U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
AVS Policy

ORDER
VS
8000.1

Effective Date:
08/11/2006

SUBJ: SAFETY MANAGEMENT SYSTEM DOCTRINE

SECTION 1. INTRODUCTION

1-1. PURPOSE. This order**—**

a. Provides a doctrine for Federal Aviation Administration (FAA) Aviation Safety (AVS) services/offices to implement a common AVS Safety Management System (AVSSMS). Specifically, this order—

(1) Furthers the practice of managing safety by moving to a more process-oriented system safety approach that stresses not only promulgation and application of technical standards but an increased emphasis on the management systems that ensure risk management and safety assurance.

(2) Sets forth basic management principles to guide AVS services/offices in their safety management and safety oversight activities, requiring them to adopt a common approach to implementing an integrated AVSSMS, including safety culture and other attributes of the AVSSMS as applicable.

(3) Requires each AVS service/office to develop and implement a plan for its functions under the AVSSMS, including, where appropriate, the structure of its safety oversight relationship with the segment of industry for which it holds safety oversight responsibility. Each service/office should provide safety management system (SMS) guidance to its regulated entities, where appropriate.

(4) Requires each AVS service/office to regularly report on its AVSSMS implementation progress, including performance measures.

b. Explains the AVSSMS principles and requirements.

c. Establishes an AVS Integrated Safety Council (ISC). The ISC will—

(1) Develop an AVS-level AVSSMS implementation plan.

(2) Publish AVS safety management and safety oversight management standards. These AVS standards will be the basis for SMS guidance and advisory material provided to industry.

d. Standardizes terminology for the AVSSMS. See Appendix 1 for a list of key terms and a glossary.

1-2. DISTRIBUTION. This order is distributed to all AVS managers and supervisors.

1-3. WHOM THIS ORDER AFFECTS.

a. This order affects all AVS services/offices but will have a more significant impact on those that currently have regulatory and safety oversight responsibilities for producers of aviation products and/or services.

b. This order refers to individuals and entities over which AVS has safety oversight jurisdiction as aviation product/service providers. Entities that provide products and services include manufacturers, operators, maintainers, educators, providers of air traffic services, and others. Entities may be organizations or individuals. For purposes of this order, the only FAA organization considered to be an aviation product/service provider is the Air Traffic Organization (ATO).

1-4. AUTHORITY TO CHANGE THIS ORDER. The Associate Administrator for Aviation Safety (AVS-1) has authority to issue revisions to this order.

1-5. INFORMATION CURRENCY. Forward any deficiencies found, clarifications needed, or suggested improvements regarding the content of this order to the Office of Quality, Integration and Executive Services, AQS, Quality, Integration and Process Division, AQS-100, 800 Independence Avenue SW., Washington, DC 20591 for consideration. Your suggestions are welcome. FAA Form 1320-19, Directive Feedback Information, is located on the last page of this order for your convenience. If an interpretation is urgently needed, you may contact AQS-100 at 202-267-9612, but you should also submit Form 1320-19 to document the conversation.

SECTION 2. BACKGROUND AND SUPPORTING REQUIREMENTS

2-1. STATUTORY BASIS.

a. The AVSSMS doctrine is derived in part from the statutory authority in Title 49 of the United States Code (49 U.S.C.) and Title 14 of the Code of Federal Regulations (14 CFR). Section 40101(d) of 49 U.S.C. establishes safety considerations in the public interest and states in pertinent part that the Administrator shall consider the following matters, among others, as being in the public interest:

(1) Assigning, maintaining, and enhancing safety and security as the highest priorities in air commerce.

(2) Regulating air commerce in a way that best promotes safety and fulfills national defense requirements.

(3) Encouraging and developing civil aeronautics, including new aviation technology.

(4) Controlling the use of the navigable airspace and regulating civil and military operations in that airspace in the interest of the safety and efficiency of both of those operations.

(5) Consolidating research and development for air navigation facilities and the installation and operation of those facilities.

(6) Developing and operating a common system of air traffic control and navigation for military and civil aircraft.

b. Title 49 U.S.C. chapter 447 of subpart III, part A, subtitle VII, prescribes the authority and powers of the FAA concerning safety regulation, including the issuance of air carrier and airman certificates, type certificates, production certificates, airworthiness certificates, and airport certificates. This chapter also prescribes the authority of the FAA to examine, investigate, and rate air agencies and air navigation facilities. In the case of air carriers, the statute is explicit on their responsibility for safety. Section 44702 of 49 U.S.C. states that the FAA Administrator, when issuing a certificate, shall consider the duty of an air carrier to provide service with the highest possible degree of safety in the public interest.

c. This doctrine also is based on FAA policy contained in FAA Order 1000.1A, Policy Statement of the FAA that states, in part, that “It is the statutory responsibility, and primary mission, of the Federal Aviation Administration to promote safety and to provide for the safe use of airspace.”

2-2. AVS RESPONSIBILITIES AND THE BASIS FOR CHANGE.

a. Historical AVS safety methodologies focused on end product inspections and design features during certification, and lacked systematic and measurable processes to address gaps in and between design and operations. This approach tended to create the perception that the AVS safety organization was accepting responsibility for quality control or quality assurance, functions that by law are the responsibility of the aviation product/service provider.

b. The FAA has been establishing system safety as the basis for its safety oversight of the air transportation system for more than a decade.[1] A partial list of action taken includes the following:

(1) In 1994, the FAA established a new FAA organizational structure to make it more efficient, effective, and businesslike and to make better use of resources. This organization included an Office of the Assistant Administrator for System Safety (ASY). In 2005, ASY was abolished and its functions were transferred to AVS.

