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SENIOR FLAMMABILITY REVIEW BOARD MEETING
BUILDING 2 - ROOM 966
January 13, 1968

*The following Board members were in attendance:

R. R. Gilruth - Chairman
G. M. Low
M. A. Faget
A. C. Bond
C. A. Berry
D. K. Slayton
C. C. Kraft, Jr.
K. S. Kleinknecht
George Jeffs, representing William Bergen

DISCUSSION

The original plan for the Command Module flammability tests was to test at 6.2 psi oxygen, 16.2 psi air, and 16.2 psi oxygen. It was determined that tests in air would not be required, since testing at 6.2 psi oxygen would be a more severe case than any tests in air. The test plan was subsequently revised to identify tests at 6.2 psi oxygen and 16.5 psi oxygen.

The flammability test series at 6.2 psi oxygen in Boilerplate 1224 was concluded on January 7. As a result of this testing, it was determined that a means for improving the crew compartment environment on the pad should be evaluated. A task team was formed, chaired by Aaron Cohen, to evaluate the use of a mixture of oxygen and nitrogen for the launch atmosphere. The task team evaluated the use of mixtures ranging from 60% oxygen and 40% nitrogen through 100% oxygen. The team's recommendation was to accomplish further testing in Boilerplate 1224, utilizing a 60% oxygen and 40% nitrogen atmosphere to obtain further data on the flammability characteristics of materials in this environment.

*Major General S. C. Phillips was unable to be present for the meeting of the Board. The purpose of the meeting was discussed with him on January 12. He was notified of the results of the meeting, immediately following the meeting on January 13, and indicated his concurrence with the Board's decisions.

It was determined during the discussion that, considering both anoxia and the bends, a crew compartment atmosphere of 60% oxygen and 40% nitrogen would not be harmful to the crew. The bends problem was considered to be independent of cabin atmosphere, to the first order, within the limits of present considerations. Insofar as anoxia is concerned, the 60% oxygen, 40% nitrogen environment was not expected to cause any problems at the normal regulated pressure of 5.0 psi, or at the low limit of that pressure of 4.8 psi. Under emergency conditions, the pressure in the suit will be 3.5 psi. This pressure (3.5 psi), at a mixture of 60% oxygen and 40% nitrogen, would not cause deleterious effects for very short exposures, but would be harmful for prolonged exposures. However, the additional exposure time of purging the suit (after donning the suit, or helmet and gloves) would be insignificant.

Preliminary data were presented by the task team which showed that the material flammability in an atmosphere of 60% oxygen and 40% nitrogen at 16.2 psi was comparable to material flammability in an oxygen atmosphere of 6.2 psi.

SUMMARY

A 60% oxygen and 40% nitrogen atmosphere was acceptable from a crew physiological standpoint. The requirement for crew pre-breathing prior to launch (i. e., length of time for pre-breathing) was not dependent upon launching with a 60% oxygen and 40% nitrogen atmosphere. Operationally, the crew could remove their helmets and gloves following orbital insertion, and verification of the integrity of the cabin and its environmental control system, allowing oxygen leakage to enrich the crew compartment atmosphere.

CONCLUSIONS

The Board reviewed the task team's recommendations in detail and made the following decisions:

1. The next test series in Boilerplate 1224 will be accomplished at 16.2 psi, utilizing an atmosphere of 60% oxygen and 40% nitrogen.
2. Following the completion of this test series, the results will be presented to the Board, prior to initiating any further tests.
3. The final decision on a launch atmosphere will be based on the Boilerplate 1224 test results and will be predicated on no active

participation by the crew in controlling the crew compartment environment after orbital insertion.

4. The requirement for the crew's remaining in their suits is completely independent of the crew compartment environment. The selection of a mixed atmosphere for launch will not require the crew to remain in their suits following the demonstration of the integrity of the spacecraft's environmental control system.

5. Flammability tests will be accomplished in a 100% oxygen environment at 16.2 psi as the last series of tests in Boilerplate 1224.

Attendees in addition to Board members are identified on the attached list.



Robert R. Gilruth
Chairman

Enclosure

cc:

See attached list

Non-board member attendees, Senior Flammability Review Board
Meeting, January 13, 1968

J. N. Kotanchik
F. Borman
D. Levine - NR
G. W. S. Abbey
A. Cohen
R. L. Johnston
C. Jernigan
J. P. Kerwin
W. W. Jaderlund
V. D. Brand
J. G. Zarcaro
W. E. Ellis
R. S. Johnston
W. W. Guy
J. W. Craig
S. M. Luczkowski
H. Harmon - NR
P. Haney