





NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
MANNED SPACECRAFT CENTER  
HOUSTON, TEXAS 77058

IN REPLY REFER TO: 70-FC91-270

DEC 18 1970

MEMORANDUM TO: Distribution  
FROM : FC/Apollo 14 Flight Director  
SUBJECT : ALSEP 4 (Apollo 14) Mission Rules Review

The ALSEP 4 Mission Rules Review was held Thursday, December 3, 1970, at the Lunar Science Institute. Attendees are as listed in the enclosure.

The review resulted in several generally minor changes being agreed upon. Rules affected are:

|                             |                                  |
|-----------------------------|----------------------------------|
| 31-71 R. - Amended          | 31-114 - Cue Order Change        |
| S. - Amended                |                                  |
| 31-72 B. - Addition         | 31-119 - Note Addition           |
| H. - Addition               | 31-120 - Ruling Amendment        |
| I. - Addition               | Note Amendment                   |
| 31-73 C. - Amended          | 31-121 - Cue Amendment, Addition |
| G. - Amended                |                                  |
| H. - Amended                | 31-122 - Ruling B Amendment      |
| I. - Addition               | Note Change                      |
| J. - Addition               |                                  |
| 31-74 A. - Amended          | 31-134 - Ruling Amended          |
| C. - Amended                | 31-135 - Ruling B Amended        |
| D. - Amended                | All Notes Deleted                |
| F. - Amended                |                                  |
| G. - Deleted                | 31-137 - Ruling Amended          |
| 31-75 A. - Amended          | 31-139 - Amended                 |
| C. - Amended                |                                  |
| E. - Addition               | 31-141 - Note Addition           |
| 31-76 - Amended             | 31-142 - Cue Amended             |
| 31-81 - Cue Amendment       | 31-143 - Amended                 |
| 31-102 - Cue Amendment      | 31-144 - Ruling Amended          |
| 31-107 - Cue Addition       | 31-155 - Amended                 |
| 31-110 - Ruling G, Addition |                                  |

*Apollo*

Specific changes will appear in a forthcoming revision to the mission rules.

Two of the more significant items discussed at the meeting were the determination of when the Active Seismic Experiment (ASE) grenade mortars should be launched, and the decision logic which would be followed in the event commanding difficulties are encountered during deployment or ASE thumper sequences. Discussion of these two items follows:

a. Launching time of ASE mortars:

It is desirable to conduct the grenade launch sequence of the ASE at a time when

- lunar seismic activity and noise are near a minimum, and
- when the science data being gathered by other experiments is of low or routine interest.

further, • The earlier the firing, the more likely it is that data affecting Apollo 16 and 17 seismic experiments' design can be acted upon.

- The earlier the firing, the more likely it is that failures affecting the conduct of the experiment will not have occurred.

- The later the firing, the more likely it is that adverse permanent effects of the firing upon other experiments will not adversely affect experiment data interpretation.

- Presuming the ASE mortar events do produce long-term effects in the remainder of the ALSEP (e.g., changes in thermal characteristics), such effects will not be noticeable unless sufficient baseline data from the unperturbed systems have been gathered. Flight Control considers approximately three lunar daytime periods to be the minimum time acceptable for gathering this baseline data.

On the basis of scientific value of the ASE mortar activity, it is desirable to fire the mortars at the first occurrence of favorable conditions yet, because of possible danger to the other experiments, it is advisable to delay the mortar firing until after "sufficient" significant data has been gathered by the ALSEP. The mortars must be fired before the ALSEP lifetime has expired, i.e., while the ALSEP remains operational. The 3 month time remains tentative.

The question remains concerning the degree of danger presented to the other experiments by the mortar fire. Dr. Kovach mentioned that tests have been conducted and that empirical data is available concerning overpressures,

particle size, and particle velocity at certain distances from the GLA. ASPO (Mr. Stan Blackmer) accepted the action item to provide FOD with an ASPO position on mortar firings.

b. Commanding difficulties during ASE activation. Mission rules 31-133, 31-134, and 31-135 were discussed and will appear reflecting the following rationale:

- If the ground is unable to command the ASE to "operate select," the crew will be asked to perform this function, using Switch No. 4. Presuming the rest of the command system is intact, the crew will proceed with an otherwise normal "thumper" experiment, and depart the area with a normal closeout except the ASE will be left in "operate select," rather than "standby." Since the ASE will not survive lunar night in "operate select," the mortar firing experiment will be accomplished at some appropriate time during that first lunar day. We believe the risks associated with leaving the experiment in "operate" with the crew on the surface, and with firing the mortars early, are small compared to the gain associated with conducting the mortar experiment and obtaining ASE data. (Consideration can be given to "safing" and re-arming the system by crew action during the EVA-2 period.)
- If the ground is unable to command the ALSEP to "high bit rate," the crew will perform this function, using Switch No. 4. Presuming the rest of the command system is intact, the crew will proceed with an otherwise normal "thumper" experiment, and depart the area with a normal closeout. At some time during EVA 2, the crew will return to the ALSEP and re-actuate Switch No. 4, once more placing the package in "high bit rate." As soon as practicable after LM ascent, the mortar experiment will be conducted. The ALSEP will then be commanded to "normal bit rate" and readied for ascent stage impact data receipt. This rationale accepts the risks associated with early mortar firing and lack of significant ALSEP systems data during LM ascent in order to gain the advantage of performing the ASE mortar experiment. (Sufficient time shall have elapsed between EVA's to assure proper activation and checkout of other experiments and systems during this time.)
- If the ground is unable to command the ALSEP to "high bit rate off" (normal bit rate), as determined following the ASE thumper experiment, the crew shall perform this function using Switch No. 5. The "high bit rate" command will never again be transmitted. Mortar firings will be accomplished at a time in accord with guidelines, so that some minimal data can be obtained via the passive seismometer experiment. (This action will also be taken to lessen the eventual remote danger associated with leaving "live" ordnance on the moon.)

Questions and comments on the foregoing may be directed to K. K. Kundel,  
FC9, x3786.

  
M. P. Frank

FC93:JJNemec:jcc

Rewritten by B. L. Sharpe

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