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MEMORANDUM for Heads of Program and Staff Offices  
Center Directors  
Director, Jet Propulsion Laboratory

Subject: Termination of LMSS

The attached paper on termination of the Lunar Mapping and Survey System is furnished for your information and that of your staff. Public discussion, comment, or conjecture beyond the limits of this official Agency position are not authorized. Because of Department of Defense classification considerations, unauthorized discussion will be considered as a violation of NASA security regulations.

Requests for information beyond that contained in the position paper must be referred to the Assistant Administrator for Public Affairs in person.

Robert C. Seamans, Jr.  
Deputy Administrator

Enclosure (Unclassified)

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Termination of the Lunar Mapping and Survey System

The Lunar Mapping and Survey System (LMSS) was initiated in April of 1964 as an element of the Apollo program. Its purpose was to provide Apollo landing site certification in the event such data were unavailable from the combined Ranger-Surveyor-Lunar Orbiter automated missions. From inception, then, the LMSS was a backup development to cover the contingency situations either of unsuccessful automated missions or the discovery of such unforeseen lunar surface conditions as to require very detailed site information prior to attempting the first manned lunar landing.

Because of their experience with high-altitude photographic systems, the Department of Defense had agreed to develop the LMSS for NASA. The major part of the project effort has been carried out under Air Force contracts reimbursed by NASA.

The selection of Apollo landing sites depends on the roughness of the lunar surface and upon its composition; the design limitations of the landing module call for a surface bearing strength of at least 12 psi (dynamic) and an average slope not to exceed 12°. In addition, in order to program the landing module's computer effectively, the general slope and configuration of the surface along the approach path must be known. Surveyor and Lunar Orbiter data have proved adequate to permit selection of at least eight sites in the Apollo landing zone (the region between  $\pm 5^\circ$  lunar latitude and  $\pm 45^\circ$  lunar longitude) that are within the required tolerances of the landing module. It will therefore not be necessary to fly a precursor orbital Apollo mission for gathering site data prior to the landing attempt.

The LMSS was designed to provide certification photography of possible landing sites during a manned lunar orbital mission. The crew would have flown the camera system in low lunar orbit to photograph a number of potential landing sites and would then have returned to earth with the actual film rather than relying upon electronic transmission which inevitably degrades the quality of the images. Analysis of the films and the first-hand crew observations would then have been the basis for a decision as to where to try the first lunar landing.

When it became clear that a precursor LMSS mission would not be mandatory, the system was reevaluated as a possible payload for the Apollo Applications Program. The LMSS was examined from the viewpoint of its ability to provide scientific data, such as photogeologic information, in support of the overall long-term lunar exploration program. In this context, a number of problems were identified: because of its size and weight, the LMSS could not be carried as part of a lunar landing mission but would require an entire Saturn V flight dedicated solely to investigations from lunar orbit; for optimum scientific data return, as opposed to operational site certification, the LMSS instrumentation would have to be changed at the cost of a considerable new development effort; from a priority viewpoint, it was clear that the first phase of the Apollo Applications lunar missions should concentrate upon manned surface exploration and sample return; and for budgetary reasons, the whole AAP planning schedule was being stretched in time with a commensurate delay in the need for new developments.

These factors, together with the estimated costs of either completing the LMSS development along the lines of the original plan or of redirecting the effort toward an eventual scientific payload, were weighed against the

current budgetary situation and the lunar exploration program requirements. It was decided to terminate the LMSS, at a cost to date of some \$36 million rather than to continue a project for which there was no operational requirement and whose potential scientific contribution was uncertain.

The Department of Defense will dispose of the components and hardware developed for the LMSS.