(2) FAA Order 8040.4, Safety Risk Management (June 26, 1998), establishes safety risk management policy and prescribes procedures for implementing safety risk management as a decisionmaking tool in the FAA. The primary responsibility for this order transitioned to AVS in April 2005.

(3) The Aircraft Certification Systems Evaluation Program is a vital element within the FAA mission of continued operational safety. This program uses a team of FAA engineering, flight test, and manufacturing inspection personnel to evaluate control of FAA-approved type design after initial FAA approval at production approval holders (PAH) and associated facilities. The program is one tool to determine whether PAHs are meeting the applicable requirements of 14 CFR, and complying with the procedures established to meet those requirements. The program is dynamic and contains provisions for continuous improvement.

(4) The Air Transportation Oversight System (ATOS) surveillance process was implemented in October 1998 for safety oversight of selected air carriers. ATOS assesses the safety of air carrier's system safety principles, safety attributes, risk management, and structured system engineering practices.

(5) In 2000, the FAA initiated the System Approach for Safety Oversight (SASO) program as a means to bring all AFS business in line with the system safety approach, based on the concepts and progress made in the ATOS program.

(6) The FAA System Safety Handbook (December 30, 2000) provides guidance to program offices on how to set up and implement a safety risk management process to comply with Order 8040.4.

(7) The National Airspace System (NAS) Modernization System Safety Management Program (SSMP) (December 2004) defines the scope, purpose, objectives, and planned activities of the FAA system safety effort as it applies to the safety management for all systems providing air traffic control and navigation services in the NAS as well as the acquisition of systems in support of NAS modernization.

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[1] Air transportation system refers to the entirety of the aviation system, including the FAA; entities that design, manufacture, or operate aircraft or components of aircraft; training entities; people; infrastructure; and other systems and subsystems.

c. The AVSSMS will enable AVS to adapt to changes and continuously improve safety in the air transportation system through an integrated, data-driven approach based on risk management in a system safety framework. The AVSSMS will allow AVS to address the highest risk concerns through a system of risk controls integrated across all AVS functions, with an efficient application of FAA resources. This approach will permit the leveraging of resources through risk management and will focus on safety oversight of systems and processes rather than the traditional direct inspection of components, products, and services

d. The responsibility for the safety of aviation products and services rests with the aviation product/service provider. The AVS responsibility is to set forth the safety regulations and system requirements for aviation product/service providers to follow. In many cases, the system may be a formal SMS. While AVS will promote and, in some cases, require formal SMS, product/service providers are responsible for managing safety. AVS responsibilities include defining the requirements for those systems, applying risk-based lifecycle safety oversight, verifying that the safety systems of the aviation product/service provider meet design requirements and validating that they are being used and are effective, and maintaining support tools necessary to carry out AVS functions. These oversight responsibilities are accomplished at multiple levels.

e. AVS will allocate resources and conduct safety oversight using system safety principles. This approach recognizes that the statutory responsibility for safety rests with the aviation product/service provider. AVS establishes safety and SMS requirements and, using a variety of means such as audits, evaluations, and inspections, verifies the aviation product/service provider's safety systems are compliant with requirements and validate the implementation and effectiveness of those safety systems. In this way, FAA personnel[2] will be used more efficiently, and there will be a higher level of confidence that an aviation product/service provider will meet safety standards for each operation, whether the FAA is present or not.

f. The AVSSMS will enable the organization to respond to changing industry business models and growth, the air transportation system's increasing complexity, and the current and future challenging budget environment by allocating resources efficiently and effectively based on data-driven risk analysis and assessment. AVS will thus be able to provide the air transportation system and the public at large with—

(1) Enhanced safety;

(2) Better, innovative, more consistent, and more responsive service;

(3) Higher value; and

(4) World leadership in establishing aviation safety standards.

[2] The term personnel includes FAA employees and designees, or others who might act on behalf of the FAA administration.

2-3. SAFETY AND QUALITY.

a. AVS has implemented a quality management system (QMS) and specified that it meet the International Organization for Standardization (ISO) 9000 standard. Those principles govern all AVS activity and provide the foundation for the AVSSMS. Following the QMS structure ensures the AVSSMS will produce documented repeatable processes. AVS services/offices will implement the AVSSMS on the foundation of the quality system in place throughout AVS.

b. Safety, like quality, is an emergent property of a system that is sometimes difficult to define, unlike more tangible characteristics like profit, costs, or products produced. It cannot be touched or seen and, therefore, cannot be directly managed. Quality also is a less tangible property. Rather than being an absolute, objective measure of "goodness," quality is relative to the requirements that are set for it. What may be "excellent quality" in one set of circumstances may be completely unacceptable in another. Therefore, if "high quality" is defined in terms of process or product characteristics that enhance safety, then safety and quality are congruent. However, if quality is defined in terms that do not promote safety (or, in some cases, may even be counter to safety, for example, capacity or efficiency) then they may be in conflict. The relationship between quality and safety, therefore, is very dependent on how the system's requirements are set.

c. It follows that safety management and quality management are complementary and must therefore work together to achieve the overall safety goals of AVS. Aviation can never be entirely risk free. We must reduce risk to at least the acceptable level; as a secondary goal, we should reduce risk to as low as reasonably practicable, as long as it meets that first criteria. The primary requirement for an SMS is to establish a management system that has the necessary processes and procedures in place such that operational safety is maintained at an acceptable level (safety management) and specified operational results are consistently achieved (quality management).

