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**14 CFR Parts 1, 60, 61, 63, 141, and 142
Flight Simulation Device Initial and
Continuing Qualification and Use;
Proposed Rule**

DEPARTMENT OF TRANSPORTATION**Federal Aviation Administration****14 CFR Parts 1, 60, 61, 63, 141, and 142**

[Docket No. FAA-2002-12461; Notice No. 02-11]

RIN 2120-AH07

Flight Simulation Device Initial and Continuing Qualification and Use**AGENCY:** Federal Aviation Administration (FAA), DOT.**ACTION:** Notice of proposed rulemaking (NPRM).

SUMMARY: The FAA proposes to amend the regulations to establish flight simulation device qualification requirements for all certificate holders in a new part. The basis of these requirements currently exists in different parts of the FAA's regulations and in advisory circulars, and the proposed changes would consolidate and update flight simulation device requirements. In addition, the FAA is proposing to require a Quality Assurance program. Currently, sponsors of flight simulation devices may elect to have, but are not required to have, a Quality Assurance program. The intended effect of these proposed changes is to ensure that users of flight simulation devices receive the best possible training in devices that closely match the performance and handling characteristics of the airplanes being simulated.

DATES: Send your comments on or before December 24, 2002.

ADDRESSES: Address your comments to the Docket Management System, U.S. Department of Transportation, Room Plaza 401, 400 Seventh Street, SW., Washington, DC 20590-0001. You must identify the docket number FAA-2002-12461 at the beginning of your comments, and you should submit two copies of your comments. If you wish to receive confirmation that FAA received your comments, include a self-addressed, stamped postcard.

You may also submit comments through the Internet to <http://dms.dot.gov>. You may review the public docket containing comments to these proposed regulations in person in the Dockets Office between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The Dockets Office is on the plaza level of the NASSIF Building at the Department of Transportation at the above address. Also, you may review public dockets on the Internet at <http://dms.dot.gov>.

FOR FURTHER INFORMATION CONTACT:

Edward Cook, National Simulator Program Staff (AFS-205), Flight Standards Service, Federal Aviation Administration, 1701 Columbia Avenue, College Park, GA 30337; telephone (404) 305-6100.

SUPPLEMENTARY INFORMATION:**Comments Invited**

The FAA invites interested persons to participate in this rulemaking by submitting written comments, data, or views. We also invite comments relating to the economic, environmental, energy, or federalism impacts that might result from adopting the proposals in this document. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data. We ask that you send us two copies of written comments.

We will file in the docket all comments we receive, as well as a report summarizing each substantive public contact with FAA personnel concerning this proposed rulemaking. The docket is available for public inspection before and after the comment closing date. If you wish to review the docket in person, go to the address in the **ADDRESSES** section of this preamble between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. You may also review the docket using the Internet at the web address in the **ADDRESSES** section.

Before acting on this proposal, we will consider all comments we receive on or before the closing date for comments. We will consider comments filed late if it is possible to do so without incurring expense or delay. We may change this proposal in light of the comments we receive.

If you want the FAA to acknowledge receipt of your comments on this proposal, include with your comments a pre-addressed, stamped postcard on which the docket number appears. We will stamp the date on the postcard and mail it to you.

Availability of Rulemaking Documents

You can get an electronic copy using the Internet by taking the following steps:

- (1) Go to the search function of the Department of Transportation's electronic Docket Management System (DMS) web page (<http://dms.dot.gov/search>).
- (2) On the search page type in the last four digits of the Docket number shown at the beginning of this notice. Click on "search."
- (3) On the next page, which contains the Docket summary information for the

Docket you selected, click on the document number of the item you wish to view.

You can also get an electronic copy using the Internet through the Office of Rulemaking's web page at <http://www.faa.gov/avr/armhome.htm> or the Government Printing Office's web page at http://www.access.gpo.gov/su_docs/aces/aces140.html.

You can also get a copy by submitting a request to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267-9680. Make sure to identify the docket number, notice number, or amendment number of this rulemaking.

Background

For many years the flightcrew training regulations in 14 CFR part 121 subparts N and O allowed simulator training as an enhancement to training and testing in the airplane, but not as a complete replacement for training in the airplane. Due to improvements in flight simulator performance, appendix H was added to part 121 in 1980. Appendix H permitted and expanded use of simulators by air carriers that took advantage of the new simulator performance through an "Advanced Simulation Training Program." Appendix H permits simulators to be used for varying amounts (up to 100%) of the training, testing, and checking required by the FAA. The amount of training permitted depends on the simulator's qualification level.

As the state-of-the-art in simulator technology has advanced, more effective use has been made of the airplane simulator in training, checking, and certification of flightcrew members. Using flight simulators rather than airplanes in training allows for more in-depth training, including the practice of critical emergency procedures, in a safer environment. Not only do simulators provide improvements in safety and in safer training operations, they also provide such benefits as reducing noise, air pollution, and air traffic congestion, and conserving petroleum resources.

Appendix H of 14 CFR part 121 provides an Advanced Simulation plan outlining the steps towards optimum use of flight simulators. The plan consists of several phases of simulation devices and the training allowed in each simulation device level. The intent of including a phased simulation approach was to provide for certificate holders to transition to using the most technically advanced simulation training in order to achieve the maximum benefits of simulation training. Most major air

carriers have taken advantage of appendix H and conduct most or all of their training and checking in simulators.

The FAA originally placed simulator technical requirements in appendix H because part 121 air carriers were the primary users of airplane simulators. As the larger aviation community became interested in using simulators, the FAA in 1980 provided guidance in an advisory circular, AC 121-14C, Aircraft Simulator and Visual System Evaluation and Approval. The AC more fully described what the technical capabilities of simulators should be, how those capabilities might be verified, and how all these capabilities might be incorporated into training programs.

Over the next several years, the FAA in consultation with the aviation industry, refined and republished its guidance material several times. Because the regulations regarding advanced simulators remained in part 121, appendix H, certificate holders who operated under parts other than 121 (such as parts 125 and 135) had to obtain exemptions in order to use simulators as provided in part 121, appendix H. The number of these operators continued to grow.

The ability to manage the increasing number of exemptions, each one with slightly different provisions, conditions, and limitations, became increasingly difficult. The development of 14 CFR part 142, Certification of Training Centers, was seen to be a logical and necessary way to deal with those operators who wished to conduct training for flightcrew members but who did not and would not operate under any of the part 119, 121 125, or 135 passenger carrying rules. However, the regulatory requirements for the technical criteria for a majority of the simulators coming into the U.S. aviation inventory has remained in the part 121 operating rule.

As a result of the above, the FAA is proposing to remove the technical requirements for flight simulation devices (flight simulators and flight training devices) from part 121 and place them in a new part 60, titled "Flight Simulation Device Qualification." The proposed new part 60 would establish flight simulation device (FSD) requirements that could be used by anyone who conducts flightcrew member training, evaluation, and flight experience under any of the Federal Aviation Regulations. The term FSD includes aircraft simulators and aircraft flight training devices (FTD). In short, a flight simulator is a full size replica of a specific type aircraft cockpit, including controls, a visual

system, and a motion system; a flight training device is a full size replica of aircraft instruments, equipment, panels, and controls, but does not require a visual system or a motion system. (See proposed § 1.1 for complete definitions of these terms.) Under current 14 CFR Chapter I, there is no general term for these two types of devices.

General Discussion of Proposed Part 60

Proposed new part 60 would contain the requirements for the evaluation, qualification, and maintenance of FSD's. The proposed requirements are based on the current requirements on how to build and use simulators in appendix H of part 121 and in current § 121.407. In a separate rulemaking project that will follow this proposal, other portions of appendix H would be moved to a new subpart of part 121, and appendix H would be deleted.

Part 60 would also contain items (such as frequency, content, and method of evaluation) currently found in the advisory material in AC 120-40B, Airplane Flight Simulator Qualification, in AC 120-45A, Airplane Flight Training Device Qualification, and in AC 120-63, Helicopter Simulator Qualification. Standards from this advisory material and specific items that are subject to change through technological advancements would be placed into one of four appendices to part 60:

- Appendix A, "Airplane Flight Simulators Qualification Performance Standards."
- Appendix B, "Helicopter Flight Simulators Qualification Performance Standards."
- Appendix C, "Airplane Flight Training Devices Qualification Performance Standards."
- Appendix D, "Helicopter Flight Training Devices Qualification Performance Standards."

The Standards in these QPS documents are regulatory. Changes and additions to those standards would be subject to notice and comment procedures under the Administrative Procedures Act unless "good cause" {see 5 U.S.C.} exists to justify proceeding without notice and comment.

The current and proposed allowable and required uses of flight simulation devices would be in applicable operating, certification, and training center regulations in parts 61, 63, 121, 135, 141, and 142 and in the four QPS documents. The tasks approved for each qualification level would also be provided in the four QPS documents.

For a further discussion of the QPSs, see the preamble discussion on

"Delegation of Authority for Standards Documents." The remainder of this discussion of proposed part 60 explains how the proposed rules would be applied. The process described below for obtaining and maintaining FSD qualification is similar to current practice.

Obtaining and Maintaining FSD Qualification under the Proposed Rule

If a certificate holder intends to use an FSD in its training program in order for people to obtain credit toward FAA training, checking or testing requirements, the FSD must be evaluated and qualified by the FAA's National Simulator Program Manager (NSPM) or a person approved by the NSPM. The certificate holder may be the "sponsor" of the FSD. An FSD "sponsor" seeks qualification and subsequent approval for use of the FSD and agrees to assume responsibility for maintaining the FSD according to prescribed standards. The sponsor may contract with another person for services of document preparation and presentation, as well as FSD inspection, maintenance, repair, servicing, etc., but the sponsor retains ultimate responsibility for the qualification of the FSD. Other certificate holders may seek approval to use the same FSD for credit under an approved training program, but such certificate holders would not be sponsors of the FSD. "Credit" means use to meet initial and recurrent training, flight experience requirements or evaluation, such as checking and testing, etc. Although FSD's can be used for "credit" to meet certain flight experience requirements (e.g., re-establishing lost recency of experience in landings), time spent in FSD's may not be "credited" toward "operating experience" requirements (e.g., § 121.434).

Typically, a manufacturer produces an FSD that accurately represents the characteristics of an airplane type, model, and, if applicable, series, such as a Boeing 777-232. The sponsor buys, leases, or otherwise arranges for the use of the FSD in a specific training program, such as its Boeing 777 pilot training program for initial, upgrade, or transition training. First, the sponsor must successfully complete the required objective and subjective tests of the FSD as specified in the appropriate QPS. The findings of these tests indicate whether or not the FSD adequately represents the characteristics of the aircraft in the following areas: cockpit configuration, airplane systems and sub-systems, and performance and flying qualities. These findings also indicate whether or not the FSD adequately represents the

environment in which the aircraft actually operates.

The sponsor then applies for the NSPM evaluation. For the initial NSPM evaluation, the sponsor must allow the NSPM to test the FSD by conducting and comparing objective tests, subjective tests, and performance demonstrations with a series of specific tests conducted the same way in the aircraft. The comparison must show that the performance and flying qualities of the aircraft and FSD are the same, within established tolerances, and that the FSD functions correctly and adequately to perform its planned functions. A successful initial evaluation means that the NSPM agrees with the sponsor's findings that the FSD is an adequate representation of the aircraft.

Once the initial evaluation is successfully completed, the FAA issues a Statement of Qualification (statement). This statement indicates that the FSD is either a flight simulator or an FTD. The statement also indicates the level of qualification assigned to the FSD. Each FSD can be qualified as either a flight simulator (Level A, B, C, or D) or a flight training device (FTD) (Level 2, 3, 4, 5, or 6). The FAA is reserving the term "Level 1 FTD" for potential future use. For a further discussion of this issue, see the preamble discussion for "Conforming changes to other parts." The statement also includes a list of all of the operations tasks or simulator systems in the subjective test appendix of the appropriate QPS for which the FSD has not been subjectively tested and for which the FSD is not qualified (e.g., circling approaches, windshear training, etc.). Issuance of the statement means that the FSD: (1) Has been qualified as representative of the aircraft, or set of aircraft, as appropriate; and (2) has been qualified at a level authorized in the QPS.

A qualified FSD still cannot be used for training until it is approved for use in a certificate holder's training program in accordance with the training program regulations in parts 121, 135, 141, and 142. A certificate holder must obtain this approval from the FAA through the training program approval authority. Once the FSD has been approved for use in a training program (and the operator has been approved as the FSD sponsor), the FSD may also be approved for use in a non-sponsor's training program.

If the FSD has been evaluated and qualified and if it has been approved for use in the training program, then it may be used for credit as long as its qualification is maintained. To maintain a qualified FSD, the sponsor must comply with the following continuing

qualification requirements. The sponsor must complete performance demonstrations and objective, quarterly checks of the simulator's performance and handling qualities. These quarterly checks are to be evenly spaced throughout the year and include approximately one-fourth of the performance demonstrations and validation tests in the Master Qualification Test Guide (MQTG). All of the MQTG demonstrations and tests would have to be completed annually. The sponsor must maintain the results of these quarterly checks for review by the NSPM. This review may be accomplished at any time, but regularly occurs during scheduled recurrent evaluations. The sponsor must also coordinate with the NSPM to ensure that recurrent evaluations are completed within the required interval. The NSPM conducts recurrent evaluations that consist of performance demonstrations and objective tests in the MQTG and subjective tests.

If an FSD is removed from service for moving, storage, or other purpose, the sponsor must take the additional steps proposed in the rule. In addition if the aircraft is modified to change cockpit configuration, if the certificate holder changes relevant flightcrew member duties, or if new data is developed on relevant performance characteristics, the FSD must be modified to comply with the aircraft changes and incorporate the appropriate information in order for time spent in the FSD to be credited toward meeting training, checking, testing, or experience requirements under Title 14 of the Code of Federal Regulations.

All of these requirements are explained in more detail in the section-by-section discussion below.

Section-by-Section Discussion of Proposed Part 60 and Conforming Changes to Other Parts

Part 1 Amendments

Several proposed definitions would be added to current § 1.1, including, "Flight simulation device," "Flight simulator," and "Flight training device." The abbreviations "FSD" and "FTD," for "flight simulation device" and "flight training device," respectively, would be added to § 1.2. These terms are being added to the definitions and abbreviations in part 1 because they are used in several parts, including new proposed part 60 as well as current parts 61, 63, 121, 135, 141, and 142.

Section 60.1 Applicability

The proposed section outlines the subjects addressed in proposed part 60. Proposed paragraph (a) is based on language from the first introductory paragraph in the "Advanced Simulation" section of existing Appendix H. The proposed language states that part 60 contains requirements governing the initial and continuing qualification and use of all aircraft flight simulation devices (FSD) used for training, evaluation, or obtaining any flight experience (but not operating experience under part 121, 125, or 135) for meeting flightcrew member certification or qualification requirements.

Proposed paragraph (b) clarifies that part 60 applies to anyone who uses an FSD for flightcrew member training, qualification, or experience requirements of 14 CFR chapter I. This includes not only sponsors or owners of FSD's, but also each person who uses an FSD for training, evaluation, or obtaining flight experience required for flightcrew member certification or qualification.

Proposed paragraph (c) clarifies that the rules in proposed § 60.31 regarding falsification of applications, records, or reports apply not only to sponsors or owners of FSD's, but also to each person who uses an FSD for training, evaluation, or obtaining flight experience required for flightcrew member certification or qualification.

Section 60.2 Applicability of Sponsor Rules to Persons Who Are Not Sponsors and Who Are Engaged in Certain Unauthorized Activities

Proposed paragraph (a) proposes that the rules of this part that are addressed to FSD sponsors are also applicable to nonsponsors who inappropriately use or cause the use of an FSD. Proposed rules that are specifically addressed to sponsors included §§ 60.5(a), 60.19(a), 60.23(d), and 60.31. The purpose of § 60.2(a) would be to give the FAA a legal means by which it could charge a nonsponsor, who inappropriately uses or causes the use of an FSD, with violations of the safety rules that are directed to persons who have already become sponsors of FSDs. Because the word "person" is already defined in Part 1 of the regulations, this proposed section and all other proposed sections that refer to "person" or "persons" would apply to individuals and legal entities, including corporations, companies, and partnerships. Therefore, for example, if "Company A" made its FSD available to "Company B" with representations that the FSD was fully

qualified under Part 60, including a false representation that "Company A" was the FAA-approved sponsor for the FSD (see § 60.7(b)), then "Company A" could be charged with violating § 60.19(a). Even though § 60.19(a) directs a *sponsor* not to use or allow the use of an FSD to meet any of the requirements of the Federal Aviation Regulations unless certain requirements are met (e.g., a functional "preflight" check each calendar day before the FSD is first used), "Company A" (a nonsponsor of the FSD) could also be charged with a violation of § 60.19(a) because its actions would meet the elements under proposed § 60.2(a). Meeting the elements under § 60.2(a) would make proposed § 60.19(a) applicable to Company A.

