Ames Policy Directive

APD 1760.1
Effective Date: June 9, 2020
Expiration Date: June 9, 2025

COMPLIANCE IS MANDATORY

Subject: Certifying Test Facilities for Human Occupancy

Responsible Office: Code QS / System Safety and Mission Assurance Division

CHANGE LOG

Status [Baseline /Revision /Cancelled]	Document Revision	Date of Change	Description
Baseline		10/26/2004	Initial
Revision	1	11/9/2009	Office of primary responsibilities action is to revalidate however Directives Manager has updated document to new APD format requirements.
Revision	2	January 2015	Revalidate (expired) and reformat
Revision	2A	March 2015	Updated format and moved Records section to attachment
Revision	2B	March 2015	Moved Records to Attachment and corrected number formats
Revision	2C	April 2015	Address Code T review comments, including administrative edits.
Revision	3	6/9/2020	Update Authority, Applicable Documents and Forms, and References; clarify timeframe to notify HORB in paragraph 5.b(1); and make administrative and format edits.

1. POLICY

a. This directive sets out the policy and procedures of the Human Occupancy Review Board (HORB), established to conduct Human Occupancy Reviews (HOR) of test facilities that are occupied by humans. The HORB evaluates and certifies the readiness of these test facilities to begin operation and prevent exposure of human occupants to any unacceptable or undesirable risks.

b. It is Ames Research Center (ARC) policy to minimize the risks to assure the safety of all personnel either operating or serving as test subjects in a test facility. The review and certification of the test facility by the HORB are required prior to the full operation of the test facility with human occupants.

c. Certifying test facilities to operate with human occupants requires a multidisciplinary system review that crosses technical disciplines and functional management lines (see paragraphs 5b(3) and 5b(4) for specific requirements, documentation, and responsibilities for certifying these test facilities/equipment). The authority to augment requirements for occupational and environmental health of personnel and activities is derived from NASA Procedural Requirements (NPR) 8715.3. Both engineering and program/project responsibilities necessary to conduct the reviews are specified in NASA Policy Directive (NPD) 7120.4. Safety & mission assurance responsibilities needed to formally address the operational risks are specified in NPD 8700.1. Unique protections of human research subjects involved with the test facilities/equipment are specified in NPD 7100.8.

d. The Human Occupancy Review Board (HORB) is appointed by and reports to the Center Director and is a standing safety board for all of the test facilities having human occupants at ARC. The Board consists of a Chairperson, a representative from the System Safety and Mission Assurance Division (Code QS), the Medical Services Officer, and at least three technical members. Names of members may be obtained from Code QS. The members of the Board will serve until they are relieved by appointment of replacement members. Board meetings will meet quorum requirements. A quorum for Board meetings consists of the presence of at least two-thirds of the Board membership. The responsibilities of the HORB are outlined in Ames Procedural Requirements (APR) 8715.1. The review consists of two basic parts:

(1) Operational Readiness Review (ORR): Assess the overall readiness of the test facility for operation, including readiness to achieve all objectives.

(2) Human Interface Review (HIR): Evaluate the human interface with the test facility to ensure that the human occupants are not exposed to any unacceptable risk. This includes evaluating the adequacy of medical monitoring provisions and medical care; witnessing demonstration of emergency egress; evaluating training and certification programs; ensuring an adequate and safe environment; and ensuring all potential hazards are identified and controlled to an acceptable level.

e. The nominal process followed for the HOR resulting in certification is located in Attachment D.

2. APPLICABILITY

a. This APD is applicable to ARC and associated facilities (e.g., contractor’s facilities) for all activities that relate to test facilities having human occupants.

b. This APD applies to civil servants at ARC and contractors, grant recipients, and parties to agreements to the extent specified or referenced in the contracts, grants, or agreements.

c. In this directive, all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The terms "may" or "can" denote discretionary privilege or permission, "should" denotes a

good practice and is recommended, but not required, "will" denotes an expected outcome, and "are/is" denote descriptive material.

d. In this directive, all document citations are assumed to be the latest version unless otherwise noted.