2-4. EVOLVING STANDARDS AND CONCEPT FOR SAFETY MANAGEMENT. Standards and concepts related to aviation safety management and safety management systems are evolving on an international level, at a U.S. national level and within the FAA. To the extent practical, this doctrine and the standards and principals that evolve from it within the AVS organization will be aligned with those national and international standards and concepts.

a. Joint Planning and Development Office (JPDO). Vision 100—Century of Aviation Reauthorization Act (Public Law 108–176) created the JPDO to manage the work related to the development of the Next Generation Air Transportation System (NGATS), a vision of air transportation in 2025. Basic tenets described in the NGATS Integrated Plan include the following:

(1) Ensuring the future air transportation system will remain the world's safest form of transportation requires a new safety approach.

(2) Regulatory authorities must change their role from testing, inspecting, and certifying individual elements to approval and audits of the safety management of aviation product/service providers.

(3) Safety needs to be embedded in all products, policies, or technologies. A comprehensive safety management doctrine will create high-level standards and procedures for safety programs of aviation product/service providers and those that provide the associated safety oversight.

(4) Standards cannot be put in place without a data analysis capability to identify and resolve accident precursors.

b. International Civil Aviation Organization (ICAO).

(1) ICAO has proposed a standard for member States that includes the requirement for a State to have a safety program to achieve an acceptable level safety in the operation of aircraft. The acceptable level of safety is to be defined by each State. In the United States, the acceptable level of safety varies depending on the type of aviation product/service provider involved.

(2) One element of the ICAO program as it relates to Annex 11 (Air Traffic Services), Annex 14, Volume I (Airport Design and Operations), and potentially to Annex 6, Part I (International Commercial Air Transport—Airplanes) and Part III (International Operations—Helicopters), is for a State to require product/service providers to implement an SMS. Such an SMS is to be approved by the State.

c. AVS. This document establishes the internal SMS standard for AVS. The AVSSMS governs AVS internal procedures for regulation and safety oversight from the design of those procedures through their execution. The AVSSMS will be based on a risk management approach that ensures an acceptable level of safety throughout the air transportation system while striving for the most effective safety oversight consistent with AVS discretionary authority, resources, and other practical constraints. AVS will also develop safety management standards and guidance for the producers of aviation products/services.

2-5. SMS PRINCIPLES.

a. The AVSSMS incorporates the essential elements of any SMS — be it a producer's SMS or the SMS of the regulator responsible for safety oversight. These essential elements, or pillars, provide for a systematic approach to achieving acceptable levels of safety risk. This section discusses these pillars and the roles, responsibilities, and relationships within the air transportation system.

b. The four pillars of an SMS are—

(1) Safety Policy. The safety policy—

(a) Sets out what the organization is trying to achieve through its SMS.

(b) Outlines the methods and processes the organization will use to achieve the desired safety outcomes.

(c) Establishes senior management's commitment and expectation that the organization will incorporate and continually improve safety in all aspects of the business and business processes. The safety policy further establishes senior management's expectation of high safety performance.

(d) Reflects management's commitment to implementing procedures and processes for establishing and meeting safety objectives that are measurable and attainable, and support promotion of a safety culture.

(2) Safety Risk Management.

(a) Safety risk management is used to assess system design and verify that it adequately controls risk; safety risk management is integrated into applicable processes. Validation of system performance and effectiveness of implemented risk controls and risk management strategies occurs under the safety assurance pillar, discussed below. A formal safety risk management process—

1. Describes the system of interest.

2. Identifies the hazards.

3. Analyzes the risk.

4. Assesses the risk.

5. Controls the risk.

(b) Safety risk management provides for initial identification of hazards and the analysis and assessment of risk. Appropriate risk controls or other risk management responses are developed and are employed operationally.

(c) AVS provides risk controls through activities such as the promulgation of regulations, standards, orders, directives, and policies.

(3) Safety Assurance.

(a) The safety assurance process continually assesses activity to identify new hazards and to ensure risk controls achieve their intended objectives throughout the system life cycle. New hazards may be those not identified during the SRM process or those introduced by the risk controls. This includes assessment of the need for new risk controls or to eliminate or modify risk controls that are ineffective or are no longer needed due to changes in the operational environment. Every SMS includes a process for continuously monitoring systems of interest to identify new hazards or the need to change risk controls or other risk management responses. These monitoring activities apply to an SMS whether the operations are accomplished internally or outsourced.

(b) The safety assurance processes include—

1. Information acquisition.

2. Analysis.

3. System assessment.

4. Development of preventive/corrective action for nonconformance.

(4) Safety Promotion.

(a) Safety promotion includes the actions taken to create an environment where safety objectives can be achieved. The key objective is a positive safety culture, characterized by an adequate

knowledge base, competency, tools, communications, training, and information sharing. All levels of management will actively promote, and provide the leadership to ensure a positive safety culture.

(b) A safety culture is the product of individual and group values, attitudes, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's safety programs. In the desired safety culture, people acknowledge their accountability and act on their individual responsibility for safety. They trust and rely on the organization's processes for managing safety. The environment is characterized by good communication between management and personnel, and people continue to learn and develop through training and coaching.

(c) Attributes of a positive safety culture are—

1. Competent personnel who understand hazards and associated safety risk, are properly trained, have the skill and experience to work safely, and ensure safe products/services are produced.

2. Individual opinion is valued within the organization and personnel are encouraged to identify threats to safety and to seek the changes necessary to overcome them. An environment where people are encouraged to develop and apply their skill and knowledge to enhance safety.

3. Effective communications, including a non-punitive environment for reporting safety concerns.

4. A just culture that recognizes where disciplinary action may be warranted and there is a commonly understood difference between acceptable and unacceptable actions.

