

Potential application of the “unified uranium” category

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The “unified uranium” category, for accounting purposes, is foreseen in Code 10 of the Subsidiary Arrangements to the Safeguards Agreements related to the Treaty on the Non-Proliferation of Nuclear Weapons (as it is the case of the Quadripartite Agreement) and was included as an option in the General Procedures of the Common System for Accounting and Control of Nuclear Materials (SCCC). Its use is aimed at obtaining a complete balance of the U element and of its U235 isotope for any of the uranium categories (depleted, natural or enriched). The decision of using it or not, depends on practical issues and does not involve any modifications to the provisions already included in the Quadripartite Agreement.

Currently, the “unified uranium” category is being used at the enrichment facilities, within the scope of the SCCC, following the regulations in Code 10, which requires a declaration of the isotope content for all the uranium categories, thus simplifying the evaluation of the MUF (Material Unaccounted For) and allowing for a mass SWUs (Separative Work Units) balance. Nevertheless, nothing precludes the adoption of this category for other types of facilities, as it is the case of a Brazilian laboratory, where the use of this category is established in its facility attachment.

Even though the “unified uranium” category was introduced in order to simplify the accounting procedures in facilities with a high quantity of inventory changes involving category changes, the main advantage in its use is to allow element and isotope mass balances for any of the uranium categories, depleted (D), natural (N) and enriched (E). Since Code 10 does not require the declaration of the isotope content for the “D” and “N” categories, such values would only be reported voluntarily, following the operator’s or the state’s criterion. However, as from ABACC’s point of view, such approval would not be necessary because the declaration of depleted and natural uranium with isotope content is foreseen in Code 10, when the appropriate category of nuclear material is adopted. The reporting scheme by categories,

without a voluntary declaration of the isotope content of depleted and natural uranium, does not allow to perform the isotope's mass balance.

In addition to the enrichment facilities, ABACC has identified two cases in the Common System for Accounting and Control of Nuclear Materials where the “unified uranium” category can be potentially applied without introducing additional work burden to the operator and allowing ABACC and the IAEA to have access to a complete isotopic balance for evaluation purposes:

- on-load reactors fueled with slightly enriched uranium (LEU) fuel and with a high degree of fuel burnup;
- light water reactors with a high degree of fuel burnup.

The nuclear loss reporting in a reactor for which accounting is managed in terms of “unified uranium” involves some advantages as compared with accounting based on natural, depleted and enriched uranium categories: it requires only one general ledger, the same level of significance is applied to all categories —thus minimizing round adjustments— and it allows a consistency analysis of the isotopic component in the nuclear loss. In addition to these advantages, the impact on the material balance reports (MBRs) and on the physical inventory lists (PILs) is very weak and the audits become less time-consuming and easier.

For consistency reasons, when transported to “U” category, the inventories of the “D” and “N” categories, which are usually expressed in kilograms with two decimals, must be expressed in grams. On the other hand, the inventory of “E” category, usually expressed in grams with two decimals, must be rounded.

On the basis of the above, ABACC considers that the use of the “unified uranium” category in reactors under the aforementioned conditions is appropriate because it follows all the provisions in the Quadripartite Agreement and shows clear advantages in the recording and reporting of nuclear loss.