3. AUTHORITY

a. NPR 8715.3, NASA General Safety Program Requirements

4. APPLICABLE DOCUMENTS AND FORMS

a. NPD 7120.4, NASA Engineering and Program/Project Management Policy

b. NPD 8700.1, NASA Policy for Safety and Mission Success

c. APR 8715.1, Chapter 2, Ames Health and Safety Manual - Safety and Health Responsibilities

d. APR 8735.2, Deviation/Waiver Process

5. RESPONSIBILITY

a. **Human Occupancy Review Board** shall:

(1) Review and evaluate each test facility and all appropriate documentation (see paragraphs 5b(3) and 5b(4)) for compliance with applicable engineering and safety codes, standards, safety operation procedures, and requirements.

(2) Recommend to the Center Director that the test facility be certified for human occupancy. This is accomplished by submitting a memorandum by the HORB Chairperson, via the Code Q Director, to the Center Director after the HORB review and evaluation has been completed, all Hazard Analyses and associated Hazard Reports have been closed, and the Board has agreed that the test facility should be certified.

(3) Maintain a record of Board activities and minutes of the meetings.

b. **Human Occupancy Facility User Organizations** shall:

(1) Notify the Chairperson of the HORB and request a determination of the need for a HOR when the organization has completed design and is nearing completion of construction/implementation of a new test facility or one that has had modifications which affect human safety.

(2) If the user organization finds that the facility cannot meet a safety code/standard requirement, submit a deviation/waiver request in the ARC Problem Reporting And Corrective Action (PRACA) system[1] in accordance with APR 8735.2. Obtain all concurrences/approvals before submitting the deviation/waiver to the HORB.

[1]ARC PRACA System: https://mas.nasa.gov/ARC-PRACA/

(3) Prepare the following documentation and submit to each member of the HORB at least two weeks before the review:

(a) Top-Level diagrams, schematics, overviews, layouts and/or descriptions.
(b) List of user requirements and operational capabilities.
(c) Documented, comprehensive independent review of the facility, including design, construction, and operation, to verify that the facility meets all applicable engineering and safety codes, standards, and requirements, and to identify any deviations from these requirements.
(d) List of trained/certified operators including descriptions of the certification criteria, the certification process, dates, and certification periods. Include the role of Facility Safety Manager if prescribed in human research protocols.
(e) Summary of all identified hazards that have a Risk Assessment (RA) of High (unacceptable) or Medium (undesirable), including their current disposition and hazard closure status.
(f) Results of applicable subsystem and integrated systems check-out tests.
(g) Standard Operating Procedures (SOPs) that cover all aspects of a facility's operation from initial startup to shutdown, emergency procedures, maintenance procedures (including all critical components), and pre-and post-test medical examination procedures (if applicable).
(h) Procedures for configuration management that document all drawings and standard operating procedures of a facility, identifying the methods of controlling changes, and specifying the administrative controls governing the facility's use, repair, maintenance, and operation.

(4) Ensure that the following documentation is available for review at least two weeks prior to the scheduled HORB review:

*Note: These documents are not copied or distributed to the HORB **unless requested**.*

(a) Complete set of up-to-date as-built drawings and specifications, and any special components certification.
(b) System safety hazards analyses that document and identify all potential hazards and their Risk Assessments, and provide the status of the implementation of recommended controls.
(c) Stress analyses that identify all critical elements of a facility and present data to indicate that the facility is able to withstand all anticipated loads and forces.
(d) Training and operator certification that documents criteria for certifying personnel.
(e) List of safety critical items and records (such as inspection records/shop travelers) indicating that these items have been manufactured to meet design specifications.

(5) Ensure that human occupied testing is conducted in accordance with the HORB certification after the test facility is certified for operation with human occupants.

Note: The experimental site may be visited by one or more members of the Human Research Institutional Review Board (HRIRB). Additional information on this subject is available in APR 7170.1.

c. **Operators of Human Occupied Test Facilities** shall:

(1) Provide a clean, well-ventilated area for the test facility with sufficient space for testing, suiting, and reasonable access and egress.

(2) Incorporate "Fail Safe" operation of all systems (electrical, mechanical, pneumatic, and hydraulic), whenever feasible.

(3) Provide emergency or alternate components and systems when a credible loss of the component or system could result in injury to personnel or major damage to a facility.

(4) Ensure that provisions exist for rapid access by rescue personnel to incapacitated occupants for all anticipated emergency conditions.

(5) Ensure that pressurized/vacuum facilities can be rapidly re-pressurized/depressurized in case of emergencies, to ensure the safety of the occupants.

(6) Provide adequate communication between personnel in the test facility and personnel outside the test facility.

(7) Minimize the use of both pyrotechnic and ordnance devices.

(8) Provide a pressure relief system for sealed chambers to prevent catastrophic failure of the chamber caused by rapid pressurization, either internal or external, due to fire, rapid temperature rise, or system control failure.

(9) Provide test subjects, observers and rescue crews with appropriate breathing air apparatus whenever the chamber atmosphere could be harmful.

(10) When practical, provide a means for occupants to exit the facility unassisted.

6. DELEGATION OF AUTHORITY

None.

7. MEASUREMENT/VERIFICATION

a. Verification of conformance to requirements in this directive are measured through Center and Responsible Organizational management reviews, self-assessments, and subsequent analysis and reports of conformance to requirements, as well as periodic internal audits.

8. CANCELLATION

a. APD 1760.1, Certifying Test Facilities for Human Occupancy, dated June 2, 2015.

Eugene Tu
Director

DISTRIBUTION:

Internal and external distribution.

ATTACHMENT A. DEFINITIONS

Human Occupied Test Facility	A facility where the operators and/or test subjects could be exposed to a hazardous environment or to other than normal ground level static or ambient conditions is considered a human occupied test facility, and it must be certified by the Human Occupancy Review Board prior to occupancy and use. Such a facility may be a structure or capsule having planar, vertical, and/or rotational motion, or a chamber having simulated altitudes or nonstandard atmospheric environments. A test facility/device includes the structure, associated controls, and monitoring equipment, including emergency and supporting safety equipment.

ATTACHMENT B. ACRONYMS

ARC	Ames Research Center
HORB	Human Occupancy Review Board
HOR	Human Occupancy Review
NPD	NASA Policy Directive
NPR	NASA Procedural Requirements
PRACA	Problem Reporting And Corrective Action
SOP	Standard Operating Procedure

ATTACHMENT C. REFERENCES

C.1 NPD 7100.8, Protection of Human Research Subjects
C.2 APR 7170.1, Human Research Planning and Approval Guidelines

ATTACHMENT D. HUMAN OCCUPANCY REVIEW PROCESS

HORB Chairperson Notification	The operating organization of a new project or facility modification that involves human occupancy initiates notification. The Chairperson determines the need for human occupancy certification. This determination is based on the scope of the project or facility modification, and the extent that the human occupants might be affected.
Facility Tour and Inspection	If required by the HORB, the user organization conducts a tour of the test facility.
Operational Witnessing	If required by the HORB, the user organization conducts an unoccupied fully operational test of the facility by certified operators using the SOPs after the Board's facility inspection. The user organization identifies all safety features and demonstrate the operation of these features. Then, emergency procedures will be demonstrated, simulating a worst-case emergency scenario.
Determination of Operational Readiness	Following observation of the tests, the Board members convene to determine the operational readiness of the facility and identify any required corrective actions. These corrective actions must be completed before the facility is recommended to the Director for certification for human occupancy. The Board's chairperson documents and tracks these requirements until they are completed.
Director's Letter	Upon completion of the review and closure of all action items, the HORB prepares a letter to the Center Director (through the Code Q Director) summarizing the findings and corrective actions, and recommending certification of the facility for human occupancy. The letter contains the following: 1) Define the operating limits within which the facility has been deemed safe for human occupancy. Operating limits are established for each environmental element that constitutes a stress. When applicable, reliable controls must be provided to prevent the facility or its occupants from exceeding safe operating limits. 2) Document any approved waivers/deviations and related information.
Certification	1) After reviewing the HORB's letter, the Center director signs on the concurrence line if in agreement with the Board's recommendation to approve the human occupancy certification. 2) The signed letter is returned to the Chairperson of the HORB. 3) The Chairperson of the operating facility documents the effective date of the action and lists any limitations imposed on the facility.