5. Adequate resources to support the commitment to safety.

6. A process for sharing safety information to develop and apply lessons learned with regard to hazard identification, safety risk analysis and assessment, safety risk controls, and other safety risk management responses. Sharing of information related to corrective actions, and results of management reviews is encouraged.

7. Safety is a core value of the organization that endures over time, even in the face of significant personnel changes at any level.

8. Willingness to recognize when basic assumptions should be challenged and changes are warranted – an adaptive and agile organization.

2-6. ROLES, RESPONSIBILITIES, AND RELATIONSHIPS.

a. As AVS adopts the four pillars of SMS, recognize that the roles, responsibilities, and relationships will vary depending on whether the AVSSMS is dealing with—

(1) The air transportation system;

(2) Organizational product and service providers; or

(3) Individuals who independently provide aviation services or operate in the air transportation system.

b. AVS implements safety management through safety oversight of aviation product/service providers, whether they are single-person operations or large organizations. AVS conducts analysis of the aviation system as a whole and promulgates regulations, standards, orders, and policies. These have been AVS's primary safety oversight tools for managing safety risk in the air transportation system. AVS also carries out safety oversight activities of certification and surveillance of aviation product/service providers, both individuals and organizations, to verify their compliance with regulations, standards, and policies, and ensure they fulfill their direct safety management responsibilities.

c. Aviation product/service providers are responsible for managing safety for their operations. They control resources and activities of people directly exposed to hazards and are in a position to directly control risk related to those hazards. They have responsibility for managing safety of their operations. Depending on the nature of the aviation product/service provider, the provider may manage safety by means of an SMS. The SMS constitutes a systematic method through which the aviation product/service provider directly manages the safety risk of its operation.

d. Under the AVSSMS, AVS will increasingly conduct its activities using data-driven risk management and system safety principles to better allocate AVS resources responsible for safety oversight of the air transportation system and its components. AVS safety risk management and safety assurance include processing and analyzing internally and externally developed data, identifying hazards and analyzing risk directly related to AVS safety oversight processes and actions, and internally and externally conducting audits of AVSSMS activities.

e. In determining the nature of the AVS relationship to the air transportation system and its components, AVS considers three basic levels of the system. These levels should not be viewed rigidly, but rather as a continuum intended to describe the system for purposes of determining how the AVSSMS interacts with and manages safety in the system in different ways. Each AVS service/office AVSSMS implementation plan must address how it will function throughout the three levels described here.

(1) National Air Transportation System Level.

(a) At the highest, collective level of the national air transportation system, AVS has responsibility for safety management. AVS may analyze the overall system as well as major segments such as the—

1. NAS, including the airport and air traffic management infrastructure and system;

2. Commercial aviation system, including air transport aircraft and engine manufacturers, air carriers, and maintenance organizations; and

3. General aviation system, including aircraft and engine manufacturers, operators, and maintenance organizations.

(b) At this level, AVS tracks hazards and develops a comprehensive view of trends, measuring high-level system design and performance. Safety risk management and safety assurance activities include analyzing AVS regulations, policies, and standards to determine the effectiveness of these key risk management and risk control tools.

(2) Organizational Level.

(a) In the middle level of the air transportation system, aviation product/service providers operate as organizations. These are primarily certificate holding corporate entities such as design or production approval holders, air carriers, maintenance organizations, and ATO, even though ATO does not hold a certificate.

(b) AVS interactions with the aviation product/service providers at this level are managed through certification and surveillance of technical personnel and, importantly, through interfaces at the organizational level with the product/service providers. The nature of AVS safety oversight may vary depending on the size, scope, and sophistication of the organization's safety risk management processes.

(c) At this level, aviation product/service providers are more likely to implement an SMS. If the aviation product/service provider has implemented an SMS, the AVS role is to ensure the SMS is comprehensive and functioning properly to enable the aviation product/service provider to appropriately manage its safety risk. AVS safety assurance is secondary to the aviation product/service provider's safety assurance. AVS field elements primarily implement the AVSSMS at this level, using design and performance assessments to verify the aviation product/service provider's SMS.

(d) As SMS matures in the industry, the AVSSMS will increasingly be able to leverage its safety risk management and safety assurance with each product/service provider SMS. Safety oversight increasingly will evolve from checking for basic regulatory compliance to more in-depth analysis of SMS performance, process design, and organizational safety attributes.

(e) This level of performance is primarily an aviation product/service provider responsibility. The FAA must verify that these SMS performance, process design, and organizational safety attributes are adequately accounted for, but the aviation product/service provider is responsible for fitting them into their business model and for demonstrating the adequacy of their designed-in risk management actions. AVS further stresses the development of auditing, analysis, and management systems to manage performance of safety risk controls. Both the design and performance assessment and verification functions should be incorporated into the aviation product/service provider's SMS. AVS processes are in place to provide safety oversight of the design and performance of the aviation product/service provider's SMS.

(f) The AVSSMS and the aviation product/service provider's SMS share objectives and perhaps even tools and activities, but the responsibilities of the aviation product/service provider and the aviation authority (safety oversight) remain distinct. The aviation product/service providers have the legal and functional primary responsibility for safety management in their activities. AVS's job as regulator is not specifically to ensure a safe product or service but to determine the capability of the producer organization to ensure a safe product or service.

(3) Individual Level.

(a) The most basic level of the air transportation industry comprises the individual participants and aircraft that are certificated, authorized, or otherwise directly controlled through the AVS safety oversight process.

