DA/Dr. C. A. Berry

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Memorandum

TO : PA/Manager, Apollo Spacecraft Program

DATE: FEB 20 1968

FROM : EA/Director of Engineering and Development

In reply refer to: EC311PA-722

SUBJECT: 60% O_2 - 40% N_2 launch atmosphere selection

Since the selection of a 60% O_2 - 40% N_2 launch atmosphere, Crew Systems Division has been evaluating the system implications of its utilization. It was determined that an equivalent altitude range of 8,000 to 11,000 feet would be encountered within the spacecraft after orbital insertion if cabin leakage alone was used for oxygen enrichment. Additionally, sea level PAO_2 equivalent would not be re-established until 24 hours elapsed time from orbital insertion. Since this condition conflicts with the Medical Research and Operations Directorate guidelines for an atmospheric equivalent altitude of 4,000 feet prior to helmet or glove removal and an increase to sea level equivalent within 4 hours, a restriction on the establishment of the shirtsleeve operational mode would be imposed.

A procedure for increasing cabin leakage, and thus potentially alleviating the conflict in requirements without complicating crew procedures, is to establish flow through the urine dump nozzle by manually opening the waste storage compartment purge valve. The detailed evaluation of this technique reveals significant benefits to the process of oxygen enrichment of the cabin atmosphere after launch. In fact, for "specification-nominal" hardware characteristics, conformance to the Medical Directorate's guideline, with respect to allowable time above sea level PAO_2, is evidenced; and the maximum equivalent cabin altitude criteria is exceeded by less than 500 feet. Even a selection of spacecraft parameters (within their operating range) so as to produce a worst case, results in an equivalent cabin altitude of 6350 feet with a return to sea level equivalent PAO_2 in less than 7 hours. This favorably compares with the military aircraft criterion of unlimited duration at 10,000 feet.

The study criteria and graphical presentation of the results of the above discussed evaluations are included in the attachment.

ORIGINAL SIGNED BY
MAXIME A. FAGET

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Enclosure

cc:
See list attached

EC3:WWGuy:ld 2/13/68

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