Proposed § 60.2(b) provides an example in which proposed § 60.2(a) would not apply. If an FSD manufacturer sold a FSD to an air carrier and merely made representations that the FSD was in a condition such that it should be able to obtain FAA approval and qualify as an FSD under proposed part 60, that manufacturer would not be subject to a possible violation of any proposed section directed to FSD sponsors as long as the other conditions of proposed paragraph (b) were also met. Thus, an FSD manufacturer that did not falsely claim to be the FSD's FAA-approved sponsor and did not make false representations that someone else was already FAA-approved as the FSD's sponsor and did not claim the FSD was already fully qualified under part 60 (in a case where it really was not qualified pursuant to part 60), would not be subject to § 60.2(a). Not being the FSD's sponsor and not being subject to § 60.2(a) would mean that the manufacturer would not be subject to proposed part 60 rules addressed to "sponsors."

Section 60.3 Definitions

This proposed section contains definitions used throughout proposed part 60. The following definitions are included: "Certificate holder," "Evaluation," "Flight experience," "Flight test data," "FSD Directive," "Master Qualification Test Guide (MQTG)," "National Simulator Program Manager (NSPM)," "Objective test," "Predicted data," "Qualification level," "Qualification Performance Standard (QPS)," "Qualification Test Guide (QTG)," "Set of aircraft," "Sponsor," "Subjective test," "Training Program Approval Authority (TPAA)," and "Upgrade."

For purposes of proposed part 60 "certificate holder" refers to a person issued an operating certificate under

part 119 to conduct operations under part 121 or 135, a person issued a pilot school certificate under part 141, a person issued a training center certificate under part 142, or a person that has FAA approval for a course of training for flight engineers under part 63.

For purposes of proposed part 60, flight experience means only that flight experience used to meet landing recency requirements.

As defined, an FSD Directive is a document issued by the FAA to an FSD sponsor, requiring a modification to the FSD due to a recognized safety-of-flight issue and amending the qualification basis for the FSD. There are several types of situations that might occur that would lead the FAA to issue an FSD Directive. If an aircraft manufacturer develops new data on an aircraft and the FAA decides that the new data might affect aircraft performance or handling qualities, then the FAA may issue an FSD Directive to require each sponsor of that type FSD to make a corresponding change to the FSD. Similarly, the FAA may issue an FSD Directive if a manufacturer or the FAA discovers that the existing data for an aircraft is not accurate. Also, if the FAA issues an Airworthiness Directive on a particular aircraft and the FAA determines that the change required for the aircraft would also affect aircraft performance or handling qualities, the FAA may issue an FSD Directive requiring that a change be made to each affected FSD. Each FSD Directive would be published in the **Federal Register** as an amendment to the Record of FSD Directives appendix for the appropriate QPS. In addition, each sponsor would maintain a list of FSD Directives applicable to each FSD in the Master Qualification Test Guide (MQTG) for that FSD. The list would include a record of the completion of the modification to the FSD.

As defined, an MQTG is approved individually for each FSD, not for each type of aircraft being simulated.

A definition is proposed for "set of aircraft" because traditionally an FSD has been qualified for aircraft that share similar handling and operating characteristics, share similar operating envelopes, and have the same number and type of engines or powerplants. Aircraft that meet these criteria are usually referred to as a "set of aircraft," although the term has not previously been defined.

The term "Training Program Approval Authority" would be defined to mean a person authorized by the Administrator to approve the aircraft flight training program in which the FSD would be used. This would normally be the

Principal Operations Inspector (POI), the Training Center Program Manager (TCPM), or the assigned operations inspector in the local Flight Standards District Office (FSDO).

The proposed definition for "upgrade" is "the improvement or enhancement of an FSD for the purpose of achieving a higher qualification level." It is not considered an upgrade when a sponsor chooses to modernize some aspect of the FSD (e.g., visual system, host computer, instructor operating station, etc.) without affecting the qualification level of the device.

Section 60.4 Qualification Performance Standards

Proposed § 60.4 would describe that Appendices A, B, C, and D would contain the Qualification Performance Standards for each family of flight simulation device (Airplane Flight Simulators, Helicopter Flight Simulators, Airplane Flight Training Devices, and Helicopter Flight Training Devices) and describe which appendix contains which QPS: *i.e.*, Appendix A, contains the QPS for Airplane Flight Simulators; Appendix B contains the QPS for Airplane Flight Training Devices; Appendix C contains the QPS for Helicopter Flight Simulators; and Appendix D contains the QPS for Helicopter Flight Training Devices.

Section 60.5 Quality Assurance Program

The basic precept of the quality assurance (QA) program described in this section is for the sponsor "to say what it does; to do what it says; and to keep good records." The proposed requirement for a QA program would require each sponsor to develop a working knowledge of the requirements of part 60 and the relevant QPS document. This knowledge would be demonstrated to the NSPM through a written description of how, how often, when, where, and with what resources the sponsor's organization plans to comply with the requirements of part 60.

By having this written description, the NSPM and the sponsor would be able to compare what is actually done with what the sponsor agreed to do regarding FSD repair, modification, regular maintenance, and daily readiness. The standardization required for such satisfactory comparisons would add to the efficiency and effectiveness of the FSD. Through the reliability of the maintenance and the daily readiness provided by a sound QA program, flightcrew member training, evaluation, and flight experience would be obtained more reliably, on a planned schedule

with less interruption. Additionally, the students would more easily retain the knowledge and skills learned through such standardized, uninterrupted training.

The proposed QA Program would help provide consistent training and repetitive practice in the desirable environment of accurate and realistic simulation. Flightcrew members would be able to more readily, more directly, and more completely transfer and use in the airplane the skills and procedures learned, practiced, and reinforced in reliable FSDs. This process would yield a safer operating flightcrew and, therefore, a higher degree of safety for the traveling public.

Proposed paragraph (a) would state that a sponsor must establish and follow a quality assurance program before the sponsor can use or allow the use of an FSD for flightcrew member training or evaluation, or to obtain flight experience for a flightcrew member. Specific requirements for the quality assurance program are found in the appropriate QPS. The purpose of the quality assurance program is to ensure that the sponsor is capable of addressing their own ability to provide FSDs that continually meet the training, testing, checking, and experience requirements of their respective FAA-approved flight training program(s) and the regulatory requirements of part 60. The quality assurance program would include a complete written description of all of the procedures that the sponsor has developed for complying with all of the requirements of part 60. In addition the quality assurance program would include a regular assessment by the sponsor of the effectiveness of the sponsor's program for complying with part 60. See the "information" section of paragraph 5 in each of the QPS documents, published later in this document.

Proposed paragraph (b) would state that the sponsor is responsible for the program regardless of where the FSD is located and regardless of who the sponsor may contract with for inspection, maintenance, repair, servicing, testing, or document preparation and presentation.

Proposed paragraph (c) would state that the program must provide a means for correcting any deficiency in the program; provide a mechanism to incorporate any required or desired modification to the program; and include a means for documenting each such change or modification.

Proposed paragraph (d) would state that when the NSPM finds that the program does not contain adequate procedures and standards to meet the

requirements described in this section of the rule, the NSPM may require the sponsor to make an appropriate modification to the program to correct those deficiencies. This paragraph would also state that the sponsor would have the right to appeal to the Administrator such a notification from the NSPM to modify the program. When such an appeal is filed within 30 days of the NSPM notification, the requirement to make the modification would be delayed pending a decision by the Administrator, unless an emergency involving safety of flight requires the immediate modification.

Proposed paragraph (e) would state that each sponsor of an FSD must designate one individual as the management representative (MR) for quality assurance program purposes. The individual would have to be employed by the sponsor and identified by name to the NSPM and TPAA. The MR would be the primary contact point for all matters between the sponsor and the FAA regarding the qualification of that FSD. This individual would be ultimately responsible for the initial and day-to-day qualification of the assigned FSD, although he or she may delegate certain duties associated with FSD qualification, such as maintenance, inspection, and conduct of tests. The FAA assumes that any current FSD sponsor would already have such an individual on staff.

Section 60.7 Sponsor Qualification Requirements

Proposed paragraph (a) would state that eligibility to become a sponsor is based on whether the person holds or is an applicant for a certificate under parts 119, 141, or 142 or whether the person holds or is an applicant for an approved flight engineer course under part 63. This paragraph would also require that the FSD will be used, or will be offered for use, in the sponsor's FAA-approved flight training program for the aircraft being simulated as evidenced in a request for evaluation submitted to the NSPM through the TPAA. The primary concern of the FAA regarding an FSD is whether or not the FSD will provide the proper performance and handling qualities to those who are to use it for training, evaluation, or flight experience. The FSD must provide an environment in which flightcrew members can learn, practice, and exhibit the same behavior patterns, the same control input strategies, and the same responses to input stimuli (*i.e.*, the motion, visual, sound, and instrument cueing) as they would expect to exhibit in the real environment. Pilots, instructors, and check airmen are

critical in ensuring the FSD is providing what it is intended to provide. It is this group that really has "control" of the simulator and is most motivated to ensure it continues to be the appropriate tool for critical training, evaluation, and flight experience tasks. The people in this group are the first to know and in the best position to know when this is being accomplished and when it is not. In short the sponsor must be very motivated regarding the proper function of the FSD. The sponsor must be dependent on the FSD's use for its training program, with the most to lose or gain regarding the proper functioning of the FSD. It is the sponsor with whom the FAA's operational interest is most direct. Therefore, the FAA is proposing that the FSD will be used, or will be offered for use, in the sponsor's FAA-approved flight training program for the aircraft being simulated. The FAA specifically requests comments on the proposal regarding the FSD being used or offered for use in the sponsor's FAA-approved training program for the aircraft being simulated.

Under proposed paragraph (b) a person is a sponsor if the conditions under paragraph (a) continue and if the person has operations specifications for the aircraft type or set being simulated, or if the person has training specifications or a course of training authorizing the use of an FSD for that aircraft type or set. Also, the person would be required to have an approved quality assurance program in accordance with proposed § 60.5. Finally, the NSPM would have had to approve the person as a sponsor and not have withdrawn that approval.

Under proposed paragraph (c), a person would continue to be a sponsor of an FSD if (1) beginning 12 calendar months after the initial qualification and every 12 calendar months thereafter, the FSD is used in the sponsor's FAA-approved flight training program for the aircraft type or set of aircraft for a minimum of 600 hours annually and (2) the use of the FSD meets the requirements of parts 61, 63, 91, 121, or 135. The annual minimum number of hours is proposed to ensure that the sponsor retains the high level of interest needed when using and maintaining each FSD under the requirements of this part. In addition, this minimum number of hours also ensures that the time, effort, and expense incurred by the Administrator for initially and recurrently evaluating the FSD is appropriately incurred. In using the term "calendar month" the FAA is allowing flexibility in calculating these hours. For example, if an FSD was initially qualified on March 5, the

sponsor would have until March 31 of the following year to accumulate the minimum 600 hours of use for that FSD. This 600 requirement represents between 5 and 10 percent of the time the FSD could be used throughout the calendar year. For example, 24 hours in a day and 365 days in a year = 8760 hours in a year.

Proposed paragraph (c)(3) would state that if the use requirements in paragraphs (c)(1) and (c)(2) are not met, the person could continue to sponsor the FSD on a provisional basis for an additional 12 calendar months. If, during this additional 12-calendar-month period, the FSD is used as described in paragraphs (c)(1) and (c)(2), the provisional status would be removed and regular sponsorship resumed. If, during this additional 12-calendar-month period, the FSD is not used as described in paragraphs (c)(1) and (c)(2), the FSD would not be qualified and the sponsor could not apply to sponsor the FSD for at least 12 calendar months. This 12 month period in which a person could not sponsor an FSD is necessary to prevent a person from seeking repeated sponsorship of an FSD even though that person has no intention of using the FSD in accordance with the minimum use requirements in § 60.7. Such repeated applications would require the NSPM to expend fiscal and human resources unnecessarily.

Section 60.9 Additional Responsibilities of the Sponsor

Proposed paragraph (a) would state that the sponsor of each FSD used for flightcrew member training or evaluation under this chapter must allow the NSPM to inspect the FSD immediately, including all records and documents relating to the FSD in order to determine its compliance with proposed part 60. The proposed paragraph is similar to the second paragraph in existing Appendix H, "Advanced Simulation." In most cases the inspection would be scheduled at a convenient time for the sponsor; however, the FAA proposes to add the word "immediately" to the regulatory language in order to provide authority for an immediate inspection, if warranted.

Proposed paragraph (b) would require each sponsor to develop a method for personnel using or performing work on the FSD (flightcrew members, instructors, check airmen, simulator technicians, and maintenance personnel) to provide comments on the FSD and its operation. The proposed paragraph would require the sponsor to examine each comment for content and

importance and to take appropriate action. For example, a comment that indicates a potential malfunction or maintenance issue for the FSD would need to have follow-up action, whereas a comment on the carpet color inside the FSD would have a lower priority because it does not affect FSD performance. This requirement is intended to work in concert with the quality assurance program. It is intended as a mechanism to ensure that the sponsor knows how the FSD is operating and what must be done to maintain its usefulness.

Proposed paragraph (b) would also require that the sponsor maintain a liaison with the manufacturer of the aircraft being simulated by the FSD to facilitate compliance with § 60.13(f) when necessary.

Finally, proposed paragraph (b) would require that the sponsor post in or adjacent to the FSD the Statement of Qualification issued by the NSPM. This posting would alert users that they may not use the FSD for any specific function for which the FSD has not been qualified. For example, if the Statement of Qualification lists windshear training as a function for which the FSD has not been qualified, then the FSD may not be used for credit for windshear training.

Section 60.11 FSD Use

The introductory text of proposed § 60.11 contains language that assigns responsibility for complying with part 60 to any person who "uses," "allows the use of," or "offers the use of" an FSD for meeting training, evaluation, or flight experience requirements. Examples of people who "use" an FSD would be a certificate holder or an employee of the certificate holder, a flight instructor, or an individual flightcrew member. The person who "allows" or "offers" the use of an FSD would be an FSD sponsor who allows other certificate holders to use the FSD. Each flight instructor, check airman, or other evaluator is expected to be knowledgeable and aware of whether the equipment they are using is qualified for the task they are doing at that moment. This provision does not prohibit a person from using an FSD for other than meeting training, evaluation, or flight experience requirements. For example, an FSD that is not currently qualified under part 60 could be used for meeting foreign training requirements or the FSD could be demonstrated for a prospective customer.

Proposed paragraph (a) is similar to existing § 121.407(a)(1)(i). While the existing requirement states that each FSD be specifically approved for the

certificate holder, the proposed paragraph would require that each FSD have a sponsor, and not more than one sponsor, who may be any person who meets the definition of "sponsor" and who is authorized under this chapter to use a qualified and approved FSD. This clarification is necessary because the current rule is not explicit regarding who the certificate holder must be. The proposed rule requires a specifically-identified certificate holder as the sponsor and sets out specific duties and responsibilities for that sponsor.

Proposed paragraph (a) is also based on existing § 121.407(b), which states that a particular airplane simulator or training device may be approved for use by more than one certificate holder. The proposed paragraph would state that other persons or certificate holders may arrange to use a sponsor's FSD that is already qualified and approved for use within an approved flight training program without an additional qualification process. (See proposed § 60.16 for specific requirements for certificate holders or other persons who wish to use a sponsor's FSD for purposes beyond what the FSD is already qualified for.) However, the sponsor would still remain responsible for ensuring that the FSD continually meets the requirements of proposed part 60 and the FSD would have to be approved separately for use in each approved training program.

Proposed paragraph (b) would state that the FSD must be qualified for the make, model, and series of aircraft or set of aircraft and for all tasks and configurations, as described in the posted Statement of Qualification required by proposed § 60.9(b)(4).

Proposed paragraph (c) would state that the FSD must remain qualified through satisfactory inspection, recurrent evaluations, appropriate maintenance, and use requirements in accordance with proposed part 60 and the appropriate QPS.

Proposed paragraph (d) would require the sponsor to ensure that the software and active programming used during regular flightcrew member training, evaluation, or flight experience is the same as that which is used during FSD evaluations. For example, it would not be acceptable to narrow the range of motion of a simulator or alter the programming, such that in actual training the range of motion or a handling characteristic such as pitch sensitivity is not the same as it was during the initial evaluation of the simulator by the NSPM. The purpose of this requirement is to ensure that people using the FSD receive the best possible training in a device that closely matches

the performance and handling characteristics of the aircraft being simulated.