(b) In many cases, such as general aviation, these individuals' primary interface with AVS is through such AVS functions as certification, surveillance, or safety promotion. Such individuals are responsible for their primary safety risk management, although it may be informal and minimally documented. As individual operators, they do not participate in a comprehensive SMS unless it is through an organization in the air transportation system's middle level. The AVS role is primarily one of safety oversight of performance and safety promotion rather than design and implementation of systems.

f. AVS conducts safety risk management throughout the levels of the air transportation system for the purpose of managing safety at the high level, where AVS implements risk management strategies of regulations, standards, and policy. At no point is AVS responsible for primary safety quality assurance or for performing safety risk management for an individual or organizational aviation product/service provider.

SECTION 3. APPLICATION AND EXECUTION

3-1. INTEGRATION OF THE AVSSMS. The AVSSMS must be implemented in a fully integrated manner. The implementation of the AVSSMS will result in an integrated approach for each service/office conducting regulatory and safety oversight, integration of regulatory and safety oversight functions at the AVS level, and increased efficiency and elimination of duplication of efforts within the services/offices. Although some AVS organizational elements have more direct involvement in safety oversight than others, all must understand and operate consistent with the principles and requirements in this order. The AVS overall objective is to conduct safety oversight in a consistent and efficient manner, sharing information and minimizing duplication. We will do this in a manner consistent with system safety principles and concepts and will serve as a model for international, national, and agency policy. This paragraph describes the scope and characteristics of such integration and provides guidance on how all AVS organizational elements should approach the integration process.

a. Basic Requirement and Purpose.

(1) The AVSSMS will be an integrated system, with integration accomplished across AVS services/offices as well as from the headquarters levels through regional levels to every field office and AVS personnel. Integration must be accomplished across the organizational elements of AVS to ensure safety management throughout a product or service life cycle and in all areas of the aviation system, including—

(a) Design of aircraft and components.

(b) Manufacturer of aircraft and components.

(c) Operation of aircraft.

(d) Maintenance of aircraft and components.

(e) Management of air traffic.

(f) Training and qualification of personnel.

(g) Maintenance of the aviation system infrastructure.

(h) Promulgation of standards through regulation and guidance materials.

(2) Integration must provide for analysis of the entire air transportation system, major segments of that system such as commercial aviation and general aviation, as well as the continued focus on a given operator, manufacturer, or individual certificate holder. Regulations, being the principal high-level tool for risk management, will be based more on comprehensive analysis of the entire air transportation system and the associated risk.

(3) Throughout AVS, there must be—

(a) A common definition and understanding of risk.

(b) A consistent process for analyzing and assessing risk associated with a hazard.

(c) Common risk management techniques.

(d) Consistent safety assurance procedures.

(e) A common approach to establishing acceptable levels of risk.

b. Methodology.

(1) Integration will be achieved through unified goals, strategies, and outcomes. The goals of AVS services/offices must support the goals of AVS as a whole. Strategies to achieve those goals must address risk management in a coordinated fashion, and the common desired outcome of managing risk to an acceptable level must remain the focus for all AVS organizational elements and individuals.

(2) Integration will be accomplished by—

(a) Establishing a strong and continuously improving safety culture.

(b) Continuously verifying we have consistent and compatible values, norms, and assumptions.

(c) Identifying the knowledge, skills, and abilities needed by our personnel to support the AVSSMS.

(d) Developing and providing the training at all levels needed to understand and implement the doctrine contained in this order.

(e) Maintaining an effective communication process at all levels and between levels. Our goals, strategies, and desired outcomes must be understood at all levels of the AVS organization. All AVS personnel work activities, from headquarters to the field levels, administrative to technical, are integral to the continued success of AVS safety oversight responsibilities.

(f) Ensuring there is a functioning process for obtaining the maximum benefit from lessons learned as they relate to the operation of the AVSSMS.

c. Information Sharing.

(1) Essential to the success of the AVSSMS is a support system for information collection, analysis, and sharing. We must be able to identify and communicate common or related hazards, as well as ideas for managing the associated risk to acceptable levels. The AVSSMS will have at the air transportation systems level a common hazard tracking system, accessible to all AVS personnel. We must identify common elements of safety oversight standards, procedures, and analysis and avoid duplication. We must avoid overlapping or redundant data collection or inspection processes to minimize the adverse impact on aviation product/service providers and to optimize the use of FAA resources.

(2) A key aspect of this information sharing is to continue integrating AVS information technologies systems so that data and information flows vertically and horizontally, enabling headquarters-level policymakers, decisionmakers, regional offices, and field offices of the various services/offices to adopt a uniform approach based on a complete picture.

(3) Decisionmaking processes must consider the potential impact on all other AVS services/offices. The SMS architecture must be clearly defined and it must identify integration points between our organizational elements and others. We must ensure our processes have built in the requirement to consider the need to share information or seek participation.

3-2. IMPLEMENTATION. Each of the services/offices from the headquarters level down to each of the field offices and to each AVS personnel will implement this doctrine, using the guidelines delineated above and the definitions found in Appendix 1.

a. ISC. This order establishes the ISC to coordinate AVSSMS implementation, eliminate duplication, and provide a forum for safety issues that cross Service and/or Office boundaries, ensuring AVS collects the right information on a timely basis, to permit comprehensive safety analysis across the air transportation system. The ISC will develop and publish AVSSMS standards and other requirements.

(1) Purpose. The ISC will perform three basic functions:

(a) Develop an implementation plan for the AVSSMS at the AVS level, establishing objectives and milestones for implementing the concepts described in this order.

(b) Ensure implementation of the AVSSMS is coordinated and accomplished in a timely manner throughout the individual services/offices.

(c) Conduct AVS audits and evaluations.

