Framatome Questions submitted by email from Cal 01/13/2023
Q&A provided by Glenn Tuttle to R Jervey by email dated 01/24/2023

Q1: What is the maximum lab assay value of uranium isotopic that would meet this limit? My 8th grade science teacher would say that anything up to 5.004 wt.% U-235 would meet the license limit but anything 5.005 or greater would not. How does the NRC interpret the two decimal point designation in the license limit?

Response to Q1: From a simple statistical view of measurement uncertainty, the true value is considered to be within plus or minus twice the standard deviation of the measured value, at the 95% confidence level. That corresponds to +/- 0.003 for a nominal 5% value with a measurement uncertainty of 0.06%. In practice, the uncertainty includes both the random uncertainty of measurement (usually very small for mass spec measurements) and any systematic uncertainty (often called bias or offset) which is usually determined from repeat measurements of standards with a known value.

For purposes of the license, the two decimal places given on the enrichment possession limit can be considered the number of significant digits reported, even if an individual measurement has greater precision. The usual rounding rules for significant digits, as you describe, can apply.

Q2: Another question. If we have material that is actually 5.00 wt.% enriched as assayed by the Lab, per NUREG/BR-007 this would be E2 material for safeguards purposes. Does that have any bearing on compliance with the possession limit in the license?

Response to Q2: As noted, this question highlights the difference between the licenses limit of 5.00% and the definitions of the E1 and E2 material types for reporting purposes. Possession of nominal 5% enriched material is consistent with the license, but the 5% material should be reported as type E2 under the definitions, as the Framatome system seems to be doing. Possession of E2 material with an assay of 5% is not of itself inconsistent with the license terms

In this case, however, the 5% material appears to result from the practice of assigning a nominal enrichment of 5% to material that lacks a specific assay. If experience and available information indicates that assigning some lower value to such material (such as 4.95%) until an assay is complete is appropriate, then this “apparent” presence of E2 material could be avoided. Of course, if the actual assay indicates the material is 5% or greater it should be reported in inventory as E2.