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National Aeronautics and
Space Administration

NASA-HDBK-1001
AUGUST 11, 2000

Based on NASA Technical Memorandum 4511, August 1993

TERRESTRIAL ENVIRONMENT (CLIMATIC) CRITERIA HANDBOOK FOR USE IN AEROSPACE VEHICLE DEVELOPMENT

NASA TECHNICAL HANDBOOK

FOREWORD

This Handbook provides information relative to the natural environment for altitudes between 90 km and the surface of the Earth for the principal space vehicle development, operational, and launch locations and associated local and worldwide geographical areas.

This Handbook, which supersedes all editions of TM 82473, and TM 4511, entitled "Terrestrial Environment (Climatic) Criteria Guidelines for Use in Aerospace Vehicle Development" is recommended for use in the development of design requirements/specifications for aerospace vehicles and associated equipment.

The information presented in this Handbook is based on data and models considered to be accurate. However, in those design applications which indicate a critical environment interface, the user should consult an environmental specialist to ensure application of the most current information and scientific-engineering interpretation.

Various NASA programs have provided resources required for the preparation of this document. Major support came from NASA Headquarters Office of Safety and Mission Assurance (Code Q) and Office of Space Flight (Code M).

A companion document, NASA TM-4527, "*Natural Orbital Environment Guidelines for Use in Aerospace Vehicle Development"* was released as a June 1994 publication. It covers all natural environmental guidelines at orbital altitudes within the Earth's thermosphere and exosphere. That document, along with three other key documents (1) NASA TM-209630, *"The NASA/MSFC Global Reference Atmospheric Model – 1999 Version (GRAM-99)"*; (2) NASA CR-1998-208859, *"A Compendium of Wind Statistics and Models for the NASA Space Shuttle and other Aerospace Vehicle Programs"*, and (3) NASA TM-2000-210131, "*Analysis and Assessment of Peak Lightning Current Probabilities at the NASA Kennedy Space Center"* have been included in this Handbook as an update to the original NASA TM-4511, as published in August 1993.

Requests for technical information, corrections, or additions to this Handbook should be directed to the Environments Group, NASA Marshall Space Flight Center, Alabama 35812. Requests for general information concerning the Handbook and technical standards should be sent to the NASA Technical Standards Program Office, ED41, MSFC, AL, 35812 (telephone 256-544-2448). This and other NASA Handbooks/ technical standards products may be viewed and downloaded, free-of-charge, from our NASA Technical Standards Program Homepage: http://standards.nasa.gov.

Original Signed by

W. Brian Keegan
Chief Engineer

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