(2) Membership. Membership on the ISC will consist of the following:

(a) The Director or Deputy Director, Office of Quality, Integration, and Executive Services (AQS-1 or AQS-2) to act as chair.

(b) AVS Special Assistant (AVS-4).

(c) A manager directly reporting to the service/office director from each of the following organizations:

1. Air Traffic Safety Oversight Service.

2. Aircraft Certification Service.

3. Flight Standards Service.

4. Office of Accident Investigation.

5. Office of Aerospace Medicine.

6. Office of Rulemaking.

7. Suspected Unapproved Parts Program Office.

(d) Required staff support provided by services/offices to conduct research and develop draft documents, or to accomplish other tasks as directed by the ISC.

(3) Meetings. The ISC will form and have its initial meeting before the end of fiscal year 2006. Thereafter, it will meet at least monthly to verify coordination of the individual plans, minimize overlap, and facilitate sharing of information and techniques. The ISC will prepare a summary report of these meetings that emphasizes the status of plan development and implementation, and identifies any significant problems that would preclude meeting the objectives expressed in the order or schedules found in the individual plans.

(4) Reporting. The ISC will report to the AVS management team as needed, but not less than quarterly.

(5) AVS Forum. The ISC will serve as an AVS forum for discussion of internal SMS issues such as personnel training and qualifications, lessons learned, and safety concerns.

(6) Subcommittees and Work Groups. The ISC may, as necessary, form subcommittees and work groups to accomplish SMS implementation projects by requesting personnel and resources from the services/offices.

b. Implementation Plans.

(1) Each service/office will implement this doctrine using the guideline and principles in this order. Each will develop and document an implementation plan for the AVSSMS. Individual plans must be consistent with, and not duplicate other AVS plans. These plans will address how each AVS service/office will meet the criteria discussed below, including performance measurements in developing and achieving its safety management goals. Each plan must be coordinated with other plans throughout the development process and must include a consistent integrated method for measuring the performance and effectiveness of the AVSSMS. Each plan must also show how the SMS will incorporate or otherwise account for existing safety programs, related orders, and advisory material. In particular, it must be consistent with and use the AVS QMS in fulfillment of the AVS safety management doctrine.

(2) In addition, each plan must address the following:

(a) Program schedule.

(b) Change management, including leadership actions describing the transformation of the service/office to enable operation of the AVSSMS.

(c) Clearly defined responsibility and authority for implementation and integration of the AVSSMS into the service/office business functions.

(d) Overall goals, strategies and objectives for managing safety.

(e) Identification of internal and external stakeholders.

(f) Resources to fully implement the AVSSMS including the principles (pillars) of the AVSSMS.

1. Safety policy.

2. Safety risk management.

3. Safety assurance (both of the AVSSMS and product/service provider SMS).

4. Safety promotion.

(g) Establishment of an acceptable level of risk in the system of interest.

(h) Acquisition and analysis of data to make risk-based safety risk management decisions.

(i) Identification of critical process steps and development of internal controls for those critical process steps.

(j) Development of a means to measure performance of the AVSSMS including establishing performance measures and metrics and adapting the AVSSMS as necessary.

(k) Well-defined internal and external AVS interfaces to ensure proper coordination, communications, and data and information flow horizontally and vertically.

(l) Development of SMS requirements and guidance for the product/service provider that is overseen.

(m) A means to measure and track SMS implementation progress.

(n) Development of an AVS Enterprise Architecture, including a Safety Information Architecture, depicting and implementing the AVS Safety Management System Doctrine.

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Associate Administrator, Aviation Safety

APPENDIX 1 — KEY TERMS AND GLOSSARY

1. PURPOSE OF THIS APPENDIX. One of the principal purposes of this order is to standardize the use of certain terms and concepts. As system safety has evolved within AVS, the FAA, and industry, there has been some variation in the understanding of safety program elements and safety-related terminology. To some extent, this is appropriate because of the different applications of those terms; however, there are basic tenets and definitions that shall be the same throughout AVS to ensure effective internal communication as well as communication with other FAA organizations and industry. This appendix presents (1) a discussion of key terms for which a common understanding is necessary to the successful implementation of the AVSSMS, and (2) a glossary of terms.

2. KEY TERMS.

a. Safety Responsibilities.

(1) The responsibility to comply with 14 CFR to establish and maintain processes, procedures, and management oversight adequate to ensure regulatory compliance and ultimately safe operations rests with aviation product/service providers, not the FAA. The AVSSMS is not a substitute for an aviation product/service provider's quality control or quality assurance.

(2) AVS, acting as a safety advocate, will continue to enhance safety through influencing and encouraging the implementation of systematic and comprehensive approaches to managing safety within the industry by recommending the implementation of programs such as SMS and quality management systems. AVS responsibilities include—

(a) Assessing and mitigating safety risk across the air transportation system;

(b) Setting standards for control of safety risk of the regulated entities' products and services;

(c) Prescribing and enforcing minimum standards, including regulations;

(d) Issuing recommended practices; and

(e) Validating aviation product/service providers and other air transportation product or service providers have processes in place that ensure continuous safe operations.

(3) AVS accomplishes this through integrated, coordinated safety functions across its Services and Offices, including integrated data and information systems. AVS will implement a systems-oriented approach for all its functions that increases the efficiency of FAA resources through risk management. Many of the techniques and the information used are the same for the FAA and for the producers; however, responsibilities are different, and objectives, though overlapping in part, also are different.

b. System Safety Attributes.

