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Development of monitoring protocols for inorganic contaminants in preparation for curation of Canada's portion of asteroid Bennu at the Sample Curation Facility, Canadian Space Agency

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The Canadian Space Agency (CSA) will receive approximately 4.8g of material from asteroid Bennu collected as part of the OSIRIS-REx (Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer) mission. Curation of this sample will take place at the CSA's newly built Sample Curation Facility, which features Class 100 to 10000 (ISO 5 to 7) clean rooms for sample handling and for the final cleaning steps of tools and containers, respectively. In preparation for receiving the Bennu sample, we are conducting several activities to establish a comprehensive chemical map of the curation environment. The current study focuses on the development of monitoring protocols for inorganic contamination. The baseline monitoring will be performed using silicon wafers as witness plates. However, due to the lack of local analytical facilities capable of processing these samples, we are developing an alternative procedure using Teflon beakers exposed to the laboratory environment for approximately one week (e.g., Tahara et al., 2026).

Preliminary work involved identifying a local commercial laboratory capable of measuring concentrations at the parts per billion (ppb) level in aqueous and dissolved samples. Aliquots of Certified Reference Materials (CRMs) and ultrapure (deionized) water (DIW) were provided by the Metrology Research Centre at the National Research Council (NRC) in Ottawa, Ontario. These materials were sent to three laboratories, where up to 55 elements were analysed using inductively coupled plasma (ICP) instruments. Data precision was assessed using the relative standard deviation among replicate samples (n = 3), and accuracy was assessed by comparing the measured values to the certified value. The laboratory selected to continue with monitoring tests demonstrated the highest precision and accuracy. Additional considerations included the number of elements measured and their detection limits. Next steps involve evaluating the monitoring protocol by exposing open beakers to the laboratory environment and submitting them for analysis. Concurrently, we will develop tests to determine whether the monitoring samples require digestion prior to analysis. In parallel, the CSA will evaluate the feasibility of performing clean digestions in-house as it is a challenge to find external laboratories capable of operating at the required cleanliness level.