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SUBJECT: Micro-Gravity Assessment for the Human Research Facility (HRF) Surface, Water and Air Bio-characterization (SWAB) Air Sampling Device Assembly (ASD), P/N SEG46119448-301

This memorandum summarizes the micro-gravity assessment for HRF SWAB Air Sampling Device (ASD), P/N SEG46119448-301 and serves as a validation of ASD in meeting the micro-gravity requirements of PIRN NO: 57000-NA-0110H.

Based on the information provided, the ASD is a portable, battery operated, air particle collection device that pulls cabin air through itself after passing through a gelatin filter covering its opening. The ASD is not a rack-mounted hardware. It is either hand-held or attached to a Space Station's exposed internal surface via a Velcro patch during operation. The only moving part of ASD is an electric-motor driven fan. The rotational speed range will be from a possible low of 12,000 rpm to a high of 20,000 rpm. That equates to a frequency range of 200 Hz to 333 Hz

The following table is a list of feature comparisons of ASD fan versus the common fan (SEG46116060-701) widely used in Human Research Facility (HRF) Rack-1A & 2A:

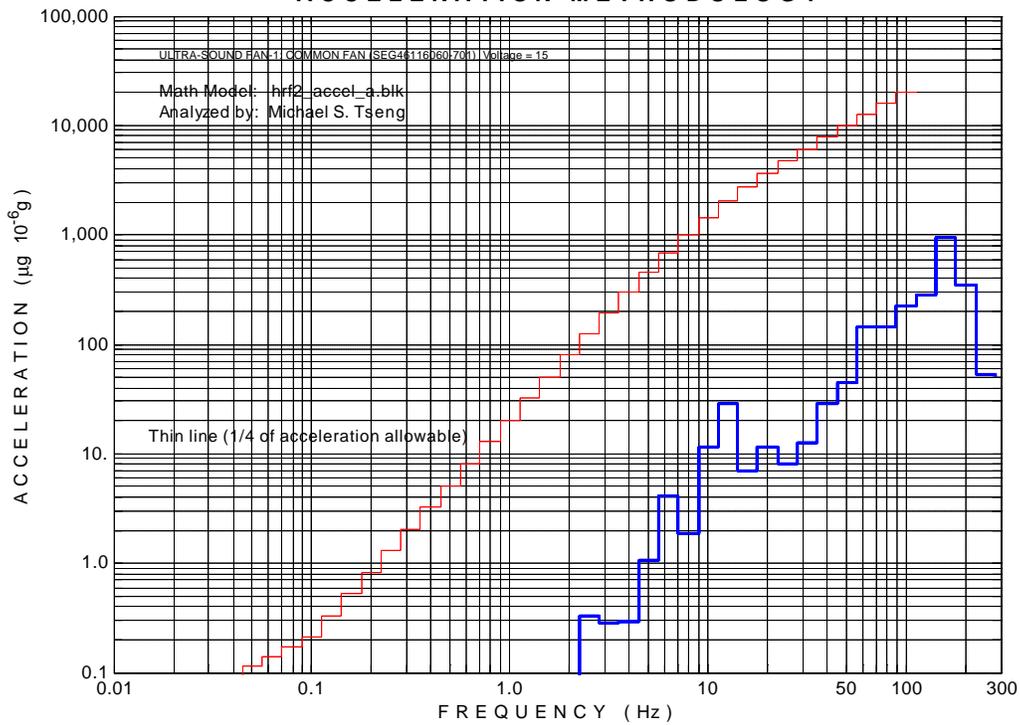
	Features	ASD Fan	Common Fan
1	Acoustic output noise	45 dB	79 dB
2	Impeller size (diameter)	<= 3"	5"
3	Impeller material	plastic	metallic
4	Bearing	Ruby Jewel bearings	plane bearings
5	Balanced	highly	N.A.
6	Energy dissipation	9 ~ 14 Watts	28 Watts

According to Section 3.1.2.2 ("Vibratory Requirements") of PIRN 57000-N/A-0110H, non-rack payloads shall have one-fourth of the allowable limits of rack payloads. It is easily concluded from the above comparison table that ASD fan shall generate much less vibratory disturbance than common fan. Therefore, if a common fan is proved to meet one-fourth of allowable limit, it is obvious that ASD fan can meet the same requirements.

The following figure shows the disturbance level (in μg i.e. 10^{-6}g) of one typical common fan employed in HRF Rack-1A. The same figure also shows a comparison of the disturbance level against one-quarter of allowable limit (in thin line). It proves that the disturbance level of the common fan is even much lower than one-fourth allowable limit. Therefore, it is concluded that ASD fan meets the same requirement of PIRN 57000-N/A-0110H.



**HRF RACK 1A MICRO-GRAVITY ANALYSIS
ACCELERATION METHODOLOGY**



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