Section 60.13 FSD Objective Data Requirements

Proposed paragraph (a) would require the sponsor to submit the aircraft manufacturer's flight test data to the NSPM for validating FSD performance and handling qualities during evaluation for qualification. This flight test data must come from the original certification flight tests and must include any data developed after the type certificate was issued (e.g., data developed in response to an Airworthiness Directive) that incorporates a change in performance, handling qualities, functions, or other characteristics of the aircraft that must be considered during flightcrew member training, testing, or checking, or when meeting flightcrew member experience requirements. Also, this requirement would apply not only for initial qualification of an FSD, but also for subsequent recurrent evaluations of the FSD, and evaluations following any modifications to the FSD, including those made in response to an Airworthiness Directive or an FSD Directive. This is to help ensure that the FSD accurately simulates the aircraft being simulated.

Proposed paragraph (b) would state that the sponsor may submit flight test data to the NSPM from a source in addition to or independent of the aircraft manufacturer's data submitted in support of a FSD qualification. This data would have to be gathered and developed by that source in accordance with the flight test methods, including a flight test plan, as described in the appropriate QPS.

Proposed paragraph (c) would state that the sponsor may submit alternative data (such as engineering simulation or calculated or extrapolated data, etc.) acceptable to the NSPM for consideration, approval and possible use in particular applications for FSD qualification.

Proposed paragraph (d) would require that data or other material or elements must be submitted in a form and manner acceptable to the NSPM.

Proposed paragraph (e) would state that the NSPM may require additional flight testing to support certain FSD qualification requirements.

Proposed paragraph (f) would require that, when an FSD sponsor learns or is advised by an aircraft manufacturer or supplemental type certificate (STC) holder, that an addition to, an amendment to, or a revision of the data used to program and operate an FSD

used in the sponsor's training program is available, the sponsor must immediately notify the NSPM. This would provide an opportunity for the NSPM to decide if action is needed to incorporate the data into that sponsor's or any other sponsor's FSD.

Section 60.14 Special Equipment and Personnel Requirements for Qualification of the FSD

The proposed new section would require that, when notified by the NSPM, the sponsor must make available all special equipment and specifically qualified personnel needed to accomplish tests during initial or recurrent evaluations.

The NSPM would notify the sponsor at least 24 hours in advance of the evaluation if special equipment or personnel would be required to conduct the evaluation. Examples of special equipment include spot photometers, flight control measurement devices, sound analyzer, etc. Examples of special personnel would be those specifically qualified to install or use any special equipment when its use is required. The purpose of this section is to ensure that the NSPM can conduct a meaningful and useful evaluation.

Section 60.15 Initial Qualification Requirements

Proposed paragraph (a) would require that a sponsor seeking an evaluation for an initial FSD qualification must submit a request to the NSPM through the training program approval authority (TPAA), who is defined in proposed § 60.3 as a person authorized by the Administrator to approve the aircraft flight training program in which the FSD will be used (normally the FAA's assigned POI or TCPM for the sponsor). The request would have to be submitted in a form and manner described in the appropriate QPS. An application for qualification under proposed part 60 would have to be submitted through the TPAA because the design of proposed part 60 is that an FSD evaluation is closely tied to its planned use in an FAA approved training program.

Proposed paragraph (b) outlines what must be included in the sponsor's request for an evaluation. Proposed paragraph (b)(1) would state that the request must include a statement that the FSD meets all of the applicable provisions of proposed part 60.

Proposed paragraph (b)(2) would state that the request must include a statement that the sponsor has established a procedure to verify that the configuration of hardware and software present during the evaluation for initial qualification is maintained

except where modified as authorized in proposed § 60.23. The statement must include a description of the procedure. Proposed paragraph (b)(3) would state that the request must include a statement signed by at least one pilot who meets the requirements of paragraph (c) asserting that each pilot so approved has determined that: (i) The FSD systems and sub-systems function in a manner that is equivalent to those in the aircraft or set of aircraft, (ii) the performance and flying qualities of the FSD are equivalent to those of the aircraft or set of aircraft, and (iii) for type specific FSD's, the cockpit configuration conforms to the configuration of the aircraft make, model, and series being simulated. These statements are necessary to ensure that the FSD has been thoroughly and competently assessed by the sponsor and that the assessment was done by someone who is competent to make that determination.

Proposed paragraph (b)(4) would require that the sponsor's request include a list of all of the operations tasks or simulator systems in the subjective test appendix of the appropriate QPS for which the FSD has not been subjectively tested (e.g., circling approaches, windshear training, etc.) and for which qualification is not sought. This list would be required so that future or prospective users would be alerted if a particular FSD is not qualified for a particular task.

Proposed paragraph (b)(5) would require that the sponsor's request must include a qualification test guide (QTG) that includes: (i) Objective data from aircraft testing, or another approved source; (ii) correlating objective test results obtained from the performance of the FSD as prescribed in the appropriate QPS; (iii) the general FSD performance or demonstration results prescribed in the appropriate QPS; and (iv) a description of the equipment necessary to perform the evaluation for initial qualification and the recurrent evaluations for continuing qualification. The QTG is necessary to provide documentation of the results of the initial evaluation. The data will be used for comparison purposes in future recurrent evaluations.

Proposed paragraph (c) would require that, except for those FSD's previously qualified and described in § 60.17, each FSD evaluated for initial qualification would have to meet the standards that are in effect at the time of the evaluation. However, if a change to the standards (i.e., tests, tolerances, or other requirements) for the evaluation for initial qualification are published by the FAA, a sponsor may request that the

NSPM apply the standards that were in effect when an FSD was ordered for delivery under certain circumstances listed in the proposal.

Proposed paragraph (d) would require that the pilot or pilots who make the statement required by paragraph (b)(3) must be designated by the sponsor and approved by the TPAA. In addition the pilot or pilots must be qualified in the aircraft or set of aircraft being simulated or, for aircraft types not yet issued a type certificate, the pilot or pilots must be qualified on an aircraft type similar in size and configuration.

Proposed paragraph (e) would require that the subjective tests that form the basis for the statements described in proposed paragraph (b)(3) and the objective tests described in proposed paragraph (b)(5) must be accomplished at the sponsor's training facility, except as provided for in the appropriate QPS. The procedures described in the QPS allow complete testing of the FSD at the manufacturer's facility but requires that this be followed by a re-test of at least a 1/3 cross-section of all tests at the training center location to ensure that any disassembly/reassembly has not affected the performance or handling qualities of the FSD as originally determined (e.g.; see paragraph 11(m) in the proposed Airplane Flight Simulators Qualification Performance Standards, FAA Document No. FAA-5-120-40C). If the FSD must be moved after the initial evaluation, the sponsor must follow specific procedures that allow the NSPM to require the sponsor to reaccomplish certain tests to ensure that the performance was not affected by the disassembly and reassembly.

Proposed paragraph (f) would require the person seeking to qualify the FSD to provide the NSPM with access to the FSD for the length of time necessary to complete the required evaluation of the FSD for initial qualification. This evaluation for initial qualification includes performance demonstrations, objective tests, and subjective tests, including general FSD requirements, to determine that the FSD meets the standards in the appropriate QPS.

Proposed paragraph (g) would state that a satisfactory evaluation for initial qualification results in the NSPM issuing a Statement of Qualification which would: (1) Identify the sponsor; (2) identify the make, model, and series of aircraft or set of aircraft being simulated; (3) state that the FSD is qualified as either a flight simulator or an FTD; (4) identify the configuration of the aircraft or set of aircraft being simulated, e.g., engine model or models, flight instruments, navigation or other systems, etc.; (5) list all of the

operations tasks or simulator systems in the subjective test appendix of the appropriate QPS for which the FSD has not been subjectively tested and for which the FSD is not qualified, e.g., circling approaches, windshear training, etc.; and (6) indicate the qualification level of the FSD. All of this information would be included on the Statement of Qualification so that future or prospective users of an FSD can determine that the FSD can perform the tasks necessary for their training program.

Proposed paragraph (h) would require that after the NSPM completes the evaluation for initial qualification, the sponsor must update the QTG. The sponsor must incorporate the results of the FAA-witnessed tests and demonstrations, together with the results of all the objective tests and demonstrations described in the appropriate QPS.

Proposed paragraph (i) would provide that, upon issuance of the Statement of Qualification, the updated QTG would become the MQTG. The MQTG would have to be made available to the FAA upon request, so that the FAA can go to one source for all test results related to a specific FSD.

Section 60.16 Additional Qualifications for a Currently Qualified FSD

Proposed paragraph (a) would state the additional qualification process required if a user intends to use the FSD for meeting training, evaluation, of flight experience requirements beyond the qualification issued to the sponsor. Proposed paragraph (a) would require the sponsor to:

(i) Submit to the NSPM all modifications to the MQTG that are required to support the additional qualification; (ii) describe to the NSPM all modifications to the FSD that are required to support the additional qualification; and (iii) submit a statement to the NSPM that a pilot, designated by the sponsor and approved by the TPAA, has subjectively evaluated the FSD in those areas not previously evaluated. These requirements are necessary to ensure that training received in an FSD is adequate for a particular training program.

Proposed paragraph (a)(2) would require the FSD to successfully pass an evaluation as follows: (i) For initial qualification, in accordance with proposed § 60.15 if the NSPM has determined that a full evaluation for initial qualification is necessary; or (ii) for those elements of an evaluation for initial qualification (e.g., objective tests, performance demonstrations, or

subjective tests) designated as necessary by the NSPM.

Proposed paragraph (b) would require the NSPM, in making the determinations described in paragraph (a)(2) of this section, to consider factors including the existing qualification of the FSD, any modifications to the FSD hardware or software that are involved, and any additions or modifications to the MQTG.

Proposed paragraph (c) would state that, except for those FSD's previously qualified and described in § 60.17, each FSD evaluated for initial qualification must meet the standards that are in effect at the time of the evaluation. However, if a change to the standards (i.e., tests, tolerances, or other requirements) for the evaluation for initial qualification are published by the FAA, a sponsor may request that the NSPM apply the standards that were in effect when an FSD was ordered under certain circumstances listed in the proposal.

Proposed paragraph (d) would state that the FSD is qualified for the additional uses when the NSPM issues an amended Statement of Qualification in accordance with proposed § 60.15(f).

Proposed paragraph (e) would state that the sponsor could not modify the FSD except as described in § 60.23.

Section 60.17 Previously Qualified FSD's

Proposed paragraph (a) would state that any FSD qualified before the effective date of a final rule for part 60 will retain its qualification as long as it continues to meet the standards of its original evaluation, regardless of sponsor, and as long as the sponsor complies with the applicable provisions of proposed part 60. This requirement would be effective unless otherwise specified by an FSD Directive or unless the sponsor elects to comply with later standards, as specified in proposed paragraph (e). However, this grandfathering provision applies only to the qualification basis of the FSD. All of the use requirements in part 60, such as the sponsor responsibility for a quality assurance program and the recurrent evaluation, maintenance, and recordkeeping requirements would apply to these grandfathered FSD's.

Proposed paragraph (b) would require that sponsors of previously qualified FSD's obtain a Statement of Qualification, including the Configuration List and the Restrictions to Qualification List within six (6) years after the effective date of this rule in accordance with the procedures set out in the appropriate QPS. This is necessary so that all qualified FSD's will

have a Statement of Qualification, and the information contained therein and retained on file with the NSPM will be useful to the sponsor, potential users, and the FAA.

The FAA is allowing the grandfathering process described above to ensure a stable regulatory design for investment and use of FSD's as long as the FSD is used continually under the rules in proposed § 60.7. At the same time, the FAA wants to encourage industry to use the most up to date standards and in some cases will mandate the use of new standards by issuing an FSD Directive.

Proposed paragraph (c) would state that if the FSD qualification is lost under proposed § 60.27 and is not restored for two or more years, then the basis for requalification would be those standards in effect at the time the sponsor applies for requalification. This is important because the FAA does not want to expend resources to requalify an unused FSD using out of date standards; rather, the FAA wants to encourage industry to use the most up to date standards in the requalification process. In other words, the FAA wants to discourage new investment in old technology and expenditure of public funds to requalify old technology. However, if an FSD is continually in use, the FAA will allow the FSD to continue to operate under the original standards.

Proposed paragraph (d) would require that all changes to FSD qualification levels initiated on or after the effective date of a final rule would require an evaluation for initial qualification in accordance with part 60 unless the sponsor chooses to downgrade the FSD, as specified in proposed paragraph (e). Subsequent recurrent evaluations would use the existing MQTG, modified as necessary to reflect the new qualification level.

Proposed paragraph (f) describes the requirements when a sponsor elects to adopt tests and tolerances described in qualifications standards developed after an FSD was initially qualified. The sponsor would have to provide appropriate validation data and obtain the approval of the NSPM. The NSPM would make the updated tests and tolerances a permanent part of the QTG/MTQG.

The FAA would like to note that there is another category of training devices. Although proposed § 60.17 would not specifically disallow the use of these devices, they would not be considered FTDs under this proposal. These training devices, approved under § 61.4 for use in other than FAA-approved training programs, have been treated as

Level 1 FTDs. However, because these devices were not originally qualified under FAA standards and no objective or subjective tests were required before their approval, they do not meet the proposed definition of an FTD. These devices would continue to be allowed under part 61 for certain training, evaluation, and flight experience requirements, as described under the preamble discussion for "Conforming changes to other parts."

Section 60.19 Inspection, Recurrent Evaluation, and Maintenance Requirements

Proposed § 60.19 contains the specific requirements for conducting periodic inspections and evaluations and for maintaining FSD's. These requirements are necessary to ensure that the FSD continues to meet the standards under which it was originally qualified, so that any training, evaluation, and flight experience conducted in the FSD is reliable and adequate for meeting the objectives of the approved training program under which they occur.

Proposed paragraph (a)(1) would require that to maintain the qualification level for each FSD the sponsor must accomplish all appropriate QPS Appendix 1 performance demonstrations and all appropriate QPS Appendix 2 objective tests each year. To do this, the sponsor would be required to conduct quarterly inspections of the FSD evenly spaced throughout the year. All of the MQTG performance demonstrations and objective tests would have to be completed annually. The sequence and content of each inspection would be developed by the sponsor and submitted to the NSPM for approval. In deciding whether to approve the test sequence and the content of each inspection, the NSPM would look for a balance and a mix from the performance demonstrations and objective test requirement areas; *i.e.*, performance, handling qualities, motion system (where appropriate), visual system (where appropriate), sound system (where appropriate), and other FSD systems.

Proposed paragraphs (a)(2) and (a)(3) would require that to maintain the qualification level for each FSD the sponsor must ensure that the FSD be given a functional check-out, in accordance with the appropriate QPS, before each day's use, or not less than weekly when the FSD is not in use. The proposed paragraphs are similar to existing § 121.407(a)(4).

Proposed paragraph (a)(4) would state that to maintain the qualification level for each FSD the sponsor must maintain

a discrepancy log. The discrepancy log would be maintained in or immediately adjacent to the FSD to advise users of the FSD of the current maintenance status and the status of each discrepancy, including the corrective action, recorded for at least the preceding 30 days. Under proposed paragraph (a)(5) the sponsor would have to ensure that, when a discrepancy is discovered, each discrepancy entry is maintained in the log until the discrepancy is corrected under the requirements of proposed § 60.25(b), and that the discrepancy entry, its corrective action, and the date the corrective action was taken remain in the log for at least 30 days after the discrepancy is corrected. Finally, the sponsor would be required to ensure that the discrepancy log be kept in a form and manner acceptable to the Administrator and must be kept in or immediately adjacent to the FSD. The proposed paragraphs are similar to existing § 121.407(a)(5).

Proposed paragraph (b) would specify the requirements for a recurrent evaluation to be conducted by the NSPM. Proposed paragraph (b)(1) would require that, with certain exceptions, a recurrent evaluation consist of performance demonstrations and objective and subjective tests in accordance with the qualification standards in effect at the time of the initial evaluation or as may be amended by an FSD Directive.

Proposed paragraph (b)(2) would require that the sponsor must coordinate with the NSPM to ensure that the FSD is evaluated within the established recurrent evaluation interval. The sponsor would have to contact the NSPM 60 days before the recurrent evaluation is due to schedule the evaluation.

Proposed paragraph (b)(3) would require that the sponsor must provide the NSPM access to the objective test results and general FSD performance or demonstration results in the MQTG and access to the FSD for the length of time necessary to complete the required recurrent evaluations. Access to the FSD would have to be provided weekdays between 6 AM and 6 PM (local time).

Proposed paragraph (b)(4) would provide that the frequency of NSPM-conducted recurrent evaluations for each FSD will be established by the NSPM and specified in the MQTG. Currently, NSPM evaluations are conducted annually. Proposed paragraph (b)(4) would allow these evaluations to be conducted at different intervals.

