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Acquisition

ASSURANCE OF OPERATIONAL SAFETY, SUITABILITY, & EFFECTIVENESS

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This instruction implements AFPD 63-12, *Assurance of Operational Safety, Suitability, & Effectiveness.* It defines a process for establishing and preserving the safety, suitability, and effectiveness of Air Force systems and end-items over their entire operational life by preserving technical integrity via prudent use of disciplined engineering practices, assurance of proper operation and maintenance, effective supply systems, and field utilization and maintenance trends feedback to system program offices. This guidance applies to Air Force product lines, including those operated by the Air National Guard and Air Force Reserve, as well as to designated systems and end-items procured, operated, and/or maintained by the Air Force for other government agencies. Operational safety, suitability, and effectiveness principles should apply to all items that are managed by the Air Force. Managers, at all levels, should consider the need to assure operational safety, suitability, and effectiveness throughout the life cycle of the items they manage. Maintain and dispose of records created by processes prescribed herein in accordance with AFMAN 37-139, *Records Disposition Schedule.*

Chapter 1

ASSURANCE OF OPERATIONAL SAFETY, SUITABILITY, AND EFFECTIVENESS MANDATORY PROCESS ELEMENTS

1.1. Disciplined Engineering Process. Organizations responsible for Air Force systems or end-items must use a disciplined engineering process throughout the system's life cycle to ensure that activities such as operational use, configuration changes, maintenance repairs, and part substitutions do not degrade system or end-item baselined characteristics over their operational life. A disciplined engineering process includes the following.

1.1.1. Operational Risk Management (ORM)**.** Assurance and preservation of operational safety, suitability, and effectiveness inherently involve managing to acceptable levels of risk. Therefore, an ORM program must be in place to assess the impacts of program activities. The use and application of ORM principles, tools, and techniques by users and Single Managers (to include System Safety) are critical to assuring operational safety, suitability, and effectiveness throughout the operational life of an Air Force system or end-item.

1.1.2. System Safety. System Safety involves the application of engineering and management principles, criteria, and techniques to optimize all aspects of safety within the constraints of operational effectiveness, time, and cost throughout all phases of the system or end-item life cycle. System Safety requirements are addressed in AFI 91-202 and Military Standard 882. System Safety principles and practices must be used to identify and eliminate or reduce to acceptable levels of risk hazards over the operational life of the system or end-item.

1.1.3. Configuration Management. Operational safety, suitability, and effectiveness are associated with a specific system or end-item configuration. The specific configuration and its characteristics must be defined by engineering data at all times. Therefore, a robust configuration management process must be used to establish and preserve operational safety, suitability, and effectiveness baselines. The level of configuration control may vary from program-to-program based on acquisition and sustainment strategies (e.g., commercial items, contracts with Total System Performance Responsibility (TSPR), etc.). All permanent and temporary configuration changes, as well as the use of non-conforming material, will be reviewed and approved prior to implementation or installation. Delegation of specific configuration management authority between organizations must be formally documented. This authority includes configuration management responsibility for supply, maintenance, user, and test initiated changes.

1.1.4. Test and Evaluation. Developmental Test & Evaluation, Operational Test & Evaluation, and/or other approved developmental testing must be completed and identified deficiencies corrected or accepted by the user before the operational safety, suitability, and effectiveness baselines are validated.

1.1.5. Technical Orders (TOs) and Technical Data. Current, valid, verified TOs and technical data must be provided to the Operational Commands and other users. TOs and technical data must clearly identify procedures and requirements necessary to preserve operational safety, suitability, and effectiveness baselines. They must also identify any operational limitations of the system or end-item.

1.1.6. Total Ownership Cost (TOC). Any proposed changes to operational use, configuration, maintenance procedures, or part substitutions must include an evaluation of potential TOC impacts. There-

fore, proponents of program actions must be made aware of potential Life Cycle Cost impacts as an integral part of the disciplined engineering joint decision making process.

1.2. Inspections and Maintenance. Inspections and maintenance procedures must be developed and continuously reviewed to prevent degradation of operational safety, suitability, and effectiveness. This includes the use of fielded system or end-item performance data to maintain operational safety, suitability, and effectiveness.

1.3. Sources of Maintenance and Repair. Maintenance and repair sources must deliver quality products and services in support of the preservation of operational safety, suitability, and effectiveness.

1.4. Sources of Supply. Sources of supply must be capable of producing parts and supplies that preserve the operational safety, suitability, and effectiveness baseline.

1.5. Training. Personnel must be properly trained to preserve the operational safety, suitability, and effectiveness baselines.

1.6. Certifications. All required certifications supporting operational safety, suitability, and effectiveness must be obtained (e.g., Seek Eagle, Nuclear Surety, Non-nuclear Munitions Safety Board, Information Assurance, Force Protection, etc.) prior to system or end-item operational use. These certifications are directed under separate, stand-alone Air Force policy.

1.7. Operations and Maintenance. Systems and end-items must be operated and maintained in accordance with approved TOs and Operations Manuals.

1.8. Technology Demonstrations. Operational safety, suitability, and effectiveness restrictions or limitations must be provided for Advanced Technology Demonstration (ATD), Advanced Concept Technology Demonstration (ACTD), and experimental leave-behind systems and end-items. The organization responsible for preservation of the operational safety, suitability, and effectiveness baselines must be identified for any items left with the user for continued operations.

Chapter 2

RESPONSIBILITIES AND AUTHORITIES

2.1. SAF/AQ. SAF/AQ will:

2.1.1. Provide acquisition policy and programmatic direction which requires Single Managers, in conjunction with the operational command, to establish and preserve baseline characteristics to support operational safety, suitability, and effectiveness.

2.1.2. Provide acquisition policy and programmatic direction, which requires that an appropriate level of verification be accomplished to enable continuing operational safety, suitability, and effectiveness.

2.1.3. As part of the milestone decision process, confirm establishment of baseline characteristics and user coordination.

2.2. HQ USAF/IL. HQ USAF/IL will:

2.2.1. Ensure a list of operational systems and end-items used by the Air Force is created and maintained. The list should also identify the responsible management organization for each designated system and end-item.

2.2.2. Ensure Air Force logistics data systems support the assurance of operational safety, suitability, and effectiveness for Air Force systems and end-items. Modify, as required, Air Force logistics data systems to allow Single Manager insight into the usage, maintenance, and reliability of operational systems and end-items.

2.2.3. Ensure supply and maintenance policies require technical decisions be approved by the responsible system or end-item Single Manager or by competent organizations specifically designated by the Single Manager for the system or end-item.

2.2.4. Ensure environmental risks and costs are identified and assessed throughout the weapon system and end-item operational life.

2.2.5. Ensure appropriate inspection, maintenance, maintenance training, supply, and repair source guidance addresses operational safety, suitability, and effectiveness.

2.2.6. Ensure appropriate guidance directs that systems and end-items be maintained in accordance with approved TOs.

2.3. HQ USAF/SE. HQ USAF/SE will:

2.3.1. Ensure mishap-reporting policies and procedures require an evaluation of system or end-item operational safety where system or end-item failures or deficiencies or failure to follow operational safety, suitability, and effectiveness processes are found to have contributed to the mishap.

2.3.2. Ensure that appropriate ORM and System Safety policies and procedures are available for use in the acquisition process and for all systems and end-items.

2.3.3. Ensure that mishap investigation information and recommendations are provided to the responsible Single Manager for a system or end-item involved in a mishap.

2.3.4. Identify and communicate system and end-item safety hazards, risks, and recommendations to Single Managers and using commands for their assessment and action.

2.4. HQ USAF/TE. HQ USAF/TE will ensure test and evaluation directives and documentation support evaluating systems and end-items for operational safety, suitability, and effectiveness throughout the operational life.

2.5. HQ USAF/XO. HQ USAF/XO will:

2.5.1. Ensure that operation and training directives require users to preserve the operational safety, suitability, and effectiveness baselined characteristics of the systems and end-items. These directives will also require that the users report any significant changes in planned operational usage or environment and degradation of baselined characteristics to the responsible system or end-item technical authority.

2.5.2. Ensure Operational Requirements Documents are prepared in accordance with appropriate guidance to support development of safety, suitability, and effectiveness requirements.

2.5.3. Ensure that operational training policy supports operational safety, suitability, and effectiveness.

2.5.4. Ensure that appropriate guidance directs that systems and end-items are operated in accordance with approved TOs and technical data.

2.6. Program Executive Officers (PEOs) and Designated Acquisition Com manders (DACs). PEOs and DACs will employ milestone decision processes, in conjunction with the operational commands, to ensure the evolutionary development of operational safety, suitability, and effectiveness baselines for systems and end-items in their portfolios.

2.7. Air Force Materiel Command (AFMC). AFMC will:

2.7.1. Provide policy to AFMC Centers that assures the preservation of baselined characteristics for all systems and end-items delivered to the user.

2.7.2. Establish processes and technical standards for assuring the preservation of baselined characteristics of systems and end-items. These processes and standards will be tailored to the four Air Force product lines and be reflected in AFMC policy and guidance.

2.7.3. Require the consistent application of a disciplined engineering process for the management of systems and end-items (as described in paragraph **1.1.**.).

2.7.4. Provide AF/IL and AF/SE with the data system requirements necessary to support Single Manager visibility into fielded system performance.

2.7.5. Assign responsibility for operational safety, suitability, and effectiveness preservation to the appropriate Single Manager for all systems and end-items delivered to the user.

2.7.6. Assign responsibility to the appropriate Single Manager for ATDs, ACTDs, experimental leave behind systems, and end-items left with the user.

2.7.7. Provide AF/IL with a current listing of responsible organizations for AFMC managed systems and end-items.

2.7.8. Support environment, safety, and occupational health risk assessments across the operational life of weapon systems and end-items, including during establishment of baseline characteristics.

2.8. Single Managers. Single Managers will:

2.8.1. In conjunction with the operating commands and other Air Force users, determine, document, track, and maintain positive control of baselines for operational safety, suitability, and effectiveness.

2.8.2. Use a disciplined engineering process (as described in paragraph **1.1.**.), including development of inspections and maintenance procedures, throughout the operational life of the systems and end-items that they manage.

2.8.3. Establish and define relationships with other managers that support or provide an interface with the systems or end-items that they manage.

2.8.4. Accomplish the appropriate level of verification to ensure all validated baseline requirements are met and to enable the continuing operational safety, suitability, and effectiveness throughout the operational life of the systems and end-items that they manage.

2.8.5. Use fielded performance data from Air Force maintenance, deficiency reporting, and mishap reporting systems to continuously evaluate system and end-item performance.

2.8.6. Provide selection criteria and recommendations to the selection authority for maintenance, supply, and repair sources when they are not the selection authority. Select and qualify sources when they are the selection authority.

2.8.7. Accomplish or obtain all required certifications supporting operational safety, suitability, and effectiveness prior to system or end-item operational use.

2.8.8. Provide an evaluation of potential TOC impacts to changes in operational use, configuration, maintenance procedures, or part substitutions.

2.8.9. Track and take appropriate action on mishap recommendations involving a managed system or end-item to ensure operational safety, suitability, and effectiveness.

2.9. Operating Commands and Other Air Force Users. Operating Commands and other Air Force users will:

2.9.1. Ensure that any new operational change to a system or end-item is coordinated with the Single Manager responsible for the operational safety, suitability, and effectiveness of that system or end-item.

2.9.2. Ensure that any new or modified configurations or maintenance conditions are coordinated with, and approved by, the Single Manager responsible for the operational safety, suitability, and effectiveness of the systems and end-items prior to implementation.

2.9.3. Report any degradation of baselined characteristics to the responsible Single Manager.

2.9.4. For all systems and end-items they manage, the Operating Commands will:

2.9.4.1. Provide policy and guidance to subordinate units that assures the preservation of baselined characteristics.

2.9.4.2. Establish processes and technical standards for assuring the preservation of baselined characteristics.

2.9.4.3. Require the consistent application of a disciplined engineering process (as described in paragraph **1.1.**.).

2.9.4.4. Provide AF/IL and AF/SE with the data system requirements necessary to support visibility into fielded system performance.

2.9.4.5. Assign responsibility for operational safety, suitability, and effectiveness preservation to the appropriate management organization.

2.9.4.6. Provide AF/IL with a current listing of responsible organizations for those managed systems and end-items.

2.9.4.7. Support environment, safety, and occupational health risk assessments across the operational life of those managed weapon systems and end-items, including during establishment of baseline characteristics.

2.9.4.8. Track and take appropriate action on mishap recommendations involving a managed system or end-item to ensure operational safety, suitability, and effectiveness.

2.9.5. Ensure that any operation and maintenance training they provide supports the preservation of operational safety, suitability, and effectiveness.

2.10. Commander's Prerogative on Mission Capability. This guidance does not infringe on the Major Command Commander's prerogative to operate less than fully mission capable systems.

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Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFI 10-301, *Responsibilities of Air Reserve Component (ARC) Forces*

AFI 10-601, *Mission Needs and Operational Requirements Guidance and Procedures*

AFI 10-602, *Determining Mission Capability and Supportability Requirements*

AFI 10-703, *Electronic Warfare Integrated Reprogramming*

AFI 10-705, *Command and Control Warfare Procedures*

AFI 10-706, *Electronic Warfare (EW)*

AFI 11-1201, *Space Operations*

AFI 11-215, *Flight Manuals Program (FMP)*

AFI 21-101, *Maintenance Management of Aircraft*

AFI 21-104, *Selective Management of Selected Gas Turbine Engines*

AFI 21-105, *Aerospace Equipment Structural Maintenance*

AFI 21-107, *Maintaining Commercial Derivative Aircraft*

AFJI 21-301, *Interservicing of Technical Manuals and Related Technology*

AFI 21-403, *Acquiring Engineering Data*

AFI 31-702, *Systems Security Engineering*

AFI 31-703, *Product Security*

AFI 33-102, *Command, Control, Communications, Computers, and Intelligence (C4I) Capabilities Planning Process*

AFI 33-103, *Requirements Development and Processing*

AFI 33-108, *Compatibility, Interoperability, and Integration of Command, Control, Communications, and Computer (C4) Systems*

AFI 36-2232, *Maintenance Training*

AFMAN 37-139, *Records Disposition Schedule*

AFI 40-201, *Managing Radioactive Materials in the USAF*

AFI 62-201, *System Survivability*

AFI 63-101, *Acquisition System*

AFMCP 63-101, *Risk Management*

AFI 63-104, *The SEEK EAGLE Program*

AFM 63-119, *Certification of System Readiness for Dedicated Operational Test and Evaluation*

AFI 63-124, *Performance-Based Service Contracts (PBSC)*

AFI 63-201, *Automatic Test Systems and Equipment Acquisition*

AFI 63-501, *Air Force Acquisition Quality Program*

AFI 63-1001, *Aircraft Structural Integrity Program*

AFI 65-601V1, *Budget Guidance and Procedures*

AFI 90-901, *Operational Risk Management*

AFPAM 90-902, *Operational Risk Management (ORM) Guidelines and Tools*

AFI 91-101, *Air Force Nuclear Weapons Surety Program*

AFI 91-102, *Nuclear Weapon System Safety Studies, Operational Safety Reviews, and Safety Rules*

AFI 91-103, *Air Force Nuclear Safety Certification Program*

AFI 91-104, *Nuclear Surety Tamper Control and Detection Programs*

AFI 91-105, *Critical Components*

AFI 91-106, *Unauthorized Launch and Launch Action Studies*

AFI 91-107, *Design, Evaluation, Troubleshooting, and Maintenance Criteria for Nuclear Weapon Systems*

AFI 91-110, *Nuclear Safety Review and Launch Approval for Space or Missile Use of Radioactive Material and Nuclear Systems*

AFMAN 91-118, *Safety Design and Evaluation Criteria for Nuclear Weapon Systems*

AFI 91-202, *The US Air Force Mishap Prevention Program*

AFI 91-204, *Safety Investigations and Reports*

AFI 91-205, *Nonnuclear Munitions Safety Board*

AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program*

AFI 99-101, *Developmental Test and Evaluation*

AFI 99-102, *Operational Test and Evaluation*

AFMAN 99-104, *Armament/Munitions Test Process--Direction and Methodology for Testing*

AFI 99-105, *Live Fire Test and Evaluation*

AFI 99-106, *Joint Test and Evaluation*

AFMAN 99-110, *Airframe-Propulsion-Avionics Test and Evaluation Process Manual*

AFMAN 99-111, *Command, Control, Communications, Computers and Intelligence (C4I) Test and Evaluation Process*

AFMAN 99-112, *Electronic Warfare Test and Evaluation Process--Direction and Methodology for EW Training*

AFMAN 99-113, *Space Systems Test and Evaluation Process Direction and Methodology for Space System Testing*

AFI 99-151, *Air-Launched Missile Analysis Group (ALMAG)*

Military Standard 882D, *Standard Practice for System Safety*

Technical Order 00-35D-34, *USAF Deficiency Reporting and Investigation System*

Abbreviations and Acronyms

ACTD—Advanced Concept Technology Demonstration

AFMC—Air Force Materiel Command

ATD—Advanced Technology Demonstration

DAC—Designated Acquisition Commander

ORM—Operational Risk Management

PDO—Publishing Distribution Office

PEO—Program Executive Officer

TO—Technical Orders

TOC—Total Ownership Cost

TSPR—Total System Performance Responsibility

Terms

Air Force Product Lines—In response to the FY98 National Defense Authorization Act, the Air Force has defined its Research, Development, Testing, and Evaluation infrastructure around four product lines that support core Air Force competencies. The product lines are Air (e.g., Unmanned Air Vehicles), Air Armament (e.g., Directed Energy), Command and Control (e.g., Global Grid), and Space & Missile (e.g., Intercontinental Ballistic Missiles).

Assurance—A planned and systematic pattern of actions necessary to provide confidence that expected performance is achieved.

Baseline—A description of the operational safety, suitability, and effectiveness characteristics and limitations of any system or end-item that must be understood, acknowledged and maintained during operational deployment, use, experimentation, exercises, training, and maintenance of the system or end-item. [The operational safety, suitability, and effectiveness baseline is established in development and updated as changes (threat, operational usage, aging, etc.) and improvements are made to the system or end-item. The operational safety, suitability, and effectiveness baseline may include the configuration baseline (specifications, drawings, and software code listings), Mission Need Statements, Operational Requirements Documents, TOs, Time Compliance Technical Orders, certifications, training, maintenance facilities, spare parts, threat scenarios, etc.]

End-Item—Equipment that can be used by itself to perform a military function.

Experimental Leave-Behind—The systems, capabilities, or functions turned over to the user and sustained shortly after the completion of an operational experiment or exercise. The concept of

Experimental Leave-Behind is similar to the sustainable operational capability that exists at the conclusion of an ACTD.

Force Protection—Passive, Active, and Offensive measures taken to prevent or mitigate successful hostile actions against Air Force people and resources while not directly engaged with the enemy.

Full-Dimension Protection—A combination of Information Assurance and Force Protection measures used throughout a system's life cycle to ensure mission capability.

Information Assurance—Information operations that protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and non-repudiation. This includes providing for restoration of information systems by incorporating protection, detection, and reaction capabilities.

Operational Effectiveness—The overall degree of mission accomplishment of a system or end-item used by representative personnel in the environment planned or expected (e.g., natural, electronic, threat) for operational employment of the system or end-item considering organization, doctrine, tactics, information assurance, force protection, survivability, vulnerability, and threat (including countermeasures; initial nuclear weapons effects; and nuclear, biological, and chemical contamination threats). (AFI 99-102)

Operational Risk Management (ORM)—The systematic process of identifying hazards, assessing risk, analyzing risk control options and measures, making control decisions, implementing control decisions, accepting residual risks, and supervising and reviewing the activity for effectiveness of the implemented controls. The application of ORM in the acquisition and sustainment of systems and end-items includes System Safety. (AFPAM 90-902)

Operational Safety—The condition of having acceptable risk to life, health, property, and environment caused by a system or end-item when employing that system or end-item in an operational environment. This requires the identification of hazards, assessment of risk, determination of mitigating measures, and acceptance of residual risk.

Operational Suitability—The degree to which a system or end-item can be placed satisfactorily in field use, with consideration given to availability, compatibility, transportability, interoperability, reliability, wartime use rates, maintainability, full-dimension protection, operational safety, human factors, architectural and infrastructure compliance, manpower supportability, logistics supportability, natural environmental effects and impacts, and documentation and training requirements. (AFI 99-102)

Single Manager—The single individual specifically designated, under the integrated weapon system management architecture, to be responsible for the life cycle management of a system or end-item. The Single Manager is the program manager vested with full authority, responsibility, and resources to execute and support an approved Air Force program.

System—A specific grouping of subsystems, components, or elements designed and integrated to perform a military function.

System Safety—The application of engineering and management principles, criteria, and techniques to achieve acceptable mishap risk, within the constraints of operational effectiveness and suitability, time, and cost, throughout all phases of the system life cycle. (Military Standard 882D)

Total Ownership Cost (TOC)—Total ownership cost includes all costs associated with the fielding, operation, sustainment, and disposition of a discernible system, end-item, or sub-system. Costs include,

overhead, material, personnel, training, equipment, environmental, safety, occupational health, construction and capital investment.