production cross sections

(N. Otsuka, 2021-07-01, Memo CP-D/1017)

This paper proposes a new action to NNDC and JCPRG for corrections of illegal REACTION SF3=X.

REACTION SF3=X should not be used when the process is uniquely determined (exclusive).

**Example** (EXFOR A0523.005)

(23-V-51(A,N)25-MN-54,,SIG) rather than (23-V-51(A,X)25-MN-54,,SIG).

To find use of SF3=X for a quantity of an exclusive reaction, I extracted the REACTION codes satisfying the following conditions from EXFOR Master Ver. 2021-06-15:

1. SF3 = X,
2. Nonzero values are given for the mass and atomic numbers of SF1 (target), SF2 (incident particle) and SF4 (reaction product), and
3. SF3 should be neutral (*i.e.*, charge is conserved without SF3).

The table appended to this memo lists all datasets satisfying these conditions. I consider SF3=X is suspicious unless

- CUM is coded in SF5, or
- the incident energy is higher than the threshold of a mesonic process (*e.g.*, (p,p $\pi^-$ ) in addition to (p,n) reaction),

and summarized proposed corrections in the appended table. SF5=CUM is questionable (*i.e.*, no precursor exists) for a few cases, and I added my proposals for such cases, too.

### Datasets coded with SF3=X and Z(SF1)+Z(SF2)=Z(SF4) in EXFOR Master 2021-06-15

$E_t$ : Threshold energy for production

$E_{t,\pi}$ : Threshold energy for mesonic process,

$E_{max}$ : Maximum energy of the dataset

Dataset #	REACTION	$E_t$	$E_{t,\pi}$	$E_{max}$	Remark
10214.016	50-SN-124(N,X)50-SN-123-M,CUM,SIG	8.56E+06	1.49E+08	1.40E+07	(Ok)
22735.004	76-OS-192(N,X)76-OS-190-M,CUM,SIG	1.34E+07	1.53E+08	2.00E+07	(Ok)
22794.030	27-CO-59(N,X)27-CO-55,,SIG,,,DERIV	4.12E+07	1.83E+08	1.80E+08	Use SF3=5N.
22794.031	27-CO-59(N,X)27-CO-56,,SIG,,,DERIV	3.09E+07	1.72E+08	1.80E+08	(Ok)
22794.032	27-CO-59(N,X)27-CO-57,,SIG,,,DERIV	1.94E+07	1.61E+08	1.80E+08	(Ok)
22794.033	27-CO-59(N,X)27-CO-58,,SIG,,,DERIV	1.06E+07	1.52E+08	1.80E+08	(Ok)
22951.002	1-H-2(N,X)1-H-1,,DE,,RAW	3.34E+06	2.17E+08	1.70E+07	Use SF3=2N. Add SF7=P.
23494.002	69-TM-169(N,X)69-TM-170-L,,SIG,,MXW	0.00E+00	2.65E+08	2.50E-02	Use SF3=G.
31784.014	23-V-51(N,X)23-V-48,,SIG	3.26E+07	1.74E+08	3.40E+07	Use SF3=4N.
41038.008.2	63-EU-151(N,X)63-EU-152-G+M2,,SIG,,FIS	0.00E+00	2.66E+08	1.42E+06	Use SF3=G.
41639.002	51-SB-124(N,X)51-SB-125,,SIG,,SPA	0.00E+00	2.64E+08	1.00E+06	Use SF3=G. EN-DUMMY=0.0253 eV?
A0068.064.1	24-CR-52(P,X)25-MN-52,,SIG,,,DERIV	5.60E+06	1.47E+08	2.20E+07	Use SF3=N.
A0068.065.1	26-FE-56(P,X)27-CO-56,,SIG,,,DERIV	5.45E+06	1.47E+08	2.20E+07	Use SF3=N.

A0068.069.1	40-ZR-91(P,X)41-NB-91,,SIG,,,DERIV	2.06E+06	1.43E+08	2.20E+07	Use SF3=N.
A0068.070.1	40-ZR-94(P,X)41-NB-94,,SIG,,,DERIV	1.70E+06	1.42E+08	2.20E+07	Use SF3=N.
A0068.070.2	40-ZR-94(P,X)41-NB-93,,SIG,,,DERIV	9.01E+06	1.49E+08	2.20E+07	Use SF3=2N.
A0068.071.1	49-IN-115(P,X)50-SN-115,,SIG,,,DERIV	2.87E+05	1.40E+08	2.20E+07	Use SF3=N.
A0068.071.2	49-IN-115(P,X)50-SN-114,,SIG,,,DERIV	7.90E+06	1.48E+08	2.20E+07	Use SF3=2N.
A0068.072.1	73-TA-181(P,X)74-W-181,,SIG,,,DERIV	9.93E+05	1.41E+08	2.20E+07	Use SF3=N.
A0100.009.1	27-CO-59(P,X)28-NI-57,IND,SIG	2.35E+07	1.65E+08	2.00E+08	(Ok)
A0145.006	23-V-51(P,X)24-CR-51,,SIG	1.57E+06	1.43E+08	1.60E+07	Use SF3=N.
A0236.008	15-P-31(A,X)17-CL-34-M,,TTY,,PHY	6.38E+06	1.63E+08	4.40E+07	Use SF3=N.
A0294.007.2	41-NB-93(A,X)43-TC-95-M,,TTY,,(PHY)	1.56E+07	1.60E+08	4.50E+07	Use SF3=2N.
A0294.007.3	41-NB-93(A,X)43-TC-96,,TTY,,(PHY)	7.34E+06	1.52E+08	4.50E+07	Use SF3=N.
A0322.006	93-NP-237(D,X)94-PU-236,CUM,SIG	9.19E+06	1.49E+08	2.50E+07	(Ok)
A0322.008	93-NP-237(D,X)94-PU-238,CUM,SIG	0.00E+00	1.36E+08	2.50E+07	(Ok)
A0471.086	65-TB-159(D,X)66-DY-155,CUM,SIG	3.61E+07	1.77E+08	7.30E+09	(Ok)
A0471.087	65-TB-159(D,X)66-DY-157,CUM,SIG	1.95E+07	1.60E+08	7.30E+09	(Ok)
A0477.007	25-MN-55(P,X)26-FE-52-G,IND,SIG	3.50E+07	1.77E+08	3.70E+09	(Ok)
A0485.002	3-LI-7(P,X)4-BE-7,,SIG	1.88E+06	1.62E+08	1.00E+08	Use SF3=N.
A0497.005	25-MN-55(P,X)26-FE-52,,TTY,,PHY	3.50E+07	1.77E+08	9.90E+07	Use SF3=4N.
A0497.006	25-MN-55(P,X)26-FE-55,,TTY,,PHY	1.03E+06	1.43E+08	9.90E+07	Use SF3=N.
A0523.004	9-F-19(A,X)11-NA-22,,SIG	2.36E+06	1.71E+08	3.20E+07	Use SF3=N.
A0523.005	23-V-51(A,X)25-MN-54,,SIG	2.47E+06	1.52E+08	3.70E+07	Use SF3=N.
A0523.006	23-V-51(A,X)25-MN-52-G,M+,SIG	2.51E+07	1.75E+08	5.80E+07	Use SF3=3N.
A0523.020	75-RE-187(A,X)77-IR-190-G,M+,SIG	1.03E+07	1.52E+08	6.00E+07	Use SF3=N.
A0523.021	75-RE-187(A,X)77-IR-189,CUM,SIG	1.68E+07	1.59E+08	6.00E+07	Use SF3=2N. Delete SF5=CUM.
A0528.005	93-NP-237(P,X)94-PU-236,CUM,SIG	6.91E+06	1.46E+08	1.80E+07	(Ok)
A0901.058	26-FE-56(P,X)27-CO-57,IND,SIG	0.00E+00	2.69E+08	2.60E+09	(Ok)
A0901.059	26-FE-56(P,X)27-CO-56,IND,SIG	5.45E+06	1.47E+08	2.60E+09	(Ok)
A0901.060	26-FE-56(P,X)27-CO-55,IND,SIG	1.57E+07	1.57E+08	2.60E+09	(Ok)
A0906.122	41-NB-93(P,X)42-MO-93-M,IND,SIG	1.20E+06	1.42E+08	2.60E+09	(O)
A0906.123	41-NB-93(P,X)42-MO-91,IND,SIG	2.22E+07	1.63E+08	4.60E+07	Use SF3=3N.
A0914.003	83-BI-209(P,X)84-PO-209,IND,SIG	2.69E+06	1.42E+08	6.60E+08	(Ok)
A0914.004	83-BI-209(P,X)84-PO-208,IND,SIG	9.69E+06	1.49E+08	6.60E+08	(Ok)
A0914.005	83-BI-209(P,X)84-PO-207,IND,SIG	1.81E+07	1.58E+08	1.40E+08	Use SF3=3N.
A0914.008	83-BI-209(P,X)84-PO-206,IND,SIG	2.52E+07	1.65E+08	6.60E+08	(Ok)
A0914.010	83-BI-209(P,X)84-PO-205,IND,SIG	3.40E+07	1.74E+08	6.60E+08	(Ok)
A0914.013	83-BI-209(P,X)84-PO-204,IND,SIG	4.13E+07	1.81E+08	6.60E+08	(Ok)
A0914.015	83-BI-209(P,X)84-PO-203,IND,SIG	5.04E+07	1.90E+08	6.60E+08	(Ok)
A0914.017	83-BI-209(P,X)84-PO-202,IND,SIG	5.79E+07	1.97E+08	6.60E+08	(Ok)
A0914.019	83-BI-209(P,X)84-PO-201,IND,SIG	6.74E+07	2.07E+08	4.80E+08	(Ok)
A0914.025	83-BI-209(P,X)84-PO-199,IND,SIG	8.49E+07	2.25E+08	6.60E+08	(Ok)
A0916.017	52-TE-125(P,X)53-I-126,,SIG	0.00E+00	2.66E+08	6.60E+08	(Ok)
A0927.002	82-PB-208(P,X)83-BI-207,IND,SIG	1.06E+07	1.50E+08	5.00E+08	(Ok)
A0927.003	82-PB-208(P,X)83-BI-206,IND,SIG	1.87E+07	1.58E+08	5.00E+08	(Ok)
A0927.004	82-PB-208(P,X)83-BI-205,IND,SIG	2.58E+07	1.65E+08	5.00E+08	(Ok)
A0927.005	82-PB-208(P,X)83-BI-204,IND,SIG	3.43E+07	1.74E+08	5.00E+08	(Ok)
A0927.006	82-PB-208(P,X)83-BI-203,IND,SIG	4.16E+07	1.81E+08	5.00E+08	(Ok)
A0927.007	82-PB-208(P,X)83-BI-202,IND,SIG	5.05E+07	1.90E+08	5.00E+08	(Ok)
C0336.002	24-CR-52(P,X)25-MN-52-G,,SIG	5.60E+06	1.47E+08	2.70E+07	Use SF3=N.
C0481.020	26-FE-56(P,X)27-CO-56,PAR,SIG,G,AV	5.45E+06	1.47E+08	2.40E+07	Use SF3=N.
C0709.012	92-U-238(A,X)94-PU-241,CUM,SIG	1.15E+07	1.53E+08	4.30E+07	(Ok)

C0709.014	92-U-238(A,X)94-PU-239,CUM,SIG	2.35E+07	1.65E+08	4.30E+07	(Ok)
C0709.015	92-U-238(A,X)94-PU-238,CUM,SIG	2.92E+07	1.70E+08	4.30E+07	(Ok)
C0944.002	26-FE-58(P,X)27-CO-58-G/M,,SIG/RAT	3.14E+06	1.45E+08	6.30E+06	Use SF3=N.
C0944.003	26-FE-58(P,X)27-CO-56,,SIG	2.34E+07	1.65E+08	6.30E+06	Use SF3=3N.
C0944.003	26-FE-58(P,X)27-CO-58-M,,SIG	3.14E+06	1.45E+08	6.30E+06	Use SF3=N.
C0967.002	53-I-127(P,X)54-XE-121,,SIG	5.62E+07	1.96E+08	6.70E+07	Use SF3=7N.
C0967.003	53-I-127(P,X)54-XE-122,,SIG	4.51E+07	1.85E+08	6.70E+07	Use SF3=6N.
C0967.004	53-I-127(P,X)54-XE-123,,SIG	3.71E+07	1.77E+08	6.70E+07	Use SF3=5N.
C0967.005	53-I-127(P,X)54-XE-125,,SIG	1.89E+07	1.59E+08	6.70E+07	Use SF3=3N.
C1047.004	53-I-127(D,X)54-XE-128,,SIG	0.00E+00	1.35E+08	1.80E+07	Use SF3=N.
C1094.004	67-HO-165(P,X)68-ER-153,,SIG	1.03E+08	2.43E+08	4.80E+08	(Ok)
C1094.005	67-HO-165(P,X)68-ER-152,,SIG	1.11E+08	2.51E+08	4.80E+08	(Ok)
C1094.006	67-HO-165(P,X)68-ER-151,,SIG	1.21E+08	2.61E+08	4.80E+08	(Ok)
C1094.014	69-TM-169(P,X)70-YB-155,,SIG	1.25E+08	2.65E+08	4.80E+08	(Ok)
C1094.048	79-AU-197(P,X)80-HG-183,,SIG	1.22E+08	2.61E+08	4.80E+08	(Ok)
C1159.005	39-Y-89(D,X)40-ZR-87,,SIG	2.81E+07	1.70E+08	3.90E+07	Use SF3=4N.
C1183.007	24-CR-54(P,X)25-MN-54,,TTY,,EOB/MSC	2.20E+06	1.44E+08	2.00E+07	Use SF3=N.
C1183.008	25-MN-55(D,X)26-FE-55,,TTY,,EOB/MSC	3.36E+06	1.47E+08	1.50E+07	Use SF3=2N.
C1183.024	25-MN-55(P,X)26-FE-55,,TTY,,EOB/MSC	1.03E+06	1.43E+08	2.00E+07	Use SF3=N.
C1465.025	16-S-42(D,X)17-CL-42,,SIG	0.00E+00	1.41E+08	1.00E-01	Use SF3=2N.
C1610.005	2-HE-3(A,X)4-BE-7,,SIG,,SFC,DERIV	0.00E+00	6.37E+08	0.00E+00	Use SF3=G.
C1956.011	2-HE-4(A,X)4-BE-7,PAR,SIG	3.80E+07	3.19E+08	2.00E+08	Use SF3=N.
C1997.005	56-BA-138(A,X)58-CE-141,(CUM),SIG	8.72E+06	1.52E+08	4.10E+07	(Ok)
C1997.007	56-BA-138(A,X)58-CE-141,,SIG	8.72E+06	1.52E+08	4.10E+07	Use SF3=N.
C2149.008	23-V-51(PIN,X)22-TI-48,PAR,SIG,G	0.00E+00	2.72E+07	2.20E+08	(Ok)
C2200.012	65-TB-159(P,X)66-DY-153,CUM,SIG	4.99E+07	1.90E+08	8.70E+07	Use SF3=7N? SF5=CUM is suspicious.
C2200.013	65-TB-159(P,X)66-DY-155,CUM,SIG	3.37E+07	1.73E+08	2.00E+08	SF5=CUM is suspicious?
C2200.014	65-TB-159(P,X)66-DY-157,CUM,SIG	1.71E+07	1.57E+08	1.40E+08	Use SF3=3N? SF5=CUM is suspicious.
C2296.040	94-PU-242(A,X)96-CM-244,CUM,SIG	1.77E+07	1.59E+08	4.40E+07	(Ok)
C2305.002	88-RA-226(A,X)90-TH-226,CUM,SIG	2.99E+07	1.71E+08	4.60E+07	(Ok)
C2305.004	92-U-236(A,X)94-PU-236,CUM,SIG	3.08E+07	1.72E+08	4.60E+07	(Ok)
C2327.039	41-NB-93(P,X)42-MO-93-M,,SIG	1.20E+06	1.42E+08	8.90E+07	Use SF3=N.
C2370.022	53-I-127(PIP,X)54-XE-127,,SIG	0.00E+00	1.31E+08	3.50E+08	(Ok)
C2370.023	53-I-127(PIP,X)54-XE-125,,SIG	0.00E+00	1.72E+07	3.50E+08	(Ok)
C2370.024	53-I-127(PIP,X)54-XE-123,,SIG	0.00E+00	3.53E+07	3.50E+08	(Ok)
C2370.025	53-I-127(PIP,X)54-XE-122,,SIG	0.00E+00	4.33E+07	3.50E+08	(Ok)
C2370.026	53-I-127(PIP,X)54-XE-121,,SIG	0.00E+00	5.42E+07	3.50E+08	(Ok)
C2413.014	42-MO-94(P,X)43-TC-94-G,,SIG	5.09E+06	1.45E+08	1.90E+07	Use SF3=N.
C2481.003	92-U-235(A,X)94-PU-236,CUM,SIG	2.42E+07	1.65E+08	2.80E+07	(Ok)
D0114.007	81-TL-203(P,X)82-PB-201,,TTY/DEN,,PHY	1.75E+07	1.57E+08	3.60E+07	Use SF3=3N.
D0114.008	81-TL-203(P,X)82-PB-202- M,,TTY/DEN,,PHY	8.72E+06	1.48E+08	3.60E+07	Use SF3=2N.
D0114.009	81-TL-203(P,X)82-PB-203,,TTY/DEN,,PHY	1.77E+06	1.41E+08	3.60E+07	Use SF3=N.
D0114.010	80-HG-202(P,X)81-TL-199,,TTY/DEN,,PHY	2.44E+07	1.64E+08	2.70E+07	Use SF3=4N.
D0114.012	80-HG-202(P,X)81-TL-201,,TTY/DEN,,PHY	9.06E+06	1.49E+08	2.70E+07	Use SF3=2N.
D0114.013	80-HG-202(P,X)81-TL-202,,TTY/DEN,,PHY	2.16E+06	1.42E+08	2.70E+07	Use SF3=N.
D0664.002	41-NB-93(P,X)42-MO-93-M,,TTY,,PHY	1.20E+06	1.42E+08	1.20E+07	Use SF3=N.
D0802.003	28-NI-64(P,X)29-CU-64,,SIG	2.50E+06	1.44E+08	4.00E+06	Use SF3=N.

D0802.006	28-NI-64(P,X)29-CU-64,,SIG	2.50E+06	1.44E+08	1.60E+07	Use SF3=N.
D4055.002.1	62-SM-147(HE3,X)64-GD-147,,SIG	1.35E+07	1.55E+08	3.40E+07	Use SF3=3N.
D4055.002.2	62-SM-147(HE3,X)64-GD-149,,SIG	0.00E+00	1.39E+08	3.40E+07	Use SF3=N.
D4055.003.1	62-SM-147(HE3,X)64-GD-146,,SIG	2.10E+07	1.63E+08	3.40E+07	Use SF3=4N.
D4055.005.1	62-SM-144(A,X)64-GD-147,,SIG	1.26E+07	1.55E+08	2.50E+07	Use SF3=N.
D4055.005.2	62-SM-144(A,X)64-GD-146,,SIG	2.01E+07	1.63E+08	2.50E+07	Use SF3=2N.
D4056.009	28-NI-64(D,X)29-CU-61,,TTY,,PHY/MSC	3.34E+07	1.77E+08	1.90E+07	Use SF3=5N.
D4073.016	55-CS-133(P,X)56-BA-133-M,,SIG	1.31E+06	1.41E+08	1.90E+07	Use SF3=N.
D4104.009	13-AL-27(P,X)14-SI-26,,SIG	1.96E+07	1.64E+08	2.70E+07	Use SF3=2N.
D4104.010	13-AL-27(P,X)14-SI-27,,SIG	5.80E+06	1.50E+08	2.70E+07	Use SF3=N.
D4104.024	13-AL-27(D,X)14-SI-27,,SIG	8.40E+06	1.58E+08	1.70E+07	Use SF3=2N.
D4127.002.1	37-RB-85(P,X)38-SR-85-G,,SIG	1.87E+06	1.42E+08	9.40E+07	Use SF3=N.
D4127.002.2	37-RB-85(P,X)38-SR-85-M,,SIG	1.87E+06	1.42E+08	9.40E+07	Use SF3=N.
D4154.003	78-PT-198(D,X)79-AU-199,,SIG	0.00E+00	1.36E+08	2.00E+07	Use SF3=N.
D4154.006.2	78-PT-198(D,X)79-AU-199,,TTY,,PHY,DERIV	0.00E+00	1.36E+08	1.50E+07	Use SF3=N.
D4156.002	41-NB-93(D,X)42-MO-93-M,,SIG	3.49E+06	1.45E+08	3.80E+07	Use SF3=2N.
D4175.002.2	70-YB-176(D,X)71-LU-177-G,CUM,SIG	0.00E+00	1.36E+08	2.00E+07	(Ok)
D4175.003.2	70-YB-176(D,X)71-LU-177-G,CUM,TTY,,PHY,DERIV	0.00E+00	1.36E+08	2.00E+07	(Ok)
D4180.002	69-TM-169(D,X)70-YB-169,,SIG	3.95E+06	1.44E+08	2.10E+07	Use SF3=2N.
D4232.007	27-CO-59(D,X)28-NI-57,,SIG	2.62E+07	1.70E+08	3.90E+07	Use SF3=4N.
D4249.002	81-TL-203(D,X)82-PB-204-M,,SIG	0.00E+00	1.36E+08	2.10E+07	Use SF3=N.
D4249.003	81-TL-203(D,X)82-PB-203,CUM,SIG	4.02E+06	1.44E+08	2.10E+07	Use SF3=2N. (Confirmed by Sandor.)
D4249.004	81-TL-203(D,X)82-PB-202-M,,SIG	1.10E+07	1.51E+08	2.10E+07	Use SF3=3N.
D4255.006	27-CO-59(P,X)28-NI-57,,SIG	2.35E+07	1.65E+08	7.00E+07	Use SF3=3N.
D4334.002	55-CS-133(D,X)56-BA-133-M,,SIG	3.58E+06	1.45E+08	3.90E+07	Use SF3=2N.
D4334.003	55-CS-133(D,X)56-BA-133-G,M+,SIG	3.58E+06	1.45E+08	3.00E+07	Use SF3=2N.
D4334.004	55-CS-133(D,X)56-BA-131-G,M+,SIG	2.09E+07	1.62E+08	3.90E+07	Use SF3=4N.
D7014.002	39-Y-89(A,X)41-NB-89-M,,SIG	3.86E+07	1.84E+08	4.30E+07	Use SF3=4N.
D7014.003	39-Y-89(A,X)41-NB-89-G,,SIG	3.86E+07	1.84E+08	4.30E+07	Use SF3=4N.
D7014.005	39-Y-89(A,X)41-NB-91-M,,SIG	1.55E+07	1.61E+08	4.30E+07	Use SF3=2N.
D7014.006	39-Y-89(A,X)41-NB-92-M,,SIG	7.22E+06	1.52E+08	4.30E+07	Use SF3=N.
D7014.014	39-Y-89(A,X)41-NB-89-M,,TTY,,PHY,DERIV	3.86E+07	1.84E+08	4.30E+07	Use SF3=4N.
D7014.015	39-Y-89(A,X)41-NB-89-G,,TTY,,PHY,DERIV	3.86E+07	1.84E+08	4.30E+07	Use SF3=4N.
D7014.017	39-Y-89(A,X)41-NB-91-M,,TTY,,PHY,DERIV	1.55E+07	1.61E+08	4.30E+07	Use SF3=2N.
D7014.018	39-Y-89(A,X)41-NB-92-M,,TTY,,PHY,DERIV	7.22E+06	1.52E+08	4.30E+07	Use SF3=N.
D7020.002	39-Y-89(P,X)40-ZR-86,,SIG	3.51E+07	1.76E+08	6.70E+07	Use SF3=4N.
D7020.003	39-Y-89(P,X)40-ZR-88,,SIG	1.31E+07	1.54E+08	6.70E+07	Use SF3=2N.
D7020.004	39-Y-89(P,X)40-ZR-89-G,M+,SIG	3.66E+06	1.44E+08	6.70E+07	Use SF3=N.
D7020.015	39-Y-89(P,X)40-ZR-86,,TTY,,PHY,DERIV	3.51E+07	1.76E+08	6.70E+07	Use SF3=4N.
D7020.016	39-Y-89(P,X)40-ZR-88,,TTY,,PHY,DERIV	1.31E+07	1.54E+08	6.70E+07	Use SF3=2N.
D7020.017	39-Y-89(P,X)40-ZR-89-G,M+,TTY,,PHY,DERIV	3.66E+06	1.44E+08	6.70E+07	Use SF3=N.
E1868.002	53-I-127(P,X)54-XE-123,,SIG	3.71E+07	1.77E+08	5.80E+07	Use SF3=5N.
E1868.003	53-I-127(P,X)54-XE-125,,SIG	1.89E+07	1.59E+08	5.80E+07	Use SF3=3N.
E1868.004	53-I-127(P,X)54-XE-127,,SIG	1.46E+06	1.41E+08	2.00E+07	Use SF3=N.
E1893.022	3-LI-7(D,X)4-BE-7,,TTY,,PHY	4.98E+06	1.85E+08	2.50E+07	Use SF3=2N.
E1964.048.1	79-AU-197(P,X)80-HG-197-G,M+,TTY,,EOB/FCT	1.39E+06	1.41E+08	1.60E+07	Use SF3=N.

E1964.048.2	79-AU-197(P,X)80-HG-197-G,M-,TTY,,EOB/FCT	1.39E+06	1.41E+08	1.60E+07	Use SF3=N.
E2121.003	23-V-51(D,X)24-CR-49,,SIG	2.71E+07	1.72E+08	4.70E+07	Use SF3=4N.
E2533.002	69-TM-169(D,X)70-YB-169,,SIG	3.95E+06	1.44E+08	2.40E+07	Use SF3=2N.
E2589.002	41-NB-93(D,X)42-MO-93-M,,SIG	3.49E+06	1.45E+08	2.30E+07	Use SF3=2N.
E2592.002	40-ZR-96(A,X)42-MO-99,CUM,SIG	5.33E+06	1.50E+08	3.40E+07	(Ok)
E2592.012	40-ZR-96(A,X)42-MO-99,CUM,SIG	5.33E+06	1.50E+08	2.80E+07	(Ok)
F1226.003	79-AU-197(P,X)80-HG-195-M/G,,SIG/RAT	1.71E+07	1.57E+08	3.20E+08	(Ok)
F1226.005	79-AU-197(P,X)80-HG-193-M/G,,SIG/RAT	3.33E+07	1.73E+08	3.20E+08	(Ok)
F1244.003	92-U-235(HE3,X)94-PU-236,CUM,SIG	3.24E+06	1.44E+08	4.20E+07	(Ok)
F1298.002	24-CR-52(P,X)25-MN-52,,SIG	5.60E+06	1.47E+08	1.30E+07	Use SF3=N.
F1298.003	26-FE-56(P,X)27-CO-56,,SIG	5.45E+06	1.47E+08	1.30E+07	Use SF3=N.
F1299.008	79-AU-197(D,X)80-HG-193-M/G,,SIG/RAT	3.57E+07	1.76E+08	4.40E+09	(Ok)
F1299.010	79-AU-197(D,X)80-HG-197-M/G,,SIG/RAT	3.64E+06	1.44E+08	4.40E+09	(Ok)
F1315.014	55-CS-133(P,X)56-BA-131,IND,SIG	1.85E+07	1.58E+08	1.00E+09	(Ok)
F1322.002	3-LI-7(P,X)4-BE-7,,SIG	1.88E+06	1.62E+08	1.00E+07	Use SF3=N.
F1322.003	3-LI-7(P,X)4-BE-7,,SIG	1.88E+06	1.62E+08	1.10E+07	Use SF3=N.
F1322.006	3-LI-6(D,X)4-BE-7,,SIG	0.00E+00	1.82E+08	7.40E+06	Use SF3=N.
F1322.007	3-LI-6(D,X)4-BE-7,,SIG	0.00E+00	1.82E+08	7.70E+06	Use SF3=N.
F1322.008	3-LI-6(D,X)4-BE-7,,SIG	0.00E+00	1.82E+08	9.80E+06	Use SF3=N.
F1322.009	3-LI-7(D,X)4-BE-7,,SIG	4.98E+06	1.85E+08	7.40E+06	Use SF3=2N.
F1322.010	3-LI-7(D,X)4-BE-7,,SIG	4.98E+06	1.85E+08	7.70E+06	Use SF3=2N.
F1435.002	36-KR-82(HE3,X)38-SR-82,,SIG	1.44E+07	1.58E+08	7.50E+07	Use SF3=3N.
F1435.003	36-KR-83(HE3,X)38-SR-82,,SIG	2.21E+07	1.66E+08	7.50E+07	Use SF3=4N.
F1435.004	36-KR-84(HE3,X)38-SR-82,,SIG	3.30E+07	1.77E+08	7.50E+07	Use SF3=5N.
J0102.002	4-BE-9(PIN,X)3-LI-8,,DA,,REL	0.00E+00	1.72E+07	9.00E+09	(Ok)
J1880.002	4-BE-9(PIN,X)3-LI-8,,SIG	0.00E+00	1.72E+07	1.80E+09	(Ok)
J1880.005	6-C-12(PIN,X)5-B-8,,SIG	0.00E+00	5.52E+07	1.90E+09	(Ok)
K2023.032	11-NA-23(G,X)11-NA-22,CUM,SIG,,BRA	1.24E+07	1.52E+08	1.00E+09	(Ok)
K2027.002	23-V-51(G,X)23-V-48,CUM,SIG,,BRA	3.19E+07	1.71E+08	1.00E+09	(Ok)
K2027.024	27-CO-59(G,X)27-CO-58,,SIG,,BRA	1.05E+07	1.49E+08	1.00E+09	(Ok)
K2027.025	27-CO-59(G,X)27-CO-57,,SIG,,BRA	1.90E+07	1.58E+08	1.00E+09	(Ok)
K2027.026	27-CO-59(G,X)27-CO-56,IND,SIG,,BRA	3.04E+07	1.69E+08	1.00E+09	(Ok)
K2027.027	27-CO-59(G,X)27-CO-55,IND,SIG,,BRA	4.05E+07	1.80E+08	1.00E+09	(Ok)
K2027.051	39-Y-89(G,X)39-Y-88,IND,SIG,,BRA	1.15E+07	1.50E+08	1.00E+09	(Ok)
K2027.052	39-Y-89(G,X)39-Y-87-M,IND,SIG,,BRA	2.08E+07	1.60E+08	1.00E+09	(Ok)
K2027.053	39-Y-89(G,X)39-Y-87-G,CUM,SIG,,BRA	2.08E+07	1.60E+08	1.00E+09	(Ok)
K2027.054	39-Y-89(G,X)39-Y-86-M,IND,SIG,,BRA	3.26E+07	1.72E+08	1.00E+09	(Ok)
K2027.055	39-Y-89(G,X)39-Y-86-G,CUM,SIG,,BRA	3.26E+07	1.72E+08	1.00E+09	(Ok)
K2027.056	39-Y-89(G,X)39-Y-85-M,IND,SIG,,BRA	4.22E+07	1.81E+08	9.00E+08	(Ok)
K2027.057	39-Y-89(G,X)39-Y-85-G,IND,SIG,,BRA	4.22E+07	1.81E+08	1.00E+09	(Ok)
K2027.058	39-Y-89(G,X)39-Y-84-G,IND,SIG,,BRA	5.42E+07	1.93E+08	1.00E+09	(Ok)
K2027.082	53-I-127(G,X)53-I-126,,SIG,,BRA	9.14E+06	1.48E+08	1.00E+09	(Ok)
K2027.083	53-I-127(G,X)53-I-124,IND,SIG,,BRA	2.58E+07	1.65E+08	1.00E+09	(Ok)
K2027.084	53-I-127(G,X)53-I-121,IND,SIG,,BRA	5.12E+07	1.90E+08	1.00E+09	(Ok)
K2027.085	53-I-127(G,X)53-I-120-G,IND,SIG,,BRA	6.18E+07	2.01E+08	1.00E+09	(Ok)
K2027.086	53-I-127(G,X)53-I-120-M,IND,SIG,,BRA	6.18E+07	2.01E+08	1.00E+09	(Ok)
K2027.087	53-I-127(G,X)53-I-119,IND,SIG,,BRA	6.98E+07	2.09E+08	1.00E+09	(Ok)
K2027.110	55-CS-133(G,X)55-CS-132,CUM,SIG,,BRA	8.99E+06	1.48E+08	1.00E+09	(Ok)
K2027.112	55-CS-133(G,X)55-CS-129,,SIG,,BRA	3.29E+07	1.72E+08	1.00E+09	(Ok)
K2027.113	55-CS-133(G,X)55-CS-127,IND,SIG,,BRA	5.03E+07	1.89E+08	1.00E+09	(Ok)

K2027.114	55-CS-133(G,X)55-CS-125,IND,SIG,,BRA	6.86E+07	2.08E+08	1.00E+09	(Ok)
K2027.154	57-LA-139(G,X)57-LA-135,CUM,SIG,,BRA	3.29E+07	1.72E+08	1.00E+09	(Ok)
K2027.155	57-LA-139(G,X)57-LA-133,IND,SIG,,BRA	5.02E+07	1.89E+08	1.00E+09	(Ok)
K2027.156	57-LA-139(G,X)57-LA-132-M,IND,SIG,,BRA	6.00E+07	1.99E+08	1.00E+09	(Ok)
K2027.157	57-LA-139(G,X)57-LA-132-G,CUM,SIG,,BRA	6.00E+07	1.99E+08	1.00E+09	(Ok)
K2027.158	57-LA-139(G,X)57-LA-131,IND,SIG,,BRA	6.80E+07	2.07E+08	1.00E+09	(Ok)
K2027.206	79-AU-197(G,X)79-AU-196,,SIG,,BRA	8.07E+06	1.47E+08	1.00E+09	(Ok)
K2027.207	79-AU-197(G,X)79-AU-195,IND,SIG,,BRA	1.47E+07	1.54E+08	1.00E+09	(Ok)
K2027.208	79-AU-197(G,X)79-AU-194,IND,SIG,,BRA	2.31E+07	1.62E+08	1.00E+09	(Ok)
K2027.209	79-AU-197(G,X)79-AU-193,IND,SIG,,BRA	3.00E+07	1.69E+08	1.00E+09	(Ok)
K2027.210	79-AU-197(G,X)79-AU-192,IND,SIG,,BRA	3.87E+07	1.78E+08	1.00E+09	(Ok)
K2027.211	79-AU-197(G,X)79-AU-191,IND,SIG,,BRA	4.58E+07	1.85E+08	1.00E+09	(Ok)
K2027.213	79-AU-197(G,X)79-AU-189,IND,SIG,,BRA	6.21E+07	2.01E+08	1.00E+09	(Ok)
K2027.214	79-AU-197(G,X)79-AU-188,IND,SIG,,BRA	7.14E+07	2.10E+08	1.00E+09	(Ok)
K2027.215	79-AU-197(G,X)79-AU-187,IND,SIG,,BRA	7.88E+07	2.18E+08	1.00E+09	(Ok)
K2027.216	79-AU-197(G,X)79-AU-186,IND,SIG,,BRA	8.82E+07	2.27E+08	1.00E+09	(Ok)
K2027.251	39-Y-89(G,X)39-Y-87-M/G,,SIG/RAT,,BRA	2.08E+07	1.60E+08	1.00E+09	(Ok)
K2027.252	39-Y-89(G,X)39-Y-86-M/G,,SIG/RAT,,BRA	3.26E+07	1.72E+08	1.00E+09	(Ok)
K2027.253	39-Y-89(G,X)39-Y-85-M/G,,SIG/RAT,,BRA	4.22E+07	1.81E+08	9.00E+08	(Ok)
K2027.273	57-LA-139(G,X)57-LA-132-M/G,,SIG/RAT,,BRA	6.00E+07	1.99E+08	1.00E+09	(Ok)
K2191.005	6-C-12(G,X)6-C-11,,SIG,,BRA	1.87E+07	1.59E+08	7.20E+08	(Ok)
K2191.010	6-C-12(G,X)6-C-11,,INT,,BRA	1.87E+07	1.59E+08	4.00E+08	(Ok)
M0159.009	41-NB-93(E,X)40-ZR-89,CUM,SIG	3.41E+07	1.73E+08	2.80E+08	(Ok)
M0159.011	41-NB-93(E,X)40-ZR-86,CUM,SIG	6.53E+07	2.04E+08	2.80E+08	(Ok)
M0576.003	1-H-2(G,X)1-H-1,,DA	2.23E+06	1.46E+08	4.20E+08	(Ok)
M0594.003	1-H-2(G,X)1-H-1,,DA/DP	2.23E+06	1.46E+08	5.90E+08	(Ok)
M0869.002	22-TI-46(G,X)22-TI-45,,SIG,,BRS	1.32E+07	1.52E+08	3.10E+07	Use SF3=N.
O0078.011.7	23-V-51(P,X)24-CR-48,CUM,SIG	3.51E+07	1.77E+08	6.00E+08	(Ok)
O0078.011.0	23-V-51(P,X)24-CR-51,CUM,SIG	1.57E+06	1.43E+08	6.00E+08	(Ok)
O0078.022.3	27-CO-59(P,X)28-NI-57,IND,SIG	2.35E+07	1.65E+08	6.00E+08	(Ok)
O0078.031.0	39-Y-89(P,X)40-ZR-88,IND,SIG	1.31E+07	1.54E+08	6.00E+08	(Ok)
O0078.031.2	39-Y-89(P,X)40-ZR-89,IND,SIG	3.66E+06	1.44E+08	6.00E+08	(Ok)
O0177.003	92-U-238(D,X)93-NP-239,CUM,SIG	0.00E+00	1.37E+08	1.30E+07	(Ok)
O0286.004	26-FE-56(PIN,X)25-MN-54,,SIG	0.00E+00	2.05E+07	2.80E+08	(Ok)
O0464.002	83-BI-209(P,X)84-PO-196,,SIG	1.11E+08	2.51E+08	1.60E+08	Use SF3=14N.
O0770.005	93-NP-237(P,X)94-PU-236,CUM,SIG	6.91E+06	1.46E+08	4.00E+07	(Ok)
O0840.035.1	50-SN-124(P,X)51-SB-116-M,IND,SIG	6.73E+07	2.07E+08	8.10E+09	(Ok)
O0840.035.2	50-SN-124(P,X)51-SB-116-G,IND,SIG	6.73E+07	2.07E+08	8.10E+09	(Ok)
O0840.035.3	50-SN-124(P,X)51-SB-116-M/G,,SIG/RAT	6.73E+07	2.07E+08	8.10E+09	(Ok)
O1309.003	92-U-236(HE3,X)94-PU-238,(CUM),SIG	0.00E+00	1.37E+08	5.60E+07	(Ok)
O1309.004	92-U-236(HE3,X)94-PU-236,CUM,SIG	9.86E+06	1.50E+08	5.90E+07	(Ok)
O1631.024	12-MG-24(P,X)13-AL-24,PAR,SIG,G	1.53E+07	1.60E+08	2.00E+07	Use SF3=N.
O1631.030	12-MG-24(A,X)14-SI-27,PAR,SIG,G	8.40E+06	1.71E+08	3.00E+07	Use SF3=N.
O1631.068	12-MG-24(A,X)14-SI-27,PAR,DA,G,LEG/RS	8.40E+06	1.71E+08	3.00E+07	Use SF3=N.
O1877.005	70-YB-176(D,X)71-LU-177-G,CUM,SIG	0.00E+00	1.36E+08	1.80E+07	(Ok)
O1884.008	74-W-186(P,X)75-RE-186-G,,SIG	1.37E+06	1.41E+08	2.20E+07	Use SF3=N.
O2036.004	2-HE-4(A,X)4-BE-7,,DA	3.80E+07	3.19E+08	1.00E+08	Use SF3=N. Add SF7=RSD.
O2036.007	2-HE-4(A,X)4-BE-7,,SIG	3.80E+07	3.19E+08	1.00E+08	Use SF3=N.
O2038.002.1	37-RB-85(A,X)39-Y-87,,SIG	1.35E+07	1.59E+08	5.40E+07	Use SF3=2N.

O2038.002.2	37-RB-85(A,X)39-Y-87-M/G,,SIG/RAT	1.35E+07	1.59E+08	5.40E+07	Use SF3=2N.
O2038.003.1	37-RB-85(A,X)39-Y-86,,SIG	2.58E+07	1.71E+08	5.40E+07	Use SF3=3N.
O2038.003.2	37-RB-85(A,X)39-Y-86-M/G,,SIG/RAT	2.58E+07	1.71E+08	5.40E+07	Use SF3=3N.
O2038.004.1	37-RB-85(A,X)39-Y-85,,SIG	3.58E+07	1.81E+08	5.40E+07	Use SF3=4N.
O2038.004.2	37-RB-85(A,X)39-Y-85-M/G,,SIG/RAT	3.58E+07	1.81E+08	5.40E+07	Use SF3=4N.
O2038.005.1	37-RB-85(A,X)39-Y-84,,SIG	4.84E+07	1.94E+08	5.40E+07	Use SF3=5N.
O2038.005.2	37-RB-85(A,X)39-Y-84-M/G,,SIG/RAT	4.84E+07	1.94E+08	5.40E+07	Use SF3=5N.
O2052.008	53-I-127(P,X)54-XE-122,,SIG	4.51E+07	1.85E+08	2.60E+09	(Ok)
O2052.013	53-I-127(P,X)54-XE-125,,SIG	1.89E+07	1.59E+08	2.60E+09	(Ok)
O2052.015	53-I-127(P,X)54-XE-127,,SIG	1.46E+06	1.41E+08	2.60E+09	(Ok)
O2124.008	27-CO-59(D,X)28-NI-57,,SIG	2.62E+07	1.70E+08	5.20E+07	Use SF3=4N.
O2134.012	8-O-18(P,X)9-F-18,,SIG	2.57E+06	1.50E+08	1.50E+08	Use SF3=N.
O2178.002.1	70-YB-168(A,X)72-HF-171,CUM,SIG	1.21E+07	1.54E+08	1.50E+07	Use SF3=N. Delete SF5=CUM. (Confirmed by Kiss)
O2178.002.2	70-YB-168(A,X)72-HF-171,CUM,SIG	1.21E+07	1.54E+08	1.50E+07	Use SF3=N. Delete SF5=CUM. (Confirmed by Kiss)
O2178.003	70-YB-168(A,X)72-HF-172,CUM,SIG	2.82E+06	2.79E+08	1.50E+07	Use SF3=G. Delete SF5=CUM. (Confirmed by Kiss)
O2224.017	74-W-186(D,X)75-RE-186-G,,TTY,,PHY/A	3.63E+06	1.44E+08	1.30E+07	Use SF3=2N.
O2270.004	92-U-235(HE3,X)94-PU-236,CUM,SIG	3.24E+06	1.44E+08	4.20E+07	(Ok)
O2300.004	90-TH-232(D,X)91-PA-233,CUM,SIG	0.00E+00	1.37E+08	3.00E+07	(Ok)
O2482.004	30-ZN-67(P,X)31-GA-67,,SIG	1.81E+06	1.43E+08	6.80E+07	Use SF3=N.
O2482.005	30-ZN-67(P,X)31-GA-66,,SIG	1.32E+07	1.54E+08	6.80E+07	Use SF3=2N.
T0170.002	8-O-16(P,X)9-F-16,,DA/DE	1.72E+07	1.66E+08	4.90E+08	(Ok)