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Subject: Strength and Fracture Assessment of the Human Research Facility (HRF) Surface, Water and Air Biocharacterization (SWAB) Air Sampling Device (ASD) P/N: SEG46119448-301

This memorandum presents the stress and fracture report, Strength and Fracture Assessment of the Human Research Facility (HRF) Surface, Water and Air Biocharacterization (SWAB) Air Sampling Device P/N: SEG46119448-301, LMSEAT-34164.

The HRF SWAB Air Sampling Device P/N: SEG46119448-301 is a commercial off the shelf (COTS) item that collects air samples on board the International Space Station (ISS) and Shuttle Orbiter for analysis. The air-sampling device can be hand-held by a crewmember via a handle or attached to a shuttle orbiter or station exposed internal surface via Velcro fastener tape/patch. The ASD will be soft stowed for launch and landing, therefore no launch/landing load analysis was required for the ASD based on this condition. The Air Sampling Device was analyzed for a crew-induced kick load of 125 lbf. on its enclosure and for a crew-induced handling load of 50 lbf. on its handle. The Velcro tape/patch was analyzed against a 0.2 inertial load for on-orbit maneuvering and a venting analysis of the enclosure was done using maximum depressurization/repressurization rates applicable to the ISS and Shuttle Orbiter. An ultimate factor of safety of 2.0 was used to calculate margins of safety for all loading conditions.

Positive margins were obtained for all applicable load conditions except for the crew-induced load on the handle. A negative margin of **-0.351** was obtained for the ASD handle using the 50 lb. maximum crew-induced handling load. This margin was calculated on the condition that the ASD is not free to move when the maximum 50 lbf. handling load is applied to the handle.

The ASD contains a battery pack for power for on-orbit operation. The pack consists of five Li-BCX C cells. Fracture control assessment for the battery pack is not provided in the report but is being addressed by an in-work battery certification by the ASD project team.

If there are any questions regarding this report, please contact the undersigned at 281-333-7644 or via e-mail at an-hao.lee@lmco.com.

Richard Lee

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