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# Final Report

NASA Contract  
NAG-8-156

Submitted to  
Dr. Ann F. Whitaker  
George C. Marshall Space Flight Center  
Marshall Space Flight Center, AL, 35812

## Solar Radiation Effects on Glasses

Contract Period:  
4/12/90-6/17/93

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(Vanderbilt Univ.) 2 p

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**Abstract:**

The work subject of this work was begun in 1978 under NASA grant NAS8-32695 which prepared the samples which were included in the assemblage of samples on LDEF which was placed in earth orbit by Challenger crew members during mission 41C on April 1984. Those samples, recovered in February 1990 were exposed to earth orbit environment for a total of approximately 5.8 years. Following their recovery the optical and mechanical properties were characterized and sample surfaces were examined so as to characterize micrometeorite impact sites.

Copies of the following are attached to and form a part of this final report:

Published papers describing results obtained under this contract include:

1. "Low-earth orbit radiation effects on strength of Glasses," J. Am. Ceram. Soc. 75 2893-5 (1992) with D. E. Wiedlocher, D. S. Tucker and R. Nichols.
2. "Cratering in glasses impacted by debris or micrometeorites," with David E. Wiedlocher, LDEF 69 Months in Space Second Post Retrieval Symposium, NASA Conference Publication 3194 Part 2, 529-539 (1993).
3. "Physical properties of glasses exposed to earth-facing and trailing-side environments on LDEF," NASA Conference Publication 3257, LDEF Materials Results for Spacecraft Applications, Proceedings of October 27-28, 1992 conference, Huntsville, AL with D. A. Wiedlocher, R. A. Weller, R. A. Weeks and M. H. Mendenhall, pgs 227-243.

Papers in preparation for publication:

1. "Elastic Modulus and Thermal Expansion Measurements of LDEF Glasses and Glass-ceramics using a Speckle Technique" D. W. Wiedlocher and D. L. Kinser, to be submitted as a communication to the American Ceramic Society
2. "Mechanical Failure Probability of Glasses in Earth Orbit" D. L. Kinser and D. E. Wiedlocher, to be submitted to the Journal of The American Ceramic Society:"