

CIL
EMU CRITICAL ITEMS LIST

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Date: 12/03/91

12/24/91 SUPERSEDED 10/31/90

ANALYSIS:

NAME	P/N	QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE
CONTAMINANT CONTROL CARTRIDGE, ITEM 460	2/3A	400FH01:		END ITEM: Fault to remove CO ₂ .	Decreased chemical reaction (chemisorption) level of CO ₂ with LiOH.	A. Design - To prevent channelling or a "short" charge, the cartridge is vibrated at 110G is funneled into the container and tamped at specified height levels during fitting to insure that the LiOH bed is homogeneous. A foam rubber pad preloads the bed preventing LiOH particles from shifting during CCC handling and use. Protective caps with radial O-seals isolate the LiOH from its storage environment. Tape placed over the vent hole protects against contaminants entering the item during storage and handling. A teflon screen prevents free moisture from mixing with the LiOH.
SV792600-00 (1)				CRUISE: Premature expenditure of LiOH, channelling, free moisture, failure of the storage caps to seal.	GFE INTERFACE: Increase in EMU CO ₂ level.	B. Test - Certification test - Certification testing fulfilled useful life requirements of CCC 574B, S/AB SV792600-2 and S/AB SV782700-2 design note (1) operational life. The item completed cycled man endurance testing to LiOH breakthrough during 8/90. The item was subjected to the cold case 7 hour EMU profile and upon completion of these conditions a metabolic rate of 1,000 gtu was used until breakthrough. This completed the 7 hr S/AB requirement and continued to work nominally for an average additional time period of 4.4 hours. No Class I EC's have been incorporated since this configuration was certified.
				MISSION: Terminate EVA.	CHEM/VEHICLE: None for single failure. Possible loss of crewman with loss of sep.	C. Inspection - Premature spending of LiOH is prevented by using only govt. furnished LiOH and NIP inspection of approved lot No.'s prior to charging the unit. The chemicals are weighed during assembly to verify that the proper amount has been used. This weight is recorded and inspected. Free moisture and CO ₂ are prevented from contaminating the unit by using -65 degrees D.P. nitrogen gas atmosphere during charging. All gases (N ₂ and D ₂) are tested frequently during charging and are verified by inspection throughout the assembly. Storage cap seats are inspected at their detail level to insure proper seal contact for the vented (taped) dust cap. Parts are double bagged and #2 purged to maintain the isolation of the LiOH chemical bed.

D. Failure History:
#-EMU-460-C007 (B-B-88) During a cold wall cycled man test,

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ANALYST:

NAME	FAILURE	MODE &	CAUSES	FAILURE EFFECT	NARRATIVE FOR ACCEPTANCE
Z/TRA	400FH01				<p>the containment control cartridge "broke through"; the CO₂ level exceeded by 15mmHg. This was caused by the CCC being exposed to moist gas flow during rig set-up. The procedures have been modified so that the PLSS is "bypassed" during chamber preparation.</p> <p>J-EMU-480-001 (3-13-86) During EVA testing, a high level of CO₂ was detected. It was determined that the particular batch of LIDH being used could not perform adequately at low humidity levels. The acceptance test procedures for LIDH have been revised to specify low humidity performance levels.</p>

E. Ground Turnaround -
LIDH is batch lot approved, and cartridge packing and storage are controlled to prevent exposure to ambient air per FEMM-A-001.

F. Operational Use -
 Crew Response - PreEVA: Upon receipt of message from CUS concerning CO₂ level, minimize physical activity, begin monitoring the CO₂ value. If received during depresso, also stop depress. If CO₂ value continues to rise, cease activities, consider In-Vessel LIDH change out.
 EVA: Upon receipt of message from CUS concerning CO₂ level, minimize physical activity, begin monitoring the CO₂ value. If CO₂ value continues to rise, crewmember will assess physical condition for high CO₂ using helmet purge valve. If conditions exist, the EVA is terminated, this EMU is go for standby on SCU with helmet purge valve open.
 Training - Crewmembers are trained in high CO₂ symptom recognition and response.
 Operational Considerations - Reference Loss/Failure Flight Rules: An EMU is considered lost if unable to maintain a safe CO₂ level. EMU is clear for standby on SCU following termination for high CO₂.
 EVA checklist and POF procedures verify hardware integrity and systems operational status prior to EVA. EMU CNS provides readout on EMU status. Real Time Data System allows ground monitoring of EMU systems.

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