NASA Health Standards

Committee on Aerospace Medicine and the Medicine of Extreme Environments (CAMMEE)
and
Committee on Ethics Principles and Guidelines for Health Standards
for Long Duration and Exploration Spaceflights

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David R. Liskowsky, Ph.D.
Director, Medical Policy & Ethics
Office of the Chief Health and Medical Officer
Health, Human Performance, and Medical Standards

- Health, human performance, and medical standards are designed to reduce risk to personnel, vehicle, system, or mission as a result of factors that can impact individual health and/or performance.

- Established by the Office of the Chief Health and Medical Officer

  - NASA Crewmember Medical Standards, Vol 1: Selection and Periodic Certification (OCHMO 80771201MED)


NPDs are NASA directives and “policy statements that describe what is required to achieve NASA’s vision, mission, and external mandates, and who is responsible for carrying out those requirements.”

NPRs are NASA directives that “provide Agency mandatory instructions and requirements to implement NASA policy as delineated by an associated NPD.”

A NASA Technical Standard is a “document that contains common and repeated use of rules, conditions, guidelines, or characteristics for products or related processes…” A standard can become an Agency requirement “when a directive specifies its use…”

Deliverables
NASA Health and Medical Policy for Human Space Exploration

“It is NASA's policy to:

a. Provide a healthy and safe environment for crewmembers to enable successful human space exploration.

e. Establish space flight health and medical standards that address:

(1) Health and medical screening, evaluation, and certification (including medical selection and retention standards).
(2) Health and medical diagnosis, intervention, and care (including management and training).
(3) Health maintenance, preventive programs, and countermeasures (including permissible exposure limits, permissible outcome limits, and fitness for duty standards).
(4) Habitability, environmental health, planetary protection considerations, and human performance guidelines and standards, as appropriate.”

“The Chief Health and Medical Officer (CHMO) shall:

(4) Establish and maintain human health and medical standards for space flight.
1.2.2 Health, human performance, and medical standards for human space exploration will be established and documented as follows:

a. NASA-STD-3001, NASA Space Flight Human System Standard, Volume 1 - Crew Health establishes standards to ensure a healthy and safe environment for crewmembers and to provide crewmembers with optimal health and medical practices and systems during all phases of space flight. These include appropriate levels of medical care, permissible exposure limits, fitness-for-duty criteria, and permissible outcome limits as a means of defining successful operating criteria for the human system.

b. NASA-STD-3001, NASA Space Flight Human System Standard, Volume 2 - Human Factors, Habitability and Environmental Health addresses habitability and environmental health, focuses on human physical and cognitive capabilities and limitations and defines standards for spacecraft (including vehicles, habitats, and suits), internal environments, in-space facilities, payloads, and related equipment, hardware, and software systems with which the crew interfaces during space operations.

c. OCHMO 80771201MED, NASA Crewmember Medical Standards, establishes and documents standards that address health and medical screening, evaluation, and certification of crewmembers. 
Establishes and documents standards that address health and medical screening, evaluation, and certification of crewmembers.

**Maintained** – Office of Chief Health and Medical Officer

**Governance and waiver** - Operational medicine

Selection – no waiver

Certification – waiver considered on a case-by-case basis

- Requests come to the Aerospace Medicine Board for decision. CHMO approves/disapproves.
Addresses habitability and environmental health, focuses on human physical and cognitive capabilities and limitations and defines standards for spacecraft (including orbiters, habitats, and suits), internal environments, facilities, payloads, and related equipment, hardware, and software systems with which the crew interfaces during space operations. (supported by Human Integration Design Handbook (HIDC), JSC 20584 NASA Spacecraft Maximum Allowable Concentration Tables, JSC 63414 NASA Spacecraft Water Exposure Guidelines)

**Maintained** – Office of Chief Engineer Technical Standards Library

**Governance and waiver** - Health and Medical Technical Authority

Waiver process established for Technical Authority (TA) in Agency program management requirements.

- Waiver request by program/project
- Resolved with TA
- If not resolved, flows to next level of management
Establishes standards for providing a healthy and safe environment for crewmembers and for providing health and medical programs for crewmembers during all phases of space flight.

**Standards for Human Performance**

Provide a declaration of acceptable medical risk from the deleterious health and performance effects of space flight, and help target and prioritize biomedical research and technology development efforts, promote operational and vehicle design requirements, and aid in medical decision making during space missions.

*Fitness for Duty (FFD)* - Minimum measurable capability or capacity for a given physiological or behavioral parameter that allows successful performance of all required duties. Functional capacity measured.

*Permissible Outcome Limits (POL)* - Acceptable maximum decrement or change in a physiological or behavioral parameter, during or after a space flight mission, as the result of exposure to the space environment. Biological/clinical parameter measured.

*Space Permissible Exposure Limits (SPEL)* - Quantifiable limit of exposure to a space flight factor over a given length of time (e.g., lifetime radiation exposure). Physical/chemical agent measured.

Fitness-for-Duty - Aerobic Capacity; Sensorimotor; Behavioral Health and Cognition; Hematology and Immunology

Permissible Outcome Limit – Nutrition; Muscle Strength; Microgravity-Induced Bone Mineral Loss

Space Permissible Exposure Limit - Space Flight Radiation
Level of Medical Care Standards
The amount and type of medical care to be rendered under various operational and mission scenarios

Health and Medical Screening, Evaluation, and Certification
Supports NASA Crewmember Medical Standards.

Medical Diagnosis, Intervention, Treatment, and Care
Supports operational medicine activities
**Maintained** – Office of Chief Engineer Technical Standards Library

**Governance and waiver** - Health and Medical Technical Authority

Waiver process established for Technical Authority (TA) in Agency program management requirements.

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Human performance standards relate to individual medical status

- Entertained individual request for waiver
Health, human performance, and medical standards are initiated by the NASA CHMO and are developed under the supervision of the delegated HMTA with participation of other Centers and external experts, as appropriate. Final approval is executed by the NASA CHMO.

**Process**

- Recommendation for development of a new standard or revision of an existing standard may originate anywhere in the Agency (e.g., OCHMO, HEOMD, AMB, HHP Directorate at JSC) and is forwarded to the NASA CHMO for consideration for decision to proceed.

- Team established

- Delegated HMTA then reviews the draft standard and provides a recommendation for approval of the new or revised standard to the NASA CHMO.

- The NASA CHMO determines whether or not independent technical review of the draft standard is required by an external team and convenes a team to conduct the review, where appropriate.

- The draft/revised standards are presented to the NASA Medical Policy Board, which provides a recommendation for approval to the NASA CHMO.

- The NASA CHMO considers comments and recommendations and either rejects, recommends further modifications, or executes final approval of the standard.

- Implementation of the standards is overseen by the delegated HMTA.
Recent Standards Activity


- Lunar dust exposure standard development – initiated for Constellation. Research being done by Human Research Program. OCHMO will convene external panel for independent review.

- Update to SMACs/SWEGS - Will be engaging the National Research Council Committee on Toxicology in the revision of the Spacecraft Maximum Allowable Concentrations (SMACs) and Spacecraft Water Exposure Guidelines (SWEGs) CY 14/15

- Radiation - Engaging the National Council of Radiation Protection & Measurements (NCRP) on revising the space radiation standard

- Visual impairment and inter-cranial pressure issue - Research being done by Human Research Program and data being collected from Operational Medicine to provide standard recommendation. Develop criteria for clearing a crewmember for a repeat flight after expression of VIIP in a previous flight and possible changes to pre-flight criteria.