Contribution ID: **20** Contribution code: **ATA-8** Type: **Oral Presentation**

# Survey of naturally occurring 236U with direct-AMS

*Wednesday, 23 October 2024 11:00 (20 minutes)*

From a multi-isotope direct-AMS survey of 310 uranium ore concentrates (UOCs), 236U/238U ratios from 2x10-12 to 2x10-7 are measured. However, a range from low-10-12 to mid-10-10 is expected from directly mined natural uranium ore minerals. This upper-end discrepancy would normally be attributed to inputs of spent fuel materials, but the numerous occurrences and the lack of economic reasons to recycle anything in the front stage of UOC production make the abnormally high 236U/238U ratios rather perplexing. When plotted against the 187Os/188Os ratios, which were also obtained in the survey, the high 236U/238U results are seen to occur around the value of 187Os/188Os = 10, a none-random pattern as might be anticipated from unwitting contaminations. The 187Os/188Os ratios measured reflect mostly the Os impurities contained by the UOCs. They might be affected by the Os impurities contained by the chemicals used for the UOC manufacture, but these chemicals are ultimately derived from Crust materials in which 187Os/188Os ratios are typically within 0.1 and 1. Thus, the observed correlations between 236U/238U and 187Os/188Os favor those measured high 236U/238U ratios being natural. This work also calls for further studies of naturally occurring 236U/238U in a wider range of native uranium-bearing minerals. Meanwhile, it is a reminder that any such studies are best done using direct-AMS without chemical sample pretreatment to better avoid anthropogenic 236U that is pervasively present in the environment today. It also calls for efforts combatting the AMS ion source memory effects. To secure unambiguous natural 236U surveys, an approach is described that combines UF5- production directly from powdered native samples and ion source reconfiguration to minimize background.

## Student Submission

No

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**Session Classification:** Actinide Techniques and Applications

**Track Classification:** Actinide Techniques and Applications