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OPERATIONAL WORKFLOW IN A SAMPLE RECEIVING FACILITY: INPUT FROM THE MSR OPERATION DEFINITION TEAM

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The return of scientifically selected samples from Mars would provide a rare opportunity for investigation with the full range of the latest technology available. To take full advantage of this opportunity, it is important to plan ahead to ensure the pristine nature of the samples upon arrival within the Earth environment until scientific investigations can begin.

The NASA/ESA science community-driven MSR Science Planning Group – Phase 2 (MSPG2) delivered recommendations and guidance regarding curation (1) and science (2,3) activities to be performed on the samples under containment. High-level requirements for the infrastructure were also developed by MSPG2 (4). In order to prepare infrastructure-targeted input for the ESA and NASA facility studies planned in the 2022-2023 timeframe, the MSR agency-led Operational Scenarios Definition Team (MOSDT) was assembled to conceptualize the sample operations that will inform future architecture teams. Emphasis was placed on the responsibility of MOSDT to use community-defined requirements and to represent the view of the

international scientific community.

The main deliverable of MOSDT was an operational workflow for a Sample Receiving Facility (SRF). Two other deliverables were produced: a report to narrate the workflow, and a list of instruments (see Hutzler et al., this conference). Activities described in the main sequence of the workflow range from engineering operations to curation to science, with the latter term being used here as the science to be done within a SRF. Side sequences (e.g. engineering inspection of hardware, head gas extraction) were also identified, and detailed when they would have a significant impact on the infrastructure of a SRF. It was necessary for the MOSDT to rely on assumptions for some steps and activities, and though these were kept to a minimum (and are described in both the report supporting the workflow and in the full presentation), in general, the assumptions and overall work were very conservative, as the impact of underestimating the scope of the SRF infrastructure was considered more detrimental than overestimating it. It is expected that future work will be able to confirm or inform these assumptions.

The community was consulted during the course of the MOSDT work. This abstract's aim is two-fold: on one hand, inform the scientific community and overall MSR stakeholders, to make the infrastructure studies and trade-off more understandable; on the other hand, to solicit feedback from a larger community audience for the next iterations planning for SRF design and activities.

Disclaimer: The decision to implement Mars Sample Return will not be finalized until NASA's completion of the program's National Environmental Policy Act (NEPA) process. This document is being made available for informational purposes only.

[1] Tait et al. (2021) Preliminary planning for Mars Sample Return (MSR) curation activities in a Sample Receiving Facility (SRF). Astrobiology in press, doi:10.1089/ast.2021.0105. [2] Tosca et al. (2021) Time-sensitive aspects of Mars Sample Return (MSR) science. Astrobiology in press, doi:10.1089/ast.2021.0115. [3] Velbel et al. (2021) Planning implications related to sterilization-sensitive science investigations associated with Mars Sample Return (MSR). Astrobiology in press, doi:10.1089/ast.2021.0113. [4] Carrier et al. (2021) Science and curation considerations for the design of a Mars Sample Return (MSR) Sample Receiving Facility (SRF). Astrobiology in press, doi:10.1089/ast.2021.0110.