Proposed paragraph (b)(5) would provide that recurrent evaluations

conducted in the calendar month before or after the calendar month in which the recurrent evaluations are required will be considered to have been conducted in the calendar month in which they were required.

Proposed paragraph (b)(6) would prohibit the sponsor from using, or offering for use, an FSD for flightcrew member training or evaluation, or for obtaining flight experience under this chapter, unless the FSD has been recurrently evaluated by the NSPM within the timeframe specified in the MQTG.

Proposed paragraph (c) would state that the sponsor is responsible for not only the on-going preventive maintenance, but also for the continuing corrective maintenance. By preventive maintenance the FAA means those actions that are necessary to prevent maintenance discrepancies to the largest possible degree and to continue the FSD in proper service condition (e.g., change hydraulic fluid and filters as prescribed by the manufacturer). By corrective maintenance the FAA means that the sponsor is to "repair" the device when it becomes necessary.

Section 60.20 Logging FSD Discrepancies

Proposed § 60.20 would require that each instructor, check airman, or representative of the Administrator conducting training or evaluation, or observing flight experience for flightcrew member certification or qualification, and each person conducting the preflight inspection (§ 60.19(a)(2), (3), and (4)), who discovers a discrepancy, including any missing, malfunctioning, or inoperative components in the FSD, would have to write or cause to be written a description of that discrepancy into the discrepancy log at the end of the FSD preflight or FSD use session. The FAA believes that the proposed section is important so that the sponsor will be alerted when a repair is necessary and the user will know that a particular task must not be done because any training, testing, or checking accomplished may result in incomplete or negative learning on the part of the pilot. The proposed section is similar to existing § 121.407(a)(5). Compliance with proposed § 60.20 would help FSD users comply with proposed § 60.25(a). In part, proposed § 60.25(a) provides that no person may use an FSD with a missing, malfunctioning, or inoperative component to meet any training, evaluation, or flight experience requirements for this chapter for which the correctly operating component is needed.

Section 60.21 Interim Qualification of FSD's for New Aircraft Types or Models

Proposed § 60.21 would provide for interim qualification of FSD's for new aircraft types or models under certain conditions when the final flight test data package has not been released by the aircraft manufacturer. In cases where an operator is adding a new aircraft type or model to its fleet, it may be necessary to begin training before the final flight test data is available, so that the operator can put the aircraft into service as soon as possible.

Under proposed § 60.21(a) the FSD may be eligible for interim qualification if the sponsor provides the aircraft manufacturer's predicted data, validated by a limited set of flight test data; the aircraft manufacturer's description of the prediction methodology used to develop the predicted data; and the QTG test results.

Proposed paragraph (b) states that in this situation, the interim qualification will be considered the same as initial qualification. The interim qualification would terminate one year after its issuance, if the sponsor has not applied for initial qualification using the final test data, unless the NSPM determines that specific conditions warrant otherwise. Under proposed paragraph (c), within six months of the release of the final flight test data package by the aircraft manufacturer, but no later than one year after the issuance of the interim qualification, the sponsor would have to apply for initial qualification based on the final flight test data package.

Proposed paragraph (d) states that an FSD with interim qualification may be modified only in accordance with § 60.23.

Section 60.23 Modifications to FSD's

Proposed § 60.23 outlines the circumstances under which a sponsor would have to modify an FSD and the procedural requirements the sponsor must follow for modifications. The purpose of this section is to ensure that the FSD continues to accurately simulate the aircraft and that if certain changes are made in the aircraft, the sponsor makes corresponding changes to the FSD. Proposed paragraph (a) would require that an FSD be modified when the FAA determines that the FSD cannot be used adequately for training, evaluating, or providing flight experience for flightcrew members, and when the sponsor or the FAA determines that any of the following circumstances exist:

(1) The aircraft manufacturer or another approved source develops new

data regarding the performance, functions, or other characteristics of the aircraft being simulated;

(2) A change in aircraft performance, functions, or other characteristics occurs;

(3) A change in operational procedures or requirements occurs;

(4) Other circumstances as determined by the NSPM.

Proposed paragraph (b) would state that when the FAA determines that FSD modification is necessary for safety of flight reasons, then the sponsor of each affected FSD must ensure that the FSD is modified according to the FSD Directive, regardless of the FSD's original qualification standards.

Proposed paragraph (c) would set forth requirements for sponsors in notifying the NSPM and TPAA about FSD modifications. The notification would have to include a complete description of the planned modification, including a description of the operational and engineering effect the proposed modification will have on the operation of the FSD, and be submitted in a form and manner as specified in the appropriate QPS. This notification is considered important to ensure that the FAA agrees with the modification before the modification is incorporated into training. In addition, the notification would ensure that training is consistent with the latest data, changes in aircraft performance, and changes in procedures.

Proposed paragraph (d) would set forth notification requirements if the sponsor intends to do any of the following: add additional equipment or devices intended to simulate aircraft appliances; modify hardware or software that would affect flight or ground dynamics; or change the motion, visual, or control loading systems (or sound system for FSD levels requiring sound tests and measurements). In any of these cases the sponsor would have to follow paragraph (c) plus provide a statement of the results of all objective tests that have been rerun with the modification incorporated, including any necessary updates to the MQTG. These notification requirements would not apply to routine maintenance or repair, but only for modifications to the FSD. The modifications could not be implemented until the sponsor receives written approval from the NSPM, who may require that the modified FSD be evaluated for full or partial initial qualification. The NSPM would evaluate at least the newly installed or changed equipment, any device intended to simulate an aircraft appliance, the new or changed software or hardware, and any other aspect of the

original FSD that might affect or be affected by the installation or change.

Proposed paragraph (e) would state that the sponsor may not modify a qualified FSD until, for circumstances described in paragraph (b) or (d), the sponsor receives written approval from the NSPM that the modification is authorized. For circumstances other than those described in paragraph (b) or (d), if the NSPM or TPAA does not otherwise notify the sponsor within 21 days after receiving the sponsor's notification, the sponsor may modify the FSD after the 21 days have passed.

Proposed paragraph (f) would require the sponsor to notify certificate holders about modifications made to an FSD before the certificate holders' first use of the FSD after the modification.

Proposed paragraph (g) would require that each time an FSD is modified and the modification affects an objective test, then the MQTG must be updated accordingly. The MQTG should reflect current objective test results (in accordance with § 60.15(b)(4)) and appropriate flight test data (in accordance with § 60.13). If this update is initiated by the FAA, the requirement to make this modification would be found in an FSD Directive. The MQTG would also have to be updated with the direction to make these changes, along with the record of the completion of the modification.

Section 60.25 Operation With Missing, Malfunctioning, or Inoperative Components

The FAA is proposing this section because it believes that users must be alerted when an FSD has a missing, malfunctioning, or inoperative component thereby limiting its use for certain tasks, while also providing the sponsor a reasonable time period to make repairs. If a user is unaware of a missing, malfunctioning or inoperative component, the training may be incomplete or even have negative results.

Proposed paragraph (a) would limit the use of FSD's with a missing, malfunctioning, or inoperative component. This restriction would prevent the potential of incomplete or negative learning on the part of the pilot, by preventing all maneuvers, procedures, or tasks that require the use of the correctly operating component from being conducted during flight training, evaluation, or flight experience activities when that component is not present and operating correctly. Due to the fact that the typical use of a "minimum equipment list" is associated with "safety of flight operations," which is not applicable to the use of

simulation for training, testing, or checking, the FAA is not describing or requiring the use of an FSD "minimum equipment list." Instead, the FAA believes that those who operate the FSD for credit purposes (e.g., instructors, check airmen, Aircrew Program Designees, representatives of the Administrator, etc.) are familiar with the components of a normally operating aircraft for each particular task, and know that if a normally functioning component, otherwise required for that task, were to become missing, malfunctioning, or inoperative, that task would have to be omitted from the syllabus, or delayed, until such time as that component is repaired or replaced. Except as provided below, this is not intended to restrict the operation of the FSD for accomplishment of a given task when a component is missing, malfunctioning, or inoperative, if that component is listed in the airplane "minimum equipment list" and the FSD is operated as the airplane would be operated, in accordance with any requirements listed in the "minimum equipment list" and that task is accomplished through use of alternative equipment. However, if the FAA-approved training program being administered requires that the task be completed using the correctly operating component, using the provisions of a "minimum equipment list" to complete the task without that component operating properly would not be permitted under this regulation. The FAA believes that this paragraph, together with the requirements of proposed § 60.20 (that would require each person who discovers a discrepancy, including any missing, malfunctioning, or inoperative components in the FSD, would have to write or cause to be written a description of that discrepancy into the discrepancy log) is representative of the current practice in FSD's that has well served the FAA, the industry, and the individual pilot for at least two decades. The FAA has, at this time, no reason to change this practice; however, should this position be found to be deficient in some way, additional steps may have to be considered.

Proposed paragraph (b) would require that within 7 calendar days, each missing, malfunctioning, or inoperative component must be repaired or replaced, unless the NSPM requires a shorter time or authorizes a longer time. If the sponsor does not repair or replace the component within 7 calendar days (or the shorter period required or longer period authorized under paragraph (b)), the NSPM may consider taking some

action, including removing the qualification of the FSD. The requirement to repair each missing, malfunctioning, or inoperative component applies not only to components that are necessary for flightcrew member training, evaluation, or flight experience, but also to all other components of the FSD.

Proposed paragraph (c) would require that missing, malfunctioning, or inoperative components must be placarded on or adjacent to the component or the control for that component in the FSD and that a list of currently missing, malfunctioning, or inoperative components must be readily available in or immediately adjacent to the FSD for review by users of the device.

Section 60.27 Automatic Loss of Qualification and Procedures for Restoration of Qualification

Proposed paragraph (a) would establish criteria that would indicate when an FSD is no longer qualified. When any of the circumstances in proposed paragraphs (a)(1) through (a)(5) occur, the FSD is automatically no longer qualified, without notification by the NSPM. In these circumstances, something has happened without the FAA's knowledge that makes the FSD not qualified for training, so the FSD should not be used until the FAA can evaluate the FSD under the procedures in proposed paragraph (b).

Proposed paragraphs (b) and (c) would contain requirements for restoring FSD qualification when it is lost under proposed paragraph (a). The NSPM would determine how the FSD qualification must be restored. The NSPM determination could range from requiring no evaluation, a partial evaluation for initial qualification, or a full evaluation for initial qualification. The basis for determining the evaluation content and time required for the evaluation would include: The number of recurrent evaluations missed during the inactive period, the amount of disassembly and reassembly that was accomplished, and the care that had been taken of the device since the last evaluation and since its loss of qualification.

Section 60.29 Other Losses of Qualification and Procedures for Restoration of Qualification

Proposed § 60.29 contains the procedures to be followed when an FSD loses its qualification in circumstances other than those covered in proposed § 60.27. The purpose of this section is to allow a sponsor to officially question loss of FSD qualification before the FSD

actually loses its qualification, except in emergency situations.

Proposed paragraphs (a)(1)–(3) would set forth the procedures for the NSPM or TPAA to follow in communicating with the sponsor when an FSD no longer meets qualification standards, including written notification to the sponsor; establishing a time period in which the NSPM or TPAA may respond with written information, views, and arguments on FSD qualification; and consideration of the sponsor's arguments and notification to the sponsor of the FSD qualification.

Proposed paragraph (a)(4) would require that if the NSPM or TPAA determines that an FSD is no longer qualified, the loss of qualification would be effective 30 days after the sponsor receives notice. The exceptions to this requirement would be if the NSPM or TPAA finds under paragraph (c) of this section that there is an emergency requiring immediate action with respect to safety in air transportation or air commerce, or if the sponsor petitions for reconsideration of the NSPM or the TPAA finding under paragraph (b) of this section.

Proposed paragraph (b) would set forth the procedures for a sponsor to follow when the sponsor seeks reconsideration of the NSPM or TPAA decision regarding FSD qualification. This would include submitting a petition for reconsideration, addressed to the Director of Flight Standards Service, within 30 days after the sponsor receives notice that some or all of the FSD is no longer qualified. This petition for reconsideration would suspend the NSPM's or TPAA's determination that the FSD is no longer qualified. However, this provision would not apply if the NSPM or the TPAA finds that, under paragraph (c) of this section, an emergency exists requiring immediate action with respect to safety in air transportation or air commerce.

Proposed paragraph (c) would set forth the procedures for the NSPM or TPAA to follow if they find an emergency exists that would require immediate action with respect to safety in air transportation or air commerce; such an emergency would make the procedures set out in other parts of this section impracticable or contrary to the public interest. Proposed paragraph (c)(1) would allow the NSPM or TPAA to withdraw qualification of some or all of the FSD and make the withdrawal of qualification effective on the day the sponsor receives notice of it. Proposed paragraph (c)(2) would require that the NSPM's or TPAA's notice to the sponsor articulate the reasons for its finding that

an emergency exists. The notice would have to state that such an emergency would require immediate action with respect to safety in air transportation or air commerce, or that the emergency makes it impracticable or contrary to the public interest to stay the effectiveness of the finding.

Examples of such emergencies described in proposed paragraph (c) include: A finding by the FAA that the training conducted in the FSD is or may be incomplete, inaccurate, or negative because of a specified finding of a problem with the FSD. The finding of a specific problem with the FSD could be a reasonable basis for the NSPM questioning whether or not the FSD continues to meet its qualification level. Aviation safety requires that if the FAA has a reasonable basis for questioning whether the FSD continues to meet its qualification level, that it not be used for required flightcrew member training, testing, or flight experience until its known that the FSD is qualified.

Section 60.31 Recordkeeping and Reporting

This proposed section is based on the current recordkeeping practices of FSD sponsors and is necessary to ensure that the FSD is complete and operating correctly; that problems are noted and due dates are identified for correcting malfunctions; that users are alerted to approved uses for the FSD; and that training is useful and adequate.

Proposed paragraphs (a)(1)–(3) would require the FSD sponsor to maintain the following records for each FSD: (1) The MQTG and each amendment to the MQTG; (2) A copy of the programming used during evaluation of the FSD for initial qualification or upgrade, as well as a copy of all programming changes made since the evaluation for initial qualification; (3) A copy of results of evaluations for initial and upgrade qualification; the results of the quarterly objective tests and the approved performance demonstrations, which must be kept for 2 years; the results of either the previous three recurrent evaluations or the recurrent evaluations from the previous 2 years, whichever covers a longer period; and any comments obtained under § 60.9(b)(1), which must be maintained for at least 18 months.

Proposed paragraph (a)(4) would require the FSD sponsor to maintain a record of all discrepancies entered in the discrepancy log over the previous 2 years, including a current listing of components/equipment that have become missing, malfunctioning, or inoperative; the action taken to correct the deficiency; and the date of the

corrective action. The list must be available for NSPM review at any time.

This proposed requirement should not be confused with the proposed requirement in § 60.19(a)(5)(ii), where the sponsor would be required to maintain a record of the discrepancy, and the corrective action, in the discrepancy log for a period of at least 30 days. The proposal in this section would require the sponsor to maintain these records for an additional 23 months; however, the sponsor would not necessarily have to keep the records in the discrepancy log in or immediately adjacent to the FSD for more than 30 days. Wherever the sponsor elects to keep the records, they must be available for NSPM review.

Proposed paragraph (a)(5) would require the FSD sponsor to keep a record of all modifications to FSD hardware or software configurations from the initial qualification configuration.

Proposed paragraph (b) would require the FSD sponsor to keep a current record of each certificate holder using the FSD and to provide a copy of this list to the NSPM at least semiannually.

Proposed paragraph (c) states that the records specified in this section would have to be maintained in plain language form or in coded form, if the coded form provides for the preservation and retrieval of information in a manner acceptable to the NSPM. The FAA accepts and encourages the use of electronic records and reporting for all of these proposed requirements, assuming the sponsor has appropriate security or controls to prevent the illegal or inappropriate alteration of such records after the fact.

Proposed paragraph (d) would require the sponsor to submit an annual report certifying that the FSD continues to perform and handle as qualified by the NSPM. This report would have to be signed by the management representative.

Section 60.33 Applications, Logbooks, Reports, and Records: Fraud, Falsification, or Incorrect Statements

The proposed section is based on other FAA regulations addressing falsification of applications, reports, and records. The proposal is intended to ensure that a proposed sponsor or a user of an FSD understands that aviation safety requires accuracy and truthfulness in applications, reports, and records. Therefore, depending on the circumstances, there are consequences associated with falsification of applications, reports, and records.

