

UNITED STATES GOVERNMENT

Memorandum

TO : PA/Manager, Apollo Spacecraft Program Office

DATE: March 9, 1966

FROM : ET32/Apollo Radiation Subsystem Manager

SUBJECT: Radiation Hazard to Apollo 503

A detailed analysis of alternate orbits for Apollo 503 shows that all orbits meeting the mission objectives encounter Van Allen radiation which exceeds the dose limits set by the Center Medical Office. The best orbit produces 80 rem, compared to an allowable limit of 40 rem. Consideration is now being given to revising the dose limits upward. However, even with higher dose limits, the uncertainty in the analysis (about a factor of 4) gives a high probability that a dose will be encountered which exceeds the operational limit, leading to a mission abort. The uncertainties are due to uncertainties in the dose calculation, the environment (+3), and to deviations of the actual orbit from the planned orbit (+2).

The only means by which it can be assured that the dose for Apollo 503 does not exceed the allowable limit (barring a large upward revision) required the addition of shielding to the Command Module. Thirty pounds of shielding would reduce the radiation dose by about a factor of 4. This shielding must be uniformly spread over a region of about 20 square feet extending from a line over the crew's heads to a line over the instrument panel.

It is conceivable that part of the shielding can be obtained by using movable equipment inside the CM. However, this makeshift shielding must stay in place during 3/4 of each of the highly elliptical orbits, and it is doubtful that such an arrangement will be compatible with proper spacecraft operations.

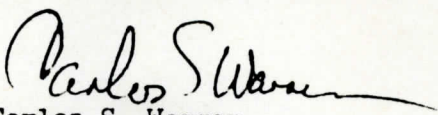
The alternatives to the addition of shielding are:

1. A high probability of a large dose.
2. A high probability of abort, or
3. Abandoning missions consisting of more than one or two highly elliptic earth orbits.



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It is, therefore, recommended that the structures subsystem manager initiate the addition of the additional shielding to the CM. The Radiation and Fields Branch is prepared to assist in determining the exact configuration required.


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