Development of a high vacuum CSVC penetration system for the Apollo Next-Generation Sample Analysis Programme. T. Schild[1], E. Tuohy[1], P.d. Medeiros[1], C. Crespi[1], F. Scharnholz[1], A. Cowley[1], N. Bamsey[2], A. Makaya[2], F. McDonald[2], J. Carpenter[2], ANGSA Science Team, [1]ESA-European Astronaut Centre, Linder Hoehe, Cologne, Germany, [2]ESA-European Space Research and Technology Centre, Noordwijk, Netherlands.

Introduction:

The analysis of the previously unopened 1972 Apollo 17 mission lunar samples with modern advanced metrology techniques is an invaluable opportunity being undertaken as part of the Apollo Next-Generation Sample Analysis (ANGSA) Programme. The lower section (73001) of these double-drive tube samples has been specially contained and curated within a Core Sample Vacuum Container (CSVC) unit, having remained sealed since collection at the lunar surface in 1972.

In this work we present the development of a vacuum enabled CSVC penetrating system, designed to allow for the extraction of potential preserved gases via a controlled piercing of the drive tube under high vacuum conditions. Once the CSVC is mounted and pierced with this system, it is anticipated that any loosely bound volatiles that are present in the sample regolith and the drive tube will then evacuate into an attached gas sampling manifold for containment and subsequent analyses by the ANGSA science team. The gas sampling manifold in itself has been designed by fellow ANGSA consortium members. Herein we discuss the engineering constraints and approach guiding the development of the piercing system, the piercing force ascertainment for the CSVC and the prototype breadboarding of the complete system. Results from the tests to derive the force and penetrator shape will be presented, along with the trade offs and iterative design of the full system as driven by science and curation requirements.

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