Proposed paragraph (a) prohibits any person from making fraudulent or intentionally false statements, false entries, omissions, or fraudulent reproduction or alteration in any applications, reports, records, or test results required under proposed part 60 or the QPS, or to exercise any privileges under any other FAA regulation.

Proposed paragraph (b) would state that if any person commits any of the above acts, that person is subject to civil penalty, certificate suspension or revocation, or the removal of FSD qualification and approval for use in a training program issued under this part or QPS. The certificate suspension or revocation could apply to either an airman certificate, in a case involving an individual, or to an operating certificate, in a case involving a certificate holder.

Proposed paragraph (c) states the actions that could serve as a basis for removal of qualification of an FSD, including the withdrawal of authorization for use of an FSD or denying an application for a qualification. These actions include: (1) An incorrect statement, on which the FAA relied or could have relied, that was made in support of an application for a qualification or a request for approval for use; or (2) an incorrect entry, on which the FAA relied or could have relied, made in any logbook, record, or report that is kept, made, or used to show compliance with any requirement for an FSD qualification or an approval for use.

Section 60.35 Specific Simulator Compliance Requirements

The proposed section addresses the goal of providing complete, accurate training and evaluation of flightcrew members in a flight simulator. This proposed requirement would help ensure that all aspects of a flightcrew member's training needs will be able to be addressed competently in a flight simulator.

Proposed paragraph (a) sets forth simulator requirements that would take effect 18 months after the effective date of the final rule for proposed part 60. These proposed requirements state that the flight simulator being evaluated for initial or upgrade qualification must conform to the aircraft being simulated, and must simulate the operation of all equipment or devices intended to simulate aircraft appliances installed and operating on the aircraft. Any simulator that was qualified before that date would remain qualified; however, if the sponsor decided to upgrade the simulator for any reason, it would also have to be upgraded to comply with this paragraph.

Proposed paragraph (b) sets forth simulator requirements that would take effect 2 years after the effective date of the final rule for proposed part 60. These proposed requirements state that each flight simulator used for meeting flightcrew member training, evaluation, or flight experience requirements of this chapter for certification or qualification that cannot perform satisfactorily in ground operations, takeoff, climb, cruise, descent, approach, and landing (including normal, abnormal, and emergency landings) would no longer be qualified as a simulator. The only significant change from existing practice is the addition of landings to this list. The net effect of this added requirement would be to eliminate the use of level A simulators.

The FAA is proposing this change because landings are an essential part of complete training conducted in simulators. The concern is that level A simulators do not provide adequate training on takeoffs and landings in normal and asymmetrical thrust conditions. Sponsors of level A simulators would have the option of downgrading to an FTD or upgrading to a level B simulator within 2 years after the effective date of the final rule.

The level A simulator is the least sophisticated of today's simulator levels and is today's reference for the historic "visual" simulator that was referenced in the regulations as far back as the mid-to late 1960's, when visual systems first appeared as attachments to the (non-visual) simulators that had been used in pilot training activities up to that time.

The requirements for data applicable to simulators of this vintage, both "visual" and "non-visual," were elementary, and relatively primitive when compared to today's standards. The two most common visual systems consisted of either a Visual Anthropomorphic Motion Picture system that projected a motion picture of the final approach course from approximately three to four miles from the approach end of the runway—sometimes, through the beginning of the missed approach; or a closed circuit television camera mounted on a movable "gondola" that provided TV pictures as the camera was "flown" over a model terrain board containing a model airport and its surrounding environment. In addition to the inherent propensity for malfunctions (e.g., the reduction of the final approach length due to continual breakage of brittle film and the resulting splicing, or the limitations of the TV cable to twist or turn and become unplugged), the "requirements" for a visual system were completely subjective and the direct

projected system provided an agreeable presentation to only one pilot at a time. The guidance given was that " * * * visual systems may be approved for the specific maneuver(s), procedure(s), or function(s) requested by the applicant provided the evaluation indicates the training and checking objectives can be accomplished as well as in (the) airplane."

Motion system requirements for visual and non-visual simulators were not as sophisticated as the requirements for a visual system. As the industry moved into the 1970's, the simulator motion system requirement stated that " * * * visual and non-visual simulators, to be approved for any of the maneuvers * * * to be performed in a simulator in lieu of the aircraft, must have motion." Most such motion systems were either two or three degrees-of-freedom (dof), and not moving through much distance—just enough to let the occupants of the simulator know they were "moving." While there was some effort expended in most cases to try to subjectively coordinate this simulator "movement" with what was thought to be what the pilot would feel in the airplane, there was little or no data on which to base this coordination and, therefore, no standards for such systems. Even though the industry formally acknowledged the value of a 6-dof motion system in the mid-1970's, the "standards" for motion systems had not yet pointed to a specific requirement for motion cueing or motion system operation. In fact, it wasn't until the beginning of the 1980's that any "requirements" for motion systems were formalized and published.

In the last two decades there have been two major advancements in the field of simulation. First, computer speed and capability have accelerated at a staggering rate; and second, there has been a recognition of the necessity for gathering meaningful airplane flight test data against which simulator performance and handling comparisons may be made. Computer speed and this newly acquired data have been incorporated rapidly into simulation and, overall, simulation has advanced considerably during this time period. Of significant note is that the levels of simulation that are the most affected by these advancements are the level C and level D simulators, with some, limited advancement in level B. Notably, however, there has not been an advancement in the data, nor in the data application, for the level A simulators probably due to the fact that very few new, level A simulators have been built and that it would be costly to modify current level A simulators to

incorporate the data/data applications that might be applicable.

The efficacy of training and testing using level A simulators has long been a topic of discussion among members of the industry and the FAA. The National Transportation Safety Board (NTSB) has also discussed the same topic when conducting investigations of several accidents/incidents during this same two decade period. Perhaps the most extensive discussion of this topic by the NTSB occurred during the investigation of the DC-9-14 accident at Milwaukee, Wisconsin, in September, 1985. In the report of that accident, the NTSB stated that “* * * advanced (6 dof) simulators are not available for that series DC-9 * * * (and) this results in a requirement that landing credits, which cannot be obtained in the simulator, must be acquired in the airplane.” The report went on to say, “However, the practicing of engine failure maneuvers on takeoff, are authorized in the visual flight simulator.”

The dichotomy that has existed with this position—and remains true today—is the premise that the level A simulator has sufficient performance and handling qualities, supported by data and data application (e.g., for motion system response), for all takeoffs (including the engine-out takeoff), but does not have sufficient performance and handling qualities, supported by data and data application, for landing maneuvers. Since takeoffs and landings occur in the same portion of the flight envelope (in and through “ground effect”), the premise that takeoffs are supportable and landings are not supportable is clearly inconsistent. Either the data and their application are present and useable or they are not. This case is one where they are not present, and, therefore, cannot be useable.

Any authorizations must be based on the capability of the simulator to provide accurate simulation. This cannot occur without the availability of accurate data properly incorporated into the operation of the simulator.

Simplistically, an order changing the authorizations of level A simulators to disallow takeoff training, including the takeoff-with-engine-failure task, might seem to be all that is appropriate. However, the FAA is concerned that unnecessary confusion, perhaps confusion leading to misuse and possible negative training, might result. However, the FAA provides for additional levels of simulation that do not allow takeoff or landing tasks. One level of these flight training devices, FTD Level 6, equipped with a proper visual system and a proper motion system (which are not required but may

be incorporated) may be authorized to conduct all of the flight training tasks that might otherwise be allowed in a “revised” approval of a level A simulator. FTDs, including those equipped with motion and/or visual systems, are not authorized for flightcrew member testing, checking, or review. Additionally, such an approach is more in line with the on-going harmonization effort currently underway with the Joint Aviation Authorities (JAA) in Europe for comparable simulation equipment.

Therefore, the FAA is proposing to eliminate the level A simulator from the inventory within the prescribed two year time frame described in the proposed rule.

Section 60.37 Simulator Qualification on the Basis of a Bilateral Aviation Safety Agreement (BASA)

The proposed section is based on existing Simulator Implementation Procedures, supported by existing BASAs, currently in place and others that are pending. Adding this to the rule provides the FAA with a regulatory basis for entering into such agreements for simulator evaluation/qualification purposes.

Proposed paragraph (a) would state that an evaluation or qualification of an airplane simulator by a contracting State to the Convention on International Civil Aviation for the sponsor of an aircraft simulator located in that contracting State may be used as the basis for the NSPM issuing a U.S. statement of qualification to the sponsor. A sample statement of qualification appears in the appropriate QPS, in appendix 5, figure 4. This would be in accordance with a BASA between the United States and the Contracting State that issued the qualification, and a Simulator Implementation Procedure (SIP) established under the BASA.

Proposed paragraph (b) would state that the SIP must contain any conditions and limitations on validation and issuance of such qualification by the U.S.

Conforming Changes to Parts 61, 63, 141, and 142

Because proposed part 60 contains the FAA requirements for evaluation and qualification of flight simulation devices, specific qualification requirements are no longer needed in other regulations that address the use of simulation in flightcrew member training. Therefore, changes are proposed in parts 61, 63, 141, and 142 to delete specific flight simulation device qualification requirements and

substitute cross references to proposed part 60.

In addition, a number of changes are proposed for part 61 to provide for the continuing use of certain training devices that have been approved by the FAA under part 61 for use in other than FAA-approved training programs. These devices are currently designated as Level 1 flight training devices, but they do not meet the proposed definition for flight training devices in this NPRM. Under this proposed rule, these devices would retain their approval and can continue to be used for their current purposes; however, they would no longer be treated as flight training devices and would not fall under the qualification or use requirements of proposed part 60. Therefore, they would not need to follow the requirements for establishment of a quality assurance program, recurrent evaluation, maintenance, and recordkeeping. The approval for these devices is described in proposed § 61.4(b). They would be referred to as “other devices approved under § 61.4(b).” These devices could be used only for private pilot certificate and instrument rating training, evaluation, and flight experience requirements. A number of sections in part 61 would be amended to provide specific approval to use these devices for meeting certain requirements of part 61. The sections that would be amended are §§ 61.1, 61.23, 61.31, 61.51, 61.65 and 61.109.

Also, some minor clarifying changes are proposed to part 63. Section 63.39(b)(3) and Appendix C, paragraph (a)(3)(iv) refer to the activity to be accomplished “* * * in an airplane simulator, or in an approved flight engineer training device.” The FAA is proposing to use the term “appropriately equipped cockpit specific flight training device qualified in accordance with part 60 of this chapter” instead of “approved flight engineer training device” because flight training device is the term used in part 60. This should avoid confusion since part 60 describes qualification requirements for FTDs whereas “approved flight engineer training device” is not a defined term.

Delegation of Authority for Standards Documents

The FAA proposes to delegate final authority to review and issue amendments to the QPSs proposed elsewhere in this notice from the Administrator to the Director, Flight Standards Service. Specifically, these standards documents are the QPSs for: Airplane Flight Simulators; Airplane Flight Training Devices; Helicopter

Flight Simulators; and Helicopter Flight Training Devices.

The FAA anticipates that these documents will require routine changes for a variety of reasons, *e.g.*, increased knowledge about human factors, analysis of incident/accident data, and changes in aircraft or simulation technology. Because these standards will be regulatory in nature, current FAA policy provides for the Administrator to review changes before final action on them is complete. This process involves significant levels of participation in the review process by individuals at all levels of the agency.

The FAA expects that most future changes to the standards/rule sections of the QPS documents will be published in the **Federal Register** as NPRMs for public comment, just as they are published as part of this NPRM. This will be true unless "good cause" exists under the Administrative Procedure Act (APA), which would warrant the FAA publishing such a change to a QPS document without following the standard notice and comment procedures. Under the APA, in order for the FAA to issue a rule without following notice and comment procedures, the FAA would have to make a good cause finding that following such notice and public procedures would be impracticable, unnecessary, or contrary to the public interest.

The FAA does not expect that many changes to these standards documents will justify the expenditure of time and resources at the highest levels of the agency that the standard procedures for final review of rulemakings requires. Therefore, consistent with good government, the FAA proposes to streamline the process for making technical changes to these standards documents by delegating authority for final review and issuance from the Administrator to the Director, Flight Standards Service. The FAA believes that the delegation will result in more timely responses to incident/accident data and advances in aircraft or simulation technology.

Consistent with similar delegations of authority, this authority would be exercised with the concurrence of the Office of the Chief Counsel. If, at any time during the amendment process the Administrator or the Director, Flight Standards Service, determines that a proposed amendment would not be appropriate for this streamlined process, the rulemaking project would proceed in accordance with the agency's normal rulemaking procedures.

Paperwork Reduction Act

This proposal contains the following new information collection requirements. As required by the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)), the Department of Transportation has submitted the information requirements associated with this proposal to the Office of Management and Budget for its review.

Title: Flight Simulation Device Initial and Continuing Qualification and Use.

Summary: The FAA proposes to amend the regulations to establish flight simulation device qualification requirements for all certificate holders in a new part. The basis of these requirements currently exists in different parts of the FAA's regulations and in advisory circulars. The proposed changes would consolidate and update flight simulation device requirements.

Use of: This proposal would support the information needs of the following initiatives under the FAA's Corporate Project, Safer Skies:

- a. AFS Strategic Plan—Goal 1: Evolve to a Systems Approach for Safety Oversight.
- b. AFS Business Plan Initiative 2.9: Improve the Requirements Process.
- c. AFS Strategic Plan—Goal 4: Promote Positive, Responsive, and Focused Customer Relations.
- d. AFS Business Plan Initiative 2.13: Continue Efforts Associated with Safer Skies—Commercial Aviation.

Respondents (including number of): The likely respondents to this proposed information requirement are sponsors of Flight Simulation Devices. At this time, the likely number of respondents is 66.

Frequency: The FAA estimates the 66 sponsors would have a total of 450 responses annually in the first year.

Annual Burden Estimate: This proposal would result in an annual recordkeeping and reporting burden of 201,653 hours for the industry at a cost of \$6,108,590. Out of that annual burden, however, the FAA believes that only 1,898 hours and \$74,010 would be truly new; although not currently required by regulation, the industry is already doing much of what is proposed in this action. In addition to the burden stated above, there would be a one-time burden of 31,680 hours and \$891,504. The recordkeeping and reporting burden is broken down into more detail as follows:

Section 60.5, Quality Assurance Program, would call for a sponsor to develop, review, and have approved by the FAA, a quality assurance program (or QAP) applicable for each flight simulation device. However, the FAA assumes that the sponsor will provide

the same QAP for each FSD it sponsors. Therefore, a calculation of the time involved is on a "per sponsor" basis, rather than on a "per FSD" basis, is appropriate. The purpose of this QA program is to require the sponsor to systematically plan for and implement the requirements of part 60 and the associated QPS.

The quality assurance program would impose two types of cost on the industry and the FAA: a set-up, or one-time cost, and an annually recurring cost.

For the one-time cost on the industry side:

(1) an FSD technician and a pilot instructor would spend approximately 320 hours and 64 hours, respectively, to develop a quality assurance program:

(2) an FSD technician and a pilot instructor would spend approximately 16 hours each to work on the technical coordination of metrics for a QA program;

(3) a clerk would spend approximately 64 hours to do the paperwork associated with a QA program.

This yields a total of 31,680 hours and \$891,504 for the one-time expense.

For the continuing, annual cost on the industry side:

(1) To maintain the QA program the Management Representative would spend 12 hours to do the paperwork:

(2) To maintain the QA program a clerk would spend approximately 2 hours to do the paperwork;

This yields a total of 924 hours and \$33,984 for the continuing, annual expense.

Section 60.9(b)(3), Additional Responsibilities of the Sponsor, sets out a requirement for each sponsor to maintain a liaison with the manufacturer of the aircraft being simulated by the FSD. The time and costs involved would be as follows:

The Management Representative would spend 0.5 hours in drafting a letter to the manufacturer each quarter (*i.e.*, each 3 months or 4 times each year) and a clerk would spend 0.5 hours each quarter preparing the letter for mailing, for a total of 264 hours and \$6,324.

Section 60.15(b), Initial Qualification Requirements, sets out the requirements for the contents of the request for evaluation and is broken into the following parts.

The request for an evaluation is a one-time event for each new FSD the sponsor wishes to include in the approved training program. Time and costs will be as follows:

(a) For the letter of request: The Management Representative, or a Pilot Instructor, would spend 0.5 hours in drafting a letter to the NSPM and a clerk

would spend 0.5 preparing the letter for mailing.

This yields 1 hour and \$50.50 for each new FSD entering service with a given sponsor.

Estimates now are that approximately 70 new FSDs will enter service each year. This estimate would yield 70 hours and \$3,535 each year.

