X-ray Probe, SEM, and Optical Property Analysis of Surface Features of Surveyor III Materials

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A study has been conducted at the Ames Research Center to investigate the effect of the lunar radiation and particulate environment on the exterior surfaces of selected Surveyor III materials. Two types of surfaces were examined; namely, the inorganic white thermal control paint on the television camera and portions of the RADVS unpainted, aluminum support tube. The study was devoted to (1) a determination of the micrometeoroid and secondary particle environment, (2) X-ray probe analysis of residual material on the surface and inside impact craters, and (3) measurement of the optical properties of the thermal control surfaces. In general, the surfaces examined were coated with lunar dust; the study considered the influence of this dust on the results of the experiments. From the analysis of the experimental work to date, it was found (by scanning electron microscopy and X-ray probe analysis) that not all the apparent impact sites were formed by micrometeoroid and that the number of micrometeoroid impacts on the lunar surface may be less than predicted by existing design criteria. It was also found that none of the surfaces retained their initial optical properties and that the amount of lunar dust on a surface was the largest single feature which contributed to the observed changes. The final goal of this study will be the possible better understanding of the lunar environment and its interaction with engineering materials.