(1) One of the tools AVS will use to analyze the systems used to produce and to manage aviation products and services is the comparison of those systems to the basic characteristics of all effective safety systems. These characteristics are embodied in the following attributes:

- Well-defined and well-documented procedures
- Risk controls over key procedural steps
- Process measures to permit effective management
- Well-defined interfaces
- Clear responsibility and authority

(2) Additional details as to how each attribute shall be evaluated depend on the application and will vary. However, the basic system attributes listed above are applicable to, and will guide, all AVS safety oversight. The objective is to achieve continual improvement in the systems and in safety.

c. Safety Management System.

(1) An SMS is an integrated collection of processes, procedures, and programs that ensures a formalized and proactive approach to system safety through risk management. Risk analysis is required for all activities or process changes to identify safety impacts. The SMS is a closed-loop system ensuring corrective actions or process changes are documented and all problems or issues are tracked to conclusion.

(2) This order provides an overview of SMS. To implement this order, one of the actions AVS organizations need to take will be to establish guidance for:

(a) Their own SMS activities in carrying out their AVS functions and (2) their industry segment on implementing SMS.

(b) The AVSSMS, like SMS in the aviation industry, is intended to establish safety objectives and use the principles of system safety, quality, and risk management to continuously improve levels of safety in their respective roles and functions.

d. Safety and Risk.

(1) For practical purposes, it is most useful to define safety as a level of risk in a specified activity that is understood and acceptable. If a risk in a specific activity is considered unacceptable, then the activity is unsafe. If the risk of an activity has been analyzed, and the analysis indicates that all reasonable risk controls have been implemented and that any remaining risk is acceptable, then the activity is considered safe.

(2) SMS involves identifying hazards, estimating risk, and reducing all known risk to an acceptable level (risk management). Particularly as the level of accidents and incidents in the air transportation industry has been dramatically reduced over the decades, risk management has become a more effective management tool in improving safety than simply trying to reduce accident and incident rates, as these are so low as to be insignificant as indicators of risk in the system. Additionally, this approach is a more reactive process than a safety risk management process.

(3) Acceptable risk also will vary depending on the application. Consequently, each Service and Office must develop internal guidelines that apply to their individual functions and to the area under their jurisdiction.

e. Safety and Quality Systems. This order focuses on an integrated safety system and addresses safety management and safety oversight. Safety systems can be considered a type of quality system. A quality system is designed to consistently meet whatever quality objectives have been identified in a particular instance. Consistent quality may or may not be synonymous with high quality, because high quality may have an unacceptable cost in a particular context. However, unlike quality management systems (ISO 9000) that may be focused on financial objectives, customer satisfaction, or other goals, the AVSSMS is a quality system focused on regulatory oversight and safety risk management. In the case of aviation safety, high quality is the only acceptable outcome. The AVSSMS is completely compatible with the operations under the ISO standard.

f. Safety Program and Oversight System.

(1) The safety program is a concept developed by ICAO to describe an integrated set of regulations and activities aimed at improving safety. ICAO standards and recommended practices require that States establish a safety program to achieve an acceptable level of safety in aviation operations. Each State establishes the acceptable level of safety. The AVSSMS meets the intent of the ICAO safety program for those aviation activities under AVS purview, including aircraft operations, air traffic services, and aircraft maintenance.

(2) ICAO describes the safety program as including provisions for an array of activities, including incident reporting, safety investigations, safety audits, and safety promotion. A coherent SMS is required to implement such safety activities in an integrated manner.

(3) The authority's safety oversight is required to ensure compliance with obligations under the ICAO standards and recommended practices addressing the following critical elements of a safety oversight system:

- Primary aviation legislation
- Specific operating regulations
- State civil aviation system and quality oversight functions
- Technical personnel qualification and training
- Technical guidance, tools, and the provision of safety-critical information
- Licensing, certification, authorization, and approval obligations
- Surveillance obligations
- Resolution of safety concerns

3. GLOSSARY.

a. Accident. An unplanned event or series of events resulting in death, injury, occupational illness, or damage to or loss of equipment or property, or damage to the environment.

b. Air transportation system. The entirety of the aviation system, including the FAA; entities that design, manufacture, or operate aircraft or components of aircraft; training entities; people; infrastructure; and other systems and subsystems.

c. Aircraft accident. An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and until such time as all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage.

d. Aircraft incident. An occurrence other than an accident, associated with the operation of an aircraft, that affects or could affect the safety of operations.

e. Audit. A scheduled or unscheduled review of an organization's operations to determine the level of compliance with established standards or protocols.

f. Continual improvement. A set of activities an organization routinely carries out to enhance its ability to meet requirements in response to ongoing system feedback. Continual improvement can be achieved by carrying out internal audits, performing management reviews, analyzing data, and implementing corrective and preventive actions.

g. Doctrine. A statement of fundamental government policy.

h. Effectiveness. A measure of how well desired outcomes are achieved, generally in reference to a specified standard. Effectiveness in a safety management system (SMS) refers to the results of risk management activities in terms of the applicable standard and the intended results.

i. Fail safe. A characteristic of a system whereby any malfunction affecting the system safety will cause the system to revert to a state that is known to be within acceptable risk parameters.

j. Hazard. Any existing or potential condition that can lead to injury, illness, or death to people; damage to or loss of a system, equipment, or property; or damage to the environment. A hazard is a condition that is a prerequisite to an accident or incident. Note that a hazard may or may not result in a situation of high risk.

k. Likelihood. The estimated probability or frequency, in quantitative or qualitative terms, of a hazard's effect.

l. National Airspace System. The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information services; rules, regulations and procedures, technical information, and manpower and material. Included are system components shared with the military.

m. Procedure. A specified way to carry out an activity or a process.

n. Process. A set of interrelated or interacting activities that transforms inputs into outputs.

o. Quality assurance. The part of quality management focused on providing confidence that requirements will be fulfilled.

p. Quality control. Activities after production of a product or service to ensure the final output has conformed to the desired parameters.

q. Quality management. Coordinated activities to direct and control an organization with regard to quality.

r. Quality management system. A set of interrelated or interacting processes with regard to quality, accomplished by the management of an organization by establishing policy and objectives and achieving those objectives.

s. Quality system. The organizational structure, responsibilities, procedures, processes, and resources for implementing quality management.

t. Risk. The composite of predicted severity and likelihood of the potential effect of a hazard in the worst credible system state. There are three types of risk:

(1) Initial — The severity and likelihood of a hazard when it is first identified and assessed; includes the effects of preexisting risk controls in the current environment.

