**Summary report of IAEA Consultants Meeting of INDEN on Structural Materials**

**16-20 December 2024 @IAEA HQ, Vienna, Austria (and hybrid)**

*INDEN Cu and Fe Benchmark tests presented by Saerom Kwon (QST)*

INDEN benchmark tests using three experiments for Copper and Iron integral experiments for DT neutrons at JAEA/FNS and Iron shielding experiments for 40 and 65 MeV neutrons at QST/TIARA were presented. MCNP6.2 and nuclear data libraries, INDEN (checked November 2024 on the official INDEN webpage of IAEA), FENDL-3.2b and JENDL-5 were used for the tests. Following results and some important remarks for the further INDEN improvements were reported and discussed.

**<Copper data>**

* The reaction rates for **neutrons above 10 MeV (93Nb(n,2n)92mNb reaction)** calculated using INDEN showed the **good agreement** with the measured ones.
* INDEN **underestimated** the measured reaction rate of **115In(n,n’)115mIn** more than FENDL-3.2b. However, some dosimetry cross sections such as 115In(n,n’)115mIn could be doubtful.
* The reaction rates for **lower energy neutrons** (which related to 197Au(n,g)198Au and 186W(n,g)187W reaction rates) calculated using INDEN **underestimated** the measured ones like those using other nuclear data libraries.
* Note that JENDL-5 showed the better (but only 10% improvement) agreement with the measured ones for the lower energy neutrons, because JENDL-5 has been re-evaluated based on the recent experimental data of capture reaction measured 2017 by Weigand, (n,g) in 63Cu.
* **As the summary for the copper data, mostly INDEN data is okay except for the issue in lower energy regions for a long time so far.**

**<Iron data>**

* The **neutron fluxes above 10 MeV** calculated using INDEN **underestimated** the measured ones.
* TIARA experiment (65 MeV) data (experimental) should be re-checked. At this moment, IAEA will not change the data sensitive to higher than 45 MeV.
* The probability data of (n,2n) at 15 MeV, 0 deg in 56Fe of INDEN/FENDL-3.2b should be modified. It seems related to the formation issue. Note that other isotopes (54,57Fe) have the same issue as shown in figure below.



* This study confirmed the importance of 57Fe data as well for showing the sensitivity of inelastic scattering data (especially for the discrete excited levels) on neutron below 10 keV.
* **As the summary for the iron data, inelastic scattering, (n,2n), (n,np) reactions in 56Fe should be re-checked. It would be good if the non-elastic scattering data above 20 MeV could be checked as well.**