

## A EUROPEAN SAMPLE CURATION FACILITY: PAST STUDIES AND PENDING ISSUES.

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EURO-CARES (European Curation of Astromaterials Returned from Exploration of Space) is an international project, for the development of a roadmap for a European Sample Curation Facility (ECSF). We describe here the part entitled “Facilities and Infrastructures” which covers the building design, the storage and curation of samples.

Although it is now widely admitted that samples from the Moon and asteroids are devoid of life, life detection is still a fundamental issue for samples from Mars [1]. To curate samples with potential biohazards while ensuring no terrestrial contamination, a specific facility is required. For the moment, existing facilities are either biocontainment facilities (BSL-4), with a negative pressure differential between inside and outside the laboratory, or contamination control facilities (cleanrooms) with a positive pressure differential.

Several studies aimed at designing such a facility, with different approaches [2-3]. Some common features are clearly notable: the facility will be designed to receive, unpack, and clean the sample container, to recover the sample and secure it in a storage unit. Preliminary examinations (weighing, photography, etc.) will be conducted, and the samples will be stored. In the case of potentially biohazardous samples, life detection techniques will be applied to a (significant) part of the sample, and sterilization of splits will be considered to ensure a quick distribution to the scientists. Each task will be conducted in a distinct room. The facility will be built using materials easy to clean and to decontaminate, with low particles emissions. Samples will be in contact with selected limited materials only. The laboratory should be finished at least two years before any sample is brought back, to have enough time to test procedures and to train a dedicated team.

Some major issues are still pending: should the samples be manipulated by humans and/or robots? Should it be an independent structure, or be part of an existing facility (BSL-4, University, etc.)? How to handle the fact that several (space) agencies and countries will have to collaborate to build and to maintain it? What storage environment should be chosen (P, T, and specific atmosphere composition)? Which experiments should be conducted inside the facility, and in which order? What sterilization protocol should be used, if any? What kind of database system will allow the team and the scientific community to record everything happening to the samples?

**References:** [1] Rummel J. D. et al. 2002. NASA/CP-2002- 211842. [2] Mani P. 2004. ESA Publication Division. [3] Beaty D. W. et al. 2009. *Astrobiology* 9:745-758.