(b) For the list of all operations tasks or simulated systems for which the sponsor is seeking or is not seeking qualification, the Management Representative, or a Pilot Instructor, would spend 1 hour developing the list and a clerk would spend 1.5 hours in preparing the list for attachment to the letter of request for evaluation.

This yields 2.5 hours and \$108.50 for each new FSD entering service with a given sponsor. Estimates now are that approximately 70 new FSDs will enter service each year. This estimate would yield 175 hours and \$7,595 each year.

(c) For the qualification test guide, an FSD technician would spend 40 hours developing the technical aspects of the qualification test guide and inserting the appropriate test results; the Management Representative or a Pilot Instructor, would spend 40 hours developing the operational aspects of the qualification test guide.

This yields 80 hours and \$4,600 for each new FSD entering service with a given sponsor.

Estimates now are that approximately 70 new FSDs will enter service each year. This estimate would yield 5,600 hours and \$322,000 each year.

Section 60.16, Additional Qualifications for a Currently Qualified FSD, sets out the requirements for the sponsor to submit to the NSPM a summary of all modifications to a qualified FSD if that FSD is going to be used by an additional user (other than the sponsor) for tasks not originally qualified. While it is not possible to predict with any accuracy what additional tasks might be needed beyond the qualified tasks for any FSD, the following is offered for consideration:

(a) For all additional tasks (beyond those originally qualified) that require no qualification test guide modification, the Management Representative or a pilot instructor would spend 0.5 hours in drafting a letter to the NSPM and a clerk would spend 0.5 preparing the letter for mailing. Assuming the following:

(1) That additional tasks (beyond those originally qualified) will be requested of 25% of all new FSDs and

(2) That 70 new FSDs will enter service each year.

(b) For each additional task (beyond those originally qualified) that requires qualification test guide modification, the FSD technician would spend 2.5 hours in developing an appropriate change, a clerk would spend 0.5 hours preparing the proposed change, the Management Representative or a pilot instructor would spend 0.5 hours drafting a letter to the NSPM, and a clerk would spend 0.5 hours preparing the letter for mailing. Assuming the following:

(1) That 2 additional tasks (beyond those originally qualified) will be requested on 5% of new FSDs;

(2) That 1 additional task will be requested on 20% of new FSDs and;

(3) That 70 new FSDs will enter service each year—

This yields 32 hours and $\$1,044.70 \times 20\% = 14$ FSDs with additional tasks; this yields 51 hours and \$1,824.

Section 60.19, Inspection, Maintenance, and Recurrent Evaluation Requirements, requires sponsors to conduct inspections of each FSD each calendar quarter, with each such inspection addressing approximately one-fourth of the performance demonstrations and one-fourth of the objective tests required in the appropriate Qualification Performance Standard document. This inspection, conducted automatically, on modern FSDs would take an FSD technician 2 hours; and on older FSDs with more manually controlled functions, this inspection would take an FSD technician 6 hours to complete. Approximately 60% of the current 500 FSD inventory are modern FSDs and 40% are older FSDs. This yields 7,200 hours and \$208,800.

This section also requires that a functional preflight check be completed prior to use each day and at least once each week when not regularly used. This preflight check would take an FSD technician 0.5 hours to complete. While it is not possible to predict with any accuracy what the frequency of use might be for any given FSD, the following is offered for consideration: Assume the following:

(1) That 70% of the qualified FSDs are used an average of 4 days each week for 42 weeks of the year and are used not more than once each week for the remainder of the 10 weeks each year;

(2) That 30% of the qualified FSDs are used an average of 6 days each week for 26 weeks, 3 days each week for 13 weeks, and not more than once each week for the remainder of the 13 weeks each year.

This yields 30,960 hours and \$897,840.

This Sub-Section also requires that when a discrepancy is discovered at any time, the discrepancy and the corrective action taken must remain in the discrepancy log for at least 30 days after the discrepancy has been corrected. While it is not possible to predict accurately the frequency with which discrepancies might occur and the amount of time required to repair any given discrepancy would be directly dependent on the nature of that discrepancy, the following is offered for consideration: Assume the following:

(1) That there are an average of 2 discrepancies each week on each qualified FSD, for an average of 104 discrepancies each year on each qualified FSD;

(2) That 80% of these discrepancies is a minor discrepancy and will take an FSD technician an average of one hour to repair;

(3) That 15% of these discrepancies is moderate and will take an FSD technician an average of 4 hours to repair; and

(4) That 5% of these discrepancies is major and will take an FSD technician an average of 24 hours to repair.

It will take an FSD technician 0.25 hours to record each correction in the discrepancy log. This yields a total of 148,000 hours and \$4,292,000.

This section also requires that each FSD be recurrently evaluated by the NSPM not less than once each year. This evaluation will require the time of a sponsor FSD technician and a sponsor pilot instructor. Each evaluation will require approximately 4 hours of time from both participants (time spent in the FSD) and approximately 2 additional hours of time from the sponsor's FSD technician. The FAA estimates that of the 500 FSDs currently qualified, approximately 30% are sponsored by 10% of the sponsors (large sponsor) and 70% are sponsored by 90% of the sponsors (small sponsor).

This yields a sub-total of 10 hours and \$518 per FSD for each of the 30% of 500 FSDs, or a total of $10 \times 150 = 1,500$ hours and $\$518 \times 150 = \$77,700$.

For 90% of the sponsors (*i.e.*, small sponsors) representing 70% of the qualified FSDs: This yields a sub-total of 10 hours and \$290 per FSD for each of the 70% of 500 FSDs, or a total of $10 \times 350 = 3,500$ hours and $\$290 \times 350 = \$101,500$. The total of the above is 5,000 hours and \$179,200.

This section also requires the sponsor to contact the NSPM to schedule the FSD for the recurrent evaluation. This contact and schedule will require a clerk for the sponsor to write, fax, or e-mail the NSPM and will take 0.5 hours to gather the necessary data, complete

the contact, and arrange for the recurrent evaluation. A clerk for the NSPM will take 0.5 hours to complete the compatible schedule. With 500 FSDs this yields $0.5 \text{ hours} \times 500 = 250$ hours and $\$ 7.50 \times 500 = \$3,750$.

Section 60.20, Logging FSD Discrepancies, requires that when a discrepancy is discovered at any time, the discrepancy must be written into the discrepancy log. While it is not possible to predict accurately the frequency with which discrepancies might occur, the following is offered for consideration: Assume the following:

(1) That there are an average of 2 discrepancies each week on each qualified FSD, for an average of 104 discrepancies each year on each qualified FSD.

(2) That 80% of these discrepancies are recognized by a pilot instructor and (3) That 20% of these discrepancies are recognized by an FSD technician.

The entry of the discrepancy into the log would take 0.05 hour per entry.

The FAA estimates that of the 500 FSDs currently qualified, approximately 30% are sponsored by 10% of the sponsors (large sponsor) and 70% are sponsored by 90% of the sponsors (small sponsor). Together, this yields a total of 2600 hours and \$119,860.

Section 60.23, Modifications to FSDs, describes what must be done in order to modify a qualified FSD. While it is not possible to predict accurately the frequency with which modifications might occur and the amount of time required to make any given modification would be directly dependent on the nature of that modification, the following is offered for consideration: Assume the following:

(1) There is an average of three modifications per year to 40% of the currently qualified FSDs;

(2) Two of these three modifications are minor in nature requiring review by, but not requiring written approval from, the NSPM;

(3) One of these modifications is major and requires both review and written approval from the NSPM; and

(4) One-quarter of the major modifications require NSPM on-site evaluation prior to returning the FSD to service.

The sponsor's FSD technician would take 2 hours to research and develop each required modification, followed by 0.5 hours to draft the notification the NSPM/TPAA. It would take a clerk 0.5 hours to prepare the notification for mailing. After the appropriate time or after receiving approval, it would take an FSD technician an average of 2 hours to complete each minor modification, and it would take the technician an

average of 16 hours to complete each major modification.

This yields a total of 5,900 hours and \$165,400.

Section 60.25, Operation with Missing, Malfunctioning, or Inoperative Components, requires that each missing, malfunctioning, or inoperative component in an FSD be placarded. While it is not possible to predict accurately the frequency with which components might become missing, might malfunction, or might not operate correctly, the following is offered for consideration: Assume the following:

(1) That an average of 2 components become missing, malfunctioning, or inoperative on each FSD each month;

(2) That it will take an FSD technician an average of 0.05 hours to placard each such component.

This yields a total of 50 hours and \$1,450.

Section 60.31, Recordkeeping and Reporting, requires the sponsor to keep a record of each certificate holder using the FSD and to provide the NSPM with a copy of this record semiannually. This would take the Management Representative an average of 1.0 hour each six months (2.0 hours annually) to record this list and it would take a clerk an average of 0.5 hours to prepare this list for mailing. This yields a total of 132 hours and \$5,334.

The agency is soliciting comments to—

(1) Evaluate whether the proposed information requirement is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility;

(2) Evaluate the accuracy of the agency's estimate of the burden;

(3) Enhance the quality, utility, and clarity of the information to be collected; and

(4) Minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology.

Individuals and organizations may submit comments on the information collection requirement by November 25, 2002, and should direct them to the address listed in the **ADDRESSES** section of this document.

According to the regulations implementing the Paperwork Reduction Act of 1995, (5 CFR 1320.8(b)(2)(vi)), an agency may not conduct or sponsor, a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control number for this information collection will be

published in the **Federal Register**, after the Office of Management and Budget approves it.

International Compatibility

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to comply with International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. The FAA has reviewed the corresponding ICAO Standards and Recommended Practices and has identified no differences with these proposed regulations.

Regulatory Evaluation Summary

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs each Federal agency proposing or adopting a regulation to first make a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this act requires agencies to consider international standards, and use them where appropriate as the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 requires agencies to prepare a written assessment of the costs and benefits and other effects of proposed and final rules. An assessment must be prepared only for rules that impose a Federal mandate on State, local or tribal governments, or on the private sector, likely to result in a total expenditure of \$100 million or more in any one year (adjusted for inflation.)

In conducting these analyses, the FAA has determined:

(1) This rule has benefits that justify its costs. This rulemaking does not impose costs sufficient to be considered "significant" under the economic standards for significance under Executive Order 12866 or under DOT's Regulatory Policies and Procedures. Due to public interest, however, it is considered significant under the Executive Order and DOT policy.

(2) This rule will not have a significant impact on a substantial number of small entities.

(3) This rule has no effect on any trade-sensitive activity.

(4) This rule does not impose an unfunded mandate on state, local, or

tribal governments, or on the private sector.

The FAA has placed these analyses in the docket and summarized them below.

The proposed rule for a new part 60 would contain the requirements for the evaluation, qualification, inspection, and maintenance of Flight Simulator Devices (FSDs) used for training, evaluating, or obtaining flight experience for flight crewmember certification or qualification. The proposed requirements are based on requirements in appendix H of part 121 and in the current § 121.407 as well as advisory circulars.

The estimated 10-year cost of this proposed rule would be approximately \$1.9 million (\$1.6 million, discounted) due to the development, review, and approval of a Quality Assurance (QA) program. The majority of the cost impact, estimated at approximately \$1.3 million (\$1.1 million, discounted) over a 10-year period, would be imposed on the industry. The FAA 10-year cost is estimated at approximately \$571,000 (\$413,000, discounted).

Based on safety considerations, the proposed rule would also eliminate the use of Level A simulators to meet flight crewmember training, evaluation, or flight experience for purposes of certification or qualification. The Level A simulator is the least sophisticated of today's simulator levels and the requirements for data applicable to simulators of this vintage are very elementary and relatively primitive when compared to today's standards for simulators. The FAA believes that all sponsors, as a result of this proposed rule, would either retire their Level A simulators or downgrade them to Level 6 Flight Training Devices at a minimal cost to the industry. The FAA believes that to upgrade to a Level B simulator would be an alternative the industry would reject because the costs (\$350,000–\$500,000 per simulator) to do so could not be recovered. The FAA has requested comments from the industry regarding this matter.

There are five types of safety and economic benefits of incorporating a QA program for each FSD sponsor. First, aviation safety would be better maintained because a QA program would identify, for the user and the FAA, flightcrew training problems that could or would arise due to problems with the maintenance and operation of the FSD. Second, when training is interrupted due to maintenance problems, those problems would be quickly and accurately corrected to allow the training process to resume. Third, sponsors would see cost savings due to a reduction of mistakes. Fourth,

sponsors could see cost savings by having to support less frequent evaluations by NSP staff. And fifth, the FAA (and the tax payers) would realize cost savings by requiring less frequent on-site FSD evaluations; by not requiring commensurate growth of FAA personnel committed to individual evaluations of an ever-expanding fleet of FSDs; and by providing the ability to focus a more constant personnel resource on safety areas more deserving of individualized scrutiny.

Lastly, the proposed new part 60 would consolidate and update the existing FSD qualification requirements. Currently, regulations regarding advanced simulators are located in appendix H. Those who operate airplanes under other parts of the regulations and wish to use appendix H authorizations have to obtain exemptions from the certificate holding requirements of part 121 and have the appropriate simulator authorizations incorporated into their exemptions or would have to obtain a part 142 certificate. The proposed new part 60 would establish FSD requirements that could be used by any certificate holder as defined under part 60 who conducts training and evaluation, or intends to meet recent flight experience requirements. Its application, therefore, would be expanded beyond just those who operate under part 121.

Initial Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) establishes “as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the business, organizations, and governmental jurisdictions subject to regulation.” To achieve that principle, the Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The Act covers a wide-range of small entities, including small businesses, not-for-profit organizations and small governmental jurisdictions.

Agencies must perform a review to determine whether a proposed or final rule will have a significant economic impact on a substantial number of small entities. If the determination is that it will, the agency must prepare a regulatory flexibility analysis as described in the Act.

However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980 act

provides that the head of the agency may so certify and a regulatory flexibility analysis is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

The adoption of this proposal would impose an estimated 10-year cost of approximately \$114,000 (\$98,000, discounted) on approximately six small entities. Each of these sponsors would incur a one-time cost of approximately \$13,000 to develop a QA program and an annual cost of approximately \$600 to maintain the program. To determine the impact of the cost on these small entities, the FAA examined the relation of a small entity's annualized cost to its potential annual revenue. The FAA estimated that each flight simulation device, on average, is in use for training about 4,800 hours a year. Also, according to industry sources, most sponsors charge a minimum of \$250 an hour for training in a Level B simulator. As a result, a sponsor's potential annual revenue from one Level B simulator is estimated at \$1.2 million. Therefore, the annualized cost of this proposed rule for each small entity, approximately \$2,300, would be considerably less than one percent of the estimated potential annual revenue (\$1.2 million) for a small entity with only one Level B simulator. The FAA contends that these small entities would not be significantly impacted by the cost of this proposed rule.

Accordingly, pursuant to the Regulatory Flexibility Act, 5 U.S.C. 605(b), the Federal Aviation Administration certifies that this rule would not have a significant economic impact on a substantial number of small entities. The FAA solicits comments from affected entities with respect to this finding and determination and requests that all comments be accompanied by clear documentation.

International Trade Impact Assessment

The Trade Agreement Act of 1979 prohibits Federal agencies from engaging in any standards or related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and where appropriate, that they be the basis for U.S. standards.

In accordance with the above statute, the FAA has assessed the potential effect of this proposed rule and has determined that it would have only a domestic impact and therefore create no

obstacles to the foreign commerce of the United States.

Unfunded Mandates Assessment

The Unfunded Mandates Reform Act of 1995 (the Act), enacted as Public Law 104-4 on March 22, 1995, is intended, among other things, to curb the practice of imposing unfunded Federal mandates on State, local, and tribal governments.

Title II of the Act requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in a \$100 million or more expenditure (adjusted annually for inflation) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a "significant regulatory action."

This proposed rule does not contain such a mandate. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

Executive Order 13132, Federalism

The FAA has analyzed this proposed rule under the principles and criteria of Executive Order 13132, Federalism. We determined that this action would not have a substantial direct effect on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, we determined that this notice of proposed rulemaking would not have federalism implications.

Environmental Analysis

FAA Order 1050.1D defines FAA actions that may be categorically excluded from preparation of a National Environmental Policy Act (NEPA) environmental impact statement. In accordance with FAA Order 1050.1D, appendix 4, paragraph 4(j), this proposed rulemaking action qualifies for a categorical exclusion.

Energy Impact

The energy impact of this notice of proposed rulemaking has been assessed in accordance with the Energy Policy and Conservation Act (EPCA) Public Law 94-163, as amended (42 U.S.C. 6362) and FAA Order 1053.1. It has been determined that this notice of proposed rulemaking is not a major regulatory action under the provisions of the EPCA.

List of Subjects

14 CFR Part 1

Air transportation.

14 CFR Part 60

Airmen, Aviation safety, Reporting and recordkeeping requirements.

14 CFR Part 61

Aircraft, Airmen, Recreation and recreation areas, Reporting and recordkeeping requirements, Teachers.

14 CFR Part 63

Aircraft, Airmen, Navigation (air), Reporting and recordkeeping requirements.

14 CFR Part 141

Airmen, Educational facilities, Reporting and recordkeeping requirements, Schools.

14 CFR Part 142

Administrative practice and procedure, Airmen, Educational facilities, Reporting and recordkeeping requirements, Schools, Teachers.

The Proposed Amendment

The Federal Aviation Administration proposes to amend parts 1, 11, 61, 63, 141 and 142 and to add part 60 to title 14, chapter I of the Code of Federal Regulations as follows:

PART 1—DEFINITIONS AND ABBREVIATIONS

1. The authority citation for part 1 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

2. Section 1.1 is amended by adding new definitions in alphabetical order to read as follows:

§ 1.1 General definitions.

* * * * *

Flight simulation device (FSD) means a flight simulator or a flight training device.

Flight simulator means a full size replica of a specific type or make, model, and series aircraft cockpit. It includes the assemblage of equipment and computer programs necessary to represent the aircraft in ground and flight operations, a visual system providing an out-of-the-cockpit view, a system that provides cues at least equivalent to those of a three-degree-of-freedom motion system, and having the full range of capabilities of the systems installed in the device as described in part 60 of this chapter and the qualification performance standards (QPS) for a specific qualification level.

* * * * *

Flight training device (FTD) means a full size replica of aircraft instruments, equipment, panels, and controls in an open flight deck area or an enclosed aircraft cockpit replica. It includes the

equipment and computer programs necessary to represent the aircraft or set of aircraft in ground and flight conditions having the full range of capabilities of the systems installed in the device as described in part 60 of this part and the qualification performance standard (QPS) for a specific qualification level.

* * * * *

3. Section 1.2 is amended by adding new abbreviations in alphabetical order to read as follows:

§ 1.2 Abbreviations and symbols.

* * * * *

FSD means flight simulation device.

FTD means flight training device.

* * * * *

4. Part 60 is added to subchapter D to read as follows:

PART 60—FLIGHT SIMULATION DEVICE INITIAL AND CONTINUING QUALIFICATION AND USE

Sec.

- 60.1 Applicability.
 - 60.2 Applicability of sponsor rules to persons who are not sponsors and who are engaged in certain unauthorized activities.
 - 60.3 Definitions.
 - 60.4 Qualification Performance Standards.
 - 60.5 Quality assurance program.
 - 60.7 Sponsor qualification requirements.
 - 60.9 Additional responsibilities of the sponsor.
 - 60.11 FSD use.
 - 60.13 FSD objective data requirements.
 - 60.14 Special equipment and personnel requirements for qualification of the FSD.
 - 60.15 Initial qualification requirements.
 - 60.16 Additional qualifications for a currently qualified FSD.
 - 60.17 Previously qualified FSD's.
 - 60.19 Inspection, recurrent evaluation, and maintenance requirements.
 - 60.20 Logging FSD discrepancies.
 - 60.21 Interim qualification of FSD's for new aircraft types or models.
 - 60.23 Modifications to FSD's.
 - 60.25 Operation with missing, malfunctioning, or inoperative components.
 - 60.27 Automatic loss of qualification and procedures for restoration of qualification.
 - 60.29 Other losses of qualification and procedures for restoration of qualification.
 - 60.31 Recordkeeping and reporting.
 - 60.33 Applications, logbooks, reports, and records: Fraud, falsification, or incorrect statements.
 - 60.35 Specific simulator compliance requirements.
 - 60.37 Simulator qualification on the basis of a Bilateral Aviation Safety Agreement (BASA).
- Appendix A to Part 60—Qualification Performance Standards for Airplane Flight Simulators

Appendix B to Part 60— Qualification Performance Standards for Airplane Flight Training Devices

Appendix C to Part 60— Qualification Performance Standards for Helicopter Flight Simulators

Appendix D to Part 60— Qualification Performance Standards for Helicopter Flight Training Devices

Authority: 49 U.S.C. 106(g), 40113, and 44701.

§ 60.1 Applicability.

(a) This part prescribes the rules governing the initial and continuing qualification and use of all aircraft flight simulation devices (FSD) used for meeting training, evaluation, or flight experience requirements of this chapter for flightcrew member certification or qualification.

(b) The rules of this part apply to each person using or applying to use an FSD to meet any requirement of this chapter.

(c) The requirements of § 60.31 regarding falsification of applications, records, or reports also apply to each person who uses an FSD for training, evaluation, or obtaining flight experience required for flightcrew member certification or qualification under this chapter.

§ 60.2 Applicability of sponsor rules to persons who are not sponsors and who are engaged in certain unauthorized activities.

(a) The rules of this part, that are directed to a sponsor of an FSD, also apply to any person who uses or causes the use of an FSD when—

(1) That person knows that the FSD does not have an FAA-approved sponsor; and

(2) The use of the FSD by that person is nonetheless claimed for purposes of meeting any requirement of this chapter or that person knows or should have known that the person's acts or omissions would cause another person to mistakenly credits use of the FSD for purposes of meeting any requirement of this chapter.

(b) A situation in which paragraph (a) of this section would not apply to a person would be when each of the following conditions are met:

(1) The person sold or leased the FSD and merely represented to the purchaser or lessee that the FSD is in a condition in which it should be able to obtain FAA approval and qualification under this part;

(2) The person does not falsely claim to be the FAA-approved sponsor for the FSD;

(3) The person does not falsely make representations that someone else is the FAA-approved sponsor of the FSD at a time when that other person is not the FAA-approved sponsor of the FSD; and

(4) The person's acts or omissions do not cause another person to detrimentally rely on such acts or omissions for the mistaken conclusion that the FSD is FAA-approved and qualified under this part at the time the FSD is sold or leased.

§ 60.3 Definitions.

In addition to the definitions in part 1 of this chapter, for the purpose of this part, the following terms and definitions apply:

Certificate holder. A person issued a certificate under parts 119, 141, or 142 of this chapter or a person holding an approved course of training for flight engineers in accordance with part 63 of this chapter.

Evaluation. With respect to an individual, the checking, testing, or review associated with flightcrew member qualification, training, and certification under parts 61, 63, 121, or 135 of this chapter. With respect to an FSD, the qualification activities (objective and subjective tests, inspections, recurrent evaluation, etc.) associated with the requirements of this part.

Flight experience. For purposes of this part, *flight experience* means recency of flight experience for landing credit purposes.

Flight test data. Actual aircraft performance data collected by the aircraft manufacturer (or other supplier of data acceptable to the NSPM) during an aircraft flight test program.

FSD Directive. A document issued by the FAA to an FSD sponsor, requiring a modification to the FSD due to a recognized safety-of-flight issue and amending the qualification basis for the FSD.

Master Qualification Test Guide (MQTG). The FAA-approved Qualification Test Guide with the addition of the FAA-witnessed test, performance, or demonstration results, applicable to each individual FSD.

National Simulator Program Manager (NSPM). The FAA manager responsible for the overall administration and direction of the National Simulator Program (NSP), or a person approved by the NSPM.

Objective test. A quantitative comparison of simulator performance data to actual or predicted aircraft performance data to ensure that FSD performance is within the tolerances prescribed in the QPS.

Predicted data. Aircraft performance data derived from sources other than direct physical measurement of, or flight tests on, the subject aircraft. Predicted data may include engineering analysis and simulation, design data, wind

tunnel data, estimations or extrapolations based on existing flight test data, or data from other models.

Qualification level. The categorization of the FSD, based on its demonstrated technical and operational capability as set out in the QPS.

Qualification Performance Standard (QPS). The collection of procedures and criteria published by the FAA to be used when conducting objective tests and subjective tests, including general FSD requirements, for establishing FSD qualification levels. The QPS are set forth in the following appendices: Appendix A, for Airplane Simulators; Appendix C, for Helicopter Simulators; Appendix B, for Airplane Flight Training Devices; and Appendix D, for Helicopter Flight Training Devices.

Qualification Test Guide (QTG). The primary reference document used for evaluating an aircraft FSD. It contains test results, performance or demonstration results, statements of compliance and capability, the configuration of the aircraft simulated, and other information for the evaluator to assess the FSD against the applicable regulatory criteria.

Set of aircraft. Aircraft that share similar handling and operating characteristics and similar operating envelopes and have the same number and type of propulsion systems (*i.e.*, engines, or engine and propeller/rotor combinations).

Sponsor. A certificate holder who seeks or maintains FSD qualification and is responsible for the prescribed actions as set out in this part and the QPS for the appropriate FSD and qualification level.

Subjective test. A qualitative comparison to determine the extent to which the FSD performs and handles like the aircraft being simulated.

Training Program Approval Authority (TPAA). A person authorized by the Administrator to approve the aircraft flight training program in which the FSD will be used.

Upgrade. The improvement or enhancement of an FSD for the purpose of achieving a higher qualification level.

§ 60.4 Qualification Performance Standards.

The Qualification Performance Standards (QPS) are published in Appendices to this part as follows:

(a) Appendix A contains the QPS for Airplane Flight Simulators.

(b) Appendix B contains the QPS for Airplane Flight Training Devices.

(c) Appendix C contains the QPS for Helicopter Flight Simulators.

(d) Appendix D contains the QPS for Helicopter Flight Training Devices.

§ 60.5 Quality assurance program.

(a) After [date 6 months after effective date of the final rule], no sponsor may use or allow the use of or offer the use of an FSD for flightcrew member training or evaluation or for obtaining flight experience to meet any requirement of this chapter unless the sponsor has established and follows a quality assurance (QA) program, approved by the NSPM, for the continuing surveillance and analysis of the sponsor's performance and effectiveness in providing a satisfactory FSD for use on a regular basis as described in the appropriate QPS.

(b) The QA program must provide a process for identifying deficiencies in the program and for documenting how the program will be changed to address these deficiencies.

(c) Whenever the NSPM finds that the QA program does not adequately address the procedures necessary to meet the requirements of this part, the sponsor must, after notification by the NSPM, change the program so the procedures meet the requirements of this part.

(d) Each sponsor of an FSD must identify to the NSPM and to the TPAA, by name, one individual, who is an employee of the sponsor, to be the management representative (MR) and the primary contact point for all matters between the sponsor and the FAA regarding the qualification of that FSD as provided for in this part.

§ 60.7 Sponsor qualification requirements.

(a) A person is eligible to apply to be a sponsor of an FSD if the following conditions are met:

(1) The person holds, or is an applicant for, a certificate under part 119, 141, or 142 of this chapter; or holds, or is an applicant for, an approved flight engineer course in accordance with part 63 of this chapter.

(2) The FSD will be used, or will be offered for use, in the sponsor's FAA-approved flight training program for the aircraft being simulated as evidenced in a request for evaluation submitted to the NSPM through the TPAA.

(b) A person is a sponsor of the FSD if the following conditions are met:

(1) The person is a certificate holder under part 119, 141, or 142 of this chapter or has an approved flight engineer course in accordance with part 63 of this chapter.

(2) The person has operations specifications authorizing the use of the aircraft type or set of aircraft being simulated by the FSD or has training specifications or a course of training authorizing the use of an FSD for that aircraft type or set of aircraft.

(3) The person has an approved quality assurance program in accordance with § 60.5.

(4) The NSPM has approved the person as the sponsor of the FSD and that approval has not been withdrawn by the FAA.

(c) A person continues to be a sponsor of an FSD, if the following conditions are met:

(1) Beginning 12 calendar months after the initial qualification of the FSD and every 12 calendar months thereafter, the FSD must have been used within the sponsor's FAA-approved flight training program for the aircraft type or set of aircraft for a minimum of 600 hours.

(2) The use of the FSD described in paragraph (c)(1) of this section must be dedicated to meeting the requirements of parts 61, 63, 91, 121, or 135 of this chapter.

(3) If the use requirements of paragraphs (c)(1) and (2) of this section are not met, the person will continue to sponsor the FSD on a provisional basis for an additional period not longer than 12 calendar months; and—

(i) If the FSD is used as described in paragraphs (c)(1) and (2) of this section within this additional 12 calendar month period, the provisional status will be removed and regular sponsorship resumed; or

(ii) If the FSD is not used as described in paragraphs (c)(1) and (2) of this section within the additional 12 calendar month period, the FSD is not qualified and the sponsor will not be eligible to apply to sponsor that FSD for at least 12 calendar months.

§ 60.9 Additional responsibilities of the sponsor.

(a) The sponsor must allow the NSPM upon request to inspect immediately the FSD, including all records and documents relating to the FSD, to determine its compliance with this part. If the sponsor fails to allow the NSPM to inspect the FSD, and all records and documents relating to the FSD, the sponsor may not allow the FSD to be used for flightcrew member training or evaluation or for obtaining flight experience to meet any of the requirements under this chapter.

(b) The sponsor must, for each FSD—

(1) Establish a mechanism for the following persons to provide comments regarding the FSD and its operation and provide for receipt of those comments:

(i) Flightcrew members recently completing training or evaluation or recently obtaining flight experience in the FSD;

(ii) Instructors and check airmen using the FSD for training, evaluation, or flight experience sessions; and

(iii) Simulator technicians and maintenance personnel performing work on the FSD.

(2) Examine each comment received under paragraph (b)(1) of this section for content and importance and take appropriate action.

(3) Maintain a liaison with the manufacturer of the aircraft, or the holder of the aircraft type certificate for the aircraft if the manufacturer is out of business, being simulated by the FSD to facilitate compliance with § 60.13(f) when necessary.

(4) Post in or adjacent to the FSD the Statement of Qualification issued by the NSPM.

§ 60.11 FSD use.

No person may use or allow the use of or offer the use of an FSD for flightcrew member training or evaluation or for obtaining flight experience to meet any of the requirements under this chapter unless, in accordance with the QPS for the specific device, the FSD—

(a) Has a single sponsor who is qualified under § 60.7. The sponsor may arrange with another person for services of document preparation and presentation, as well as FSD inspection, maintenance, repair, and servicing; however, the sponsor remains responsible for ensuring that these functions are conducted in a manner and with a result of continually meeting the requirements of this part.

(b) Is qualified as described in the Statement of Qualification that is required to be posted pursuant to § 60.9(b)(4)—

(1) For the make, model, and series of aircraft or set of aircraft; and

(2) For all tasks and configurations.

(c) Remains qualified, through satisfactory inspection, recurrent evaluations, appropriate maintenance, and use requirements in accordance with this part and the appropriate QPS.

(d) Functions during the training, evaluation, or flight experience with the same software and active programming that was evaluated by the NSPM.

§ 60.13 FSD objective data requirements.

(a) Except as provided in paragraphs (b) and (c) of this section, for the purposes of validating FSD performance and handling qualities during evaluation for qualification, the sponsor must submit to the NSPM the aircraft manufacturer's flight test data including all data developed after the type certificate was issued (e.g., data developed in response to an airworthiness directive) if such data results from a change in performance, handling qualities, functions, or other

characteristics of the aircraft that must be considered for flightcrew member training, evaluation, or for meeting experience requirements of this chapter.

(b) The sponsor may submit flight test data from a source in addition to or independent of the aircraft manufacturer's data to the NSPM in support of an FSD qualification, but only if this data is gathered and developed by that source in accordance with flight test methods, including a flight test plan, as described in the appropriate QPS.

(c) The sponsor may submit predicted data, data from pilot owner or pilot operating manuals, or data from public domain sources acceptable to the NSPM for consideration, approval and possible use in particular applications for FSD qualification.

(d) Data or other material or elements must be submitted in a form and manner acceptable to the NSPM.

(e) The NSPM may require additional flight testing to support certain FSD qualification requirements.

(f) When an FSD sponsor learns, or is advised by an aircraft manufacturer or supplemental type certificate (STC) holder, that an addition to, an amendment to, or a revision of the data used to program and operate an FSD used in the sponsor's training program is available, the sponsor must immediately notify the NSPM.

§ 60.14 Special equipment and personnel requirements for qualification of the FSD.

When notified by the NSPM, the sponsor must make available all special equipment and specifically qualified personnel needed to accomplish or assist in the accomplishment of tests during initial, recurrent, or special evaluations.

§ 60.15 Initial qualification requirements.

(a) For each FSD, the sponsor must submit a request through the TPAA to have the NSPM evaluate the FSD for initial qualification at a specific level. The request must be submitted in the form and manner described in the appropriate QPS.

(b) The request must include all of the following:

(1) A statement that the FSD meets all of the applicable provisions of this part and all applicable provisions of the QPS.

(2) A statement that the sponsor has established a procedure to verify that the configuration of hardware and software present during the evaluation for initial qualification will be maintained, except where modified as authorized in § 60.23. The statement must include a description of the procedure.

(3) A statement signed by at least one pilot who meets the requirements of paragraph (c) of this section asserting that each pilot so approved has determined that the following requirements have been met:

(i) The FSD systems and sub-systems function equivalently to those in the aircraft or set of aircraft.

(ii) The performance and flying qualities of the FSD are equivalent to those of the aircraft or set of aircraft.

(iii) For type specific FSD's, the cockpit configuration conforms to the configuration of the aircraft make, model, and series being simulated.

(4) A list of all of the operations tasks or simulator systems in the subjective test appendix of the appropriate QPS for which the FSD has not been subjectively tested (e.g., circling approaches, windshear training, etc.) and for which qualification is not sought.

(5) A qualification test guide (QTG) that includes all of the following:

(i) Objective data obtained from aircraft testing or another approved source.

(ii) Correlating objective test results obtained from the performance of the FSD as prescribed in the appropriate QPS.

(iii) The result of FSD performance demonstrations prescribed in the appropriate QPS.

(iv) A description of the equipment necessary to perform the evaluation for initial qualification and the recurrent evaluations for continuing qualification.

(c) Except for those FSD's previously qualified and described in § 60.17, each FSD evaluated for initial qualification must meet the standard that is in effect at the time of the evaluation. However—

(1) If the FAA publishes a change to the existing standard or publishes a new standard for the evaluation for initial qualification, a sponsor may request that the NSPM apply the standard that was in effect when an FSD was ordered for delivery if the sponsor—

(i) Within 30 days of the publication of the change to the existing standard or publication of the new standard, notifies the NSPM that an FSD has been ordered;

(ii) Requests that the standard in effect at the time the order was placed be used for the evaluation for initial qualification; and

(iii) The evaluation is conducted within 24 months following the publication of the change to the existing standard or publication of the new standard, unless circumstances beyond the control of the sponsor prevent the evaluation from occurring within that time.

(2) This notification must include a description of the FSD; the anticipated qualification level of the FSD; the make, model, and series of aircraft simulated; and any other pertinent information.

(3) Any tests, tolerances, or other requirements that are current at the time of the evaluation may be used during the initial evaluation, at the request of the sponsor, if the sponsor provides acceptable updates to the required qualification test guide.

(4) The standards used for the evaluation for initial qualification will be used for all subsequent evaluations of the FSD.

(d) The pilot or pilots who make the statement required by paragraph (b)(3) of this section must—

- (1) Be designated by the sponsor;
- (2) Be approved by the TPAA; and
- (3) Be qualified in—

(i) The aircraft or set of aircraft being simulated; or

(ii) For aircraft types not yet issued a type certificate, an aircraft type similar in size and configuration.

(e) The subjective tests that form the basis for the statements described in paragraph (b)(3) of this section and the objective tests referenced in paragraph (b)(5) of this section must be accomplished at the sponsor's training facility except as provided for in the appropriate QPS.

(f) The person seeking to qualify the FSD must provide the NSPM access to the FSD for the length of time necessary for the NSPM to complete the required evaluation of the FSD for initial qualification, which includes the conduct and evaluation of objective and subjective tests, including general FSD requirements, as described in the appropriate QPS, to determine that the FSD meets the standards in that QPS.

(g) When the FSD passes an evaluation for initial qualification, the NSPM issues a Statement of Qualification that includes all of the following:

(1) Identification of the sponsor.

(2) Identification of the make, model, and series of the aircraft or set of aircraft being simulated.

(3) Identification of the configuration of the aircraft or set of aircraft being simulated (e.g., engine model or models, flight instruments, navigation or other systems, etc.).

(4) A statement that the FSD is qualified as either a flight simulator or a flight training device.

(5) Identification of the qualification level of the FSD.

(6) A list of all of the operations tasks or simulator systems in the subjective test appendix of the appropriate QPS for which the FSD has not been subjectively

tested and for which the FSD is not qualified (*e.g.*, circling approaches, windshear training, etc.).

(h) After the NSPM completes the evaluation for initial qualification, the sponsor must update the QTG, with the results of the FAA-witnessed tests and demonstrations together with the results of all the objective tests and demonstrations described in the appropriate QPS.

(i) Upon issuance of the Statement of Qualification the updated QTG becomes the MQTG and must be made available to the FAA upon request.

§ 60.16 Additional qualifications for a currently qualified FSD.

(a) A currently qualified FSD is required to undergo an additional qualification process if a user intends to use the FSD for meeting training, evaluation, or flight experience requirements of this chapter beyond the qualification issued to the sponsor. This process consists of the following:

(1) The sponsor:

(i) Must submit to the NSPM all modifications to the MQTG that are required to support the additional qualification.

(ii) Must describe to the NSPM all modifications to the FSD that are required to support the additional qualification.

(iii) Must submit a statement to the NSPM that a pilot, designated by the sponsor in accordance with § 60.15(c) and approved by the TPAA for the user, has subjectively evaluated the FSD in those areas not previously evaluated.

(2) The FSD must successfully pass an evaluation—

(i) For initial qualification, in accordance with § 60.15, in those circumstances where the NSPM has determined that a full evaluation for initial qualification is necessary; or

(ii) For those elements of an evaluation for initial qualification (*e.g.*, objective tests, performance demonstrations, or subjective tests) designated as necessary by the NSPM.

(b) In making the determinations described in paragraph (a)(2) of this section, the NSPM considers factors including the existing qualification of the FSD, any modifications to the FSD hardware or software that are involved, and any additions or modifications to the MQTG.

(c) The FSD is qualified for the additional uses when the NSPM issues an amended Statement of Qualification in accordance with § 60.15(f).

(d) The sponsor may not modify the FSD except as described in § 60.23.

§ 60.17 Previously qualified FSD's.

(a) Unless otherwise specified by an FSD Directive, further referenced in the appropriate QPS, or as specified in paragraph (e) of this section, an FSD qualified before [effective date of final rule] will retain its qualification basis as long as it continues to meet the standards, including the performance demonstrations and the objective test results recorded in the MQTG, under which it was originally evaluated, regardless of sponsor. The sponsor of such an FSD must comply with the other applicable provisions of this part.

(b) For each FSD qualified before [effective date of the final rule], no sponsor may use or allow the use of or offer the use of such an FSD after [date 6 years after the effective date of the final rule] for flightcrew member training, evaluation or flight experience to meet any of the requirements of this chapter, unless that FSD has been issued a Statement of Qualification, including the Configuration List and Restrictions to the Qualification List in accordance with the procedures set out in the appropriate QPS.

(c) If the FSD qualification is lost under § 60.27 and not restored under § 60.27 for two (2) years or more, the qualification basis (in terms of objective tests and performance demonstrations) for the re-qualification will be those standards in effect and current at the time of re-qualification application.

(d) Except as provided in paragraph (e) of this section, any change in FSD qualification level initiated on or after [the effective date of this rule] requires an evaluation for initial qualification in accordance with this part.

(e) A sponsor may request that an FSD be downgraded. In such a case, the NSPM may downgrade a qualified FSD without requiring and without conducting an initial evaluation for the new qualification level. Subsequent recurrent evaluations will use the existing MQTG, modified as necessary to reflect the new qualification level.

(f) When the sponsor has appropriate validation data available and receives approval from the NSPM, the sponsor may adopt tests and associated tolerances described in the current qualification standards as the tests and tolerances applicable for the continuing qualification of a previously qualified FSD. The updated test(s) and tolerance(s) must be made a permanent part of the MQTG.

§ 60.19 Inspection, recurrent evaluation, and maintenance requirements.

(a) *Inspection.* No sponsor may use or allow the use of or offer the use of an FSD for flightcrew member training,

evaluation, or flight experience to meet any of the requirements of this chapter unless the sponsor does the following:

(1) Accomplishes all appropriate QPS Attachment 1 performance demonstrations and all appropriate QPS Attachment 2 objective tests each year. To do this, the sponsor must conduct a minimum of four evenly spaced inspections throughout the year, as approved by the NSPM. The performance demonstrations and objective test sequence and content of each inspection in this sequence will be developed by the sponsor and submitted to the NSPM for approval. In deciding whether to approve the test sequence and the content of each inspection, the NSPM looks for a balance and a mix from the performance demonstrations and objective test requirement areas listed as follows:

(i) Performance.

(ii) Handling qualities.

(iii) Motion system (where appropriate).

(iv) Visual system (where appropriate).

(v) Sound system (where appropriate).

(vi) Other FSD systems.

(2) Completes a functional preflight check in accordance with the appropriate QPS each calendar day prior to the start of the first FSD period of use that begins in that calendar day.

(3) Completes at least one functional preflight check in accordance with the appropriate QPS in every 7 consecutive calendar days.

(4) Maintains a discrepancy log.

(5) Ensures that, when a discrepancy is discovered, the following requirements are met:

(i) A description of each discrepancy is entered in the log and remains in the log until 30 days after the discrepancy is corrected as specified in § 60.25(b).

(ii) A description of the corrective action taken for each discrepancy and the date that action is taken must be entered in the log. This entry concerning the corrective action is maintained for at least 30 days.

(iii) The discrepancy log is kept in a form and manner acceptable to the Administrator and is kept in or immediately adjacent to the FSD.

(b) *Recurrent evaluation.* (1) This evaluation consists of performance demonstrations, objective tests, and subjective tests, including general FSD requirements, as described in the appropriate QPS or as may be amended by an FSD Directive.

(2) The sponsor must contact the NSPM to schedule the FSD for recurrent evaluations not later than 60 days before the recurrent evaluation is due.

(3) The sponsor must provide the NSPM access to the objective test results

and FSD performance demonstration results in the MQTG, and access to the FSD for the length of time necessary for the NSPM to complete the required recurrent evaluations, weekdays between 6 o'clock AM (local time) and 6 o'clock PM (local time).

(4) The frequency of NSPM-conducted recurrent evaluations for each FSD will be established by the NSPM and specified in the MQTG.

(5) Recurrent evaluations conducted in the calendar month before or after the calendar month in which these recurrent evaluations are required will be considered to have been conducted in the calendar month in which they were required.

(6) No sponsor may use or allow the use of or offer the use of an FSD for flightcrew member training or evaluation or for obtaining flight experience for the flightcrew member to meet any requirement of this chapter unless the FSD has passed an NSPM-conducted recurrent evaluation within the timeframe specified in the MQTG.

(c) *Maintenance.* The sponsor is responsible for continuing corrective and preventive maintenance on the FSD to ensure that it continues to meet the requirements of § 60.15(b).

§ 60.20 Logging FSD discrepancies.

Each instructor, check airman, or representative of the Administrator conducting training or evaluation, or observing flight experience for flightcrew member certification or qualification, and each person conducting the preflight inspection (§ 60.19(a)(2), (3), and (4)), who discovers a discrepancy, including any missing, malfunctioning, or inoperative components in the FSD, must write or cause to be written a description of that discrepancy into the discrepancy log at the end of the FSD preflight or FSD use session.

§ 60.21 Interim qualification of FSD's for new aircraft types or models.

(a) A sponsor may apply for and the NSPM may issue an interim qualification level for an FSD for a new type or model of aircraft, even though the flight test data used has not received final approval by the aircraft manufacturer, if the sponsor provides the following to the satisfaction of the NSPM—

(1) The aircraft manufacturer's predicted data, validated by a limited set of flight test data;

(2) The aircraft manufacturer's description of the prediction methodology used to develop the predicted data; and

(3) The QTG test results.

(b) An FSD that has been issued interim qualification will be deemed to have been issued initial qualification unless the NSPM rescinds the qualification. Interim qualification terminates one year after its issuance, unless the NSPM determines that specific conditions warrant otherwise.

(c) Within six months of the release of the final flight test data package by the aircraft manufacturer but no later than one year after the issuance of the interim qualification status the sponsor must apply for initial qualification in accordance with § 60.15 based on the final flight test data package approved by the aircraft manufacturer, unless the NSPM determines that specific conditions warrant otherwise.

(d) An FSD with interim qualification may be modified only in accordance with § 60.23.

§ 60.23 Modifications to FSD's.

(a) When the sponsor or the FAA determines that any of the following circumstances exist and the FAA determines that the FSD cannot be used adequately to train, evaluate, or provide flight experience for flightcrew members, the sponsor must modify the FSD accordingly.

(1) The aircraft manufacturer or another approved source develops new data regarding the performance, functions, or other characteristics of the aircraft being simulated;

(2) A change in aircraft performance, functions, or other characteristics occurs;

(3) A change in operational procedures or requirements occurs; or

(4) Other circumstances as determined by the NSPM.

(b) When the FAA determines that FSD modification is necessary for safety of flight reasons, the sponsor of each affected FSD must ensure that the FSD is modified according to the FSD Directive regardless of the original qualification standards applicable to any specific FSD.

(c) Before modifying a qualified FSD, the sponsor must notify the NSPM and the TPAA as follows:

(1) The notification must include a complete description of the planned modification, including a description of the operational and engineering effect the proposed modification will have on the operation of the FSD.

(2) The notification must be submitted in a form and manner as specified in the appropriate QPS.

(d) If the sponsor intends to add additional equipment or devices intended to simulate aircraft appliances; modify hardware or software that would affect flight or ground dynamics,

including revising FSD programming or replacing or modifying the host computer; or if the sponsor is changing or modifying the motion, visual, or control loading systems (or sound system for FSD levels requiring sound tests and measurements), the following applies:

(1) The sponsor must meet the notification requirements of paragraph (c) of this section and must include in the notification the results of all objective tests that have been re-run with the modification incorporated, including any necessary updates to the MQTG.

(2) However, the sponsor may not use, or allow the use of, or offer the use of, the FSD with the proposed modification for flightcrew member training or evaluation or for obtaining flight experience for the flightcrew member to meet any requirement of this chapter unless or until the sponsor receives written notification from the NSPM approving the proposed modification. Prior to approval, the NSPM may require that the modified FSD be evaluated in accordance with the standards for an evaluation for initial qualification or any part thereof before it is placed in service.

(e) The sponsor may not modify a qualified FSD until one of the following has occurred:

(1) For circumstances described in paragraph (b) or (d) of this section, the sponsor receives written approval from the NSPM that the modification is authorized.

(2) For circumstances other than those described in paragraph (b) or (d) of this section, either:

(i) Twenty-one days have passed since the sponsor notified the NSPM and the TPAA of the proposed modification and the sponsor has not received any response from the NSPM or TPAA; or

(ii) The NSPM or TPAA approves the proposed modification in fewer than 21 days since the sponsor notified the NSPM and the TPAA of the proposed modification.

(f) When a modification is made to an FSD, the sponsor must notify each certificate holder planning to use that FSD of that modification prior to that certificate holder using that FSD the first time after the modification is complete.

(g) The MQTG must be updated with current objective test results in accordance with § 60.15(b)(5) and appropriate flight test data in accordance with § 60.13, each time an FSD is modified and an objective test is affected by the modification. If this update is initiated by an FSD Directive, the direction to make the modification

and the record of the modification completion must be filed in the MQTG.

§ 60.25 Operation with missing, malfunctioning, or inoperative components.

(a) No person may use or allow the use of or offer the use of an FSD with a missing, malfunctioning, or inoperative component for meeting training, evaluation, or flight experience requirements of this chapter for flightcrew member certification or qualification during maneuvers, procedures, or tasks that require the use of the correctly operating component.

(b) Each missing, malfunctioning, or inoperative component must be repaired or replaced within 7 calendar days unless otherwise required or authorized by the NSPM. Failure to repair or replace this component within the prescribed time may result in loss of FSD qualification.

(c) Each missing, malfunctioning, or inoperative component must be placarded as such on or adjacent to that component or the control for that component in the FSD and a list of the currently missing, malfunctioning, or inoperative components must be readily available in or immediately adjacent to the FSD for review by users of the device.

§ 60.27 Automatic loss of qualification and procedures for restoration of qualification.

(a) An FSD is not qualified if any of the following occurs:

(1) The FSD is not used in the sponsor's FAA-approved flight training program in accordance with § 60.9(b)(4).

(2) The FSD is not maintained and inspected in accordance with § 60.19.

(3) The FSD is physically moved from one location to another, regardless of distance.

(4) The FSD is disassembled (*e.g.*, for repair or modification) to such an extent that it cannot be used for training, evaluation, or experience activities.

(5) The MQTG is missing or otherwise not available and a replacement is not made within 30 days.

(b) If FSD qualification is lost under paragraph (a) of this section, qualification is restored when either of the following provisions are met:

(1) The FSD successfully passes an evaluation:

(i) For initial qualification, in accordance with § 60.15 in those circumstances where the NSPM has determined that a full evaluation for initial qualification is necessary; