Add a new beta and electron capture transition TYPE

by David Brown on behalf of Paul Romano (with help from Tim Johnson)

In section 8.4c, resulting radiation spectra for decay files, the TYPE variable represents the type of transition for beta decay and electron capture. According to the manual, it is allowed to assume the values 0.0, 1.0, 2.0, and 3.0. The V-50 decay file in JEFF 3.1.1 has TYPE=4.0, indicating it is a third-forbidden transition. The ENDF-6 manual should list third and higher-forbidden transitions.

The TYPE designator is not the only mechanism that ENDF uses to communicate the speed of a decay — the half-life $T_{1/2}$ is the primary mechanism. Therefore the TYPE designator merely adds "flavor" to the description a decay mode by giving a hint about the underlying physical mechanism.

The TYPE listing in section 8.4.c should be amended as follows (new content in red):

TYPE	**Spectrum definition**
0.0	Not required for this STYP
1.0	Allowed or super-allowed ($\Delta J=0,1$, $\Delta\Pi=\pi^i \times \pi^f=1$)
2.0	First forbidden ($\Delta J=0,1,2$, $\Delta\Pi=-1$)
3.0	Second forbidden ($\Delta J=2,3$, $\Delta\Pi=1$)
4.0	Third forbidden ($\Delta J=3,4$, $\Delta\Pi=-1$)
…	
(n+1).0	n^{th} forbidden ($\Delta J=n,n+1$, $\Delta\Pi=(-1)^n$)