OVERVIEW OF THE CURATION FACILITY FOR THE CANADIAN PORTION OF BENNU SAMPLE FROM THE OSIRIS-REx MISSION. C.E. Morisset[1], P. Hill[1], T. Haltigin[1], Rémy Grenier[1], and S. Routhier[1], [1]Canadian Space Agency, 6767 Route de l'Aéroport, Saint-Hubert, QC, J3Y 8Y9, Canada (ConservationBennu-BennuCuration@asc-csa.gc.ca; caroline-emmanuelle.morisset@asc-csa.gc.ca, patrick.hill@asc-csa.gc.ca, timothy.haltigin@asc-csa.gc.ca, rémy.grenier@asc-csa.gc.ca, stephane.routhier@asc-csa.gc.ca).

Introduction: On October 20th, 2020, the OSIRIS-REx mission collected a sample from the asteroid Bennu [1], which will be delivered to Earth on September 24th, 2023. Studying the sample will allow scientists to address fundamental questions about the solar system formation and evolution, its early composition, potential water delivery to early Earth, and the source of its organic compounds, to name a few. In exchange for contributing the OSIRIS-REx Laser Altimeter (OLA) instrument, which collected ranging data to produce a 3D model of the asteroid (Figure 1) that helped identify the sampling site, Canada will receive a portion of the Bennu sample. The Canadian Space Agency is currently planning its Curation Facility, which will be the first laboratory of its kind in Canada.

Figure 1. 3D digital terrain model of the asteroid Bennu [2] .

Sample size: Canada will receive 4% by mass of the returned bulk sample, as well as one of the 24 sampling head contact pads that may have collected ~mm-sized (or smaller) particles from the surface of Bennu. The best estimate of the collected sample mass is 250±101 g [3]; the portion that will be received by Canada would thus be 10±4 g.

Canadian Curation Facility: The CSA is in the final planning steps of the state-of-the-art facility. The Canadian Curation Facility will consist of a class 100 (ISO 5) clean room where the sample will be kept and manipulated, as well as a clean room of at least class 10,000 (ISO 7) where the final cleaning steps of the materials and tools that will be in contact with the sample will be performed (Figure 2). Cleanroom classifications will follow the ISO 14644 standard.

The sample will be conserved under curation-grade nitrogen in sample cabinets. Samples that have never been on loan will be stored in separate cabinets from those that are returning from loan.

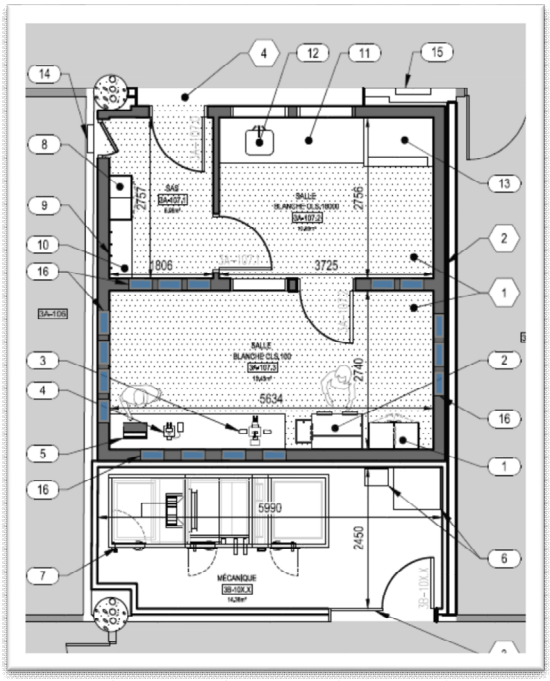

Figure 2. Preliminary design of the Canadian Curation Facility (dimensions and layout are subject to change).

Beyond the clean rooms, the facility will be equipped to characterize the samples using optical and electron microscopes and to prepare subsamples according to the needs of the researchers that will request them (e.g., unprepared pristine particles, thick and thin sections, and polished sections).

A sample catalogue will be made available online for consultation a few months after the arrival of the samples in Canada and will contain: (1) the size of the particles; (2) images of the particles under binocular magnifications; (3) additional information as it becomes available.

The portion of the sample received in Canada will be made available to study by researchers around the world, through a standardized request system that will be implemented with the release of the sample catalogue.

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References: [1] Lauretta, D.S. et al (2022) Science 377: 285-291; [2] Daly, M.G. et al (2020) Science Advances, doi:10.1126/sciadv.abd3649; [3] Ma, H. et al (2021) https://arxiv.org/abs/2109.05561.