(2) Current — The predicted severity and likelihood of a hazard at the current time.

(3) Residual — The remaining risk that exists after all risk control techniques have been implemented or exhausted and all risk controls have been verified.

u. Risk analysis. The process whereby hazards are characterized for their likelihood and severity. Risk analysis looks at hazards to determine what can happen when. This can be either a quantitative or qualitative analysis. The inability to quantify and/or the lack of historical data on a particular hazard does not exclude the hazard from the need for analysis. Some type of a risk analysis matrix is normally used to determine the level of risk.

v. Risk assessment. The process by which the results of risk analysis are used to make decisions. The process of combining the impacts of risk elements discovered in risk analysis and comparing them against some acceptability criteria. Risk assessment can include the consolidation of risks into risk sets that can be jointly mitigated, combined, and then used in decisionmaking.

w. Risk control. Anything that mitigates risk. A risk control should directly map to a safety design requirement. All risk controls must be written in requirement language.

x. Safety. Safety is the state in which the risk of harm to persons or property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management.

y. Safety assurance. SMS process management functions that systematically provide confidence that safety objectives are met or exceeded.

z. Safety culture. Safety culture is descriptive of organizations where each person involved in the organization's operations recognizes and acts on his or her individual responsibility for safety, and actively supports the organization's processes for managing safety. The outcome is that the organization's ability to manage safety continues to improve because decisionmakers at all levels work to use their knowledge of safety risk to learn and adapt, thus improving the system's ability to support safety outcomes.

aa. Safety management. The act of understanding and making decisions and taking actions to lower risk, inherent in all human activity, to acceptable levels.

bb. Safety management system. An integrated collection of processes, procedures, and programs that ensures a formalized and proactive approach to system safety through risk management. Risk analysis and assessment are required for all changes to identify safety impacts. The SMS is a closed-loop system ensuring all changes are documented and all problems or issues are tracked to conclusion. When properly implemented, an SMS establishes a safety philosophy or culture that permeates the entire organization in the monitoring and continuous improvement of safety of the operation.

cc. Safety oversight. A function by means of which States ensure effective implementation of the safety-related laws, regulations, policies, and procedures. Safety oversight also ensures the national aviation industry provides a safety level equal to or better than the acceptable level defined by the State.

dd. Safety risk management. A process within the SMS composed of describing the system, identifying hazards, and analyzing, assessing, and controlling the risk.

ee. Serious injury. Any injury any injury which:

(1) Requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received;

(2) Results in a fracture of any bone (except simple fractures of fingers, toes, or nose);

(3) Causes severe hemorrhages, nerve, muscle, or tendon damage;

(4) Involves any internal organ; or

(5) Involves second or third degree burns, or any burns affecting more than 5 percent of the body surface.

ff. Severity. The consequence or impact of a hazard in terms of degree of loss or harm.

gg. Substantial damage. Damage or failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered "substantial damage."

hh. Surveillance. The act of monitoring and evaluating an organization, product, or service in a systematic way to verify compliance with regulations; operation in accordance with their systems and methodologies; and that the desired outcome is achieved or product or service performance meets expectations.

ii. System. An integrated set of constituent pieces combined in an operational or support environment to accomplish a defined objective. These pieces include people, equipment, information, procedures, facilities, services, and other support services, which interact.

jj. System engineering. A discipline that concentrates on the design and application of the whole (system) as distinct from the parts. It involves looking at a problem in its entirety, taking into account all the facets and all the variables, and relating the social to the technical aspect. The translation of operational requirements into design, development, and implementation concepts and requirements in the lifecycle of a system.

kk. System safety. 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 lifecycle.

ll. System safety engineering. An engineering discipline requiring specialized professional knowledge and skills in applying scientific and engineering principles, criteria, and techniques to identify and eliminate hazards, in order to reduce the associated risk.

mm. System safety management. A management discipline that defines system safety program requirements and ensures the planning, implementation, and accomplishment of system safety tasks and activities are consistent with the overall program requirement.

U.S. Department
of Transportation

Federal Aviation Administration

DIRECTIVE FEEDBACK INFORMATION

Please submit any written comments or recommendations for improving this directive, or suggest new items or subjects to be added to it. Also, if you find an error, please tell us about it.

Subject: Order XXXX.XX

To: Office of Quality, Integration and Executive Services
Quality, Integration and Process Division, AQS-100
800 Independence Avenue SW.
Washington, DC 20591

(Please check all appropriate line items)

- ☐ An error (procedural or typographical) has been noted in paragraph _____ on page _____.
- ☐ Recommend paragraph _____ on page _____ be changed as follows: *(attach separate sheet if necessary)*
- ☐ In a future change to this directive, please include coverage on the following subject: *(briefly describe what you want added)*
- ☐ Other comments:
- ☐ I would like to discuss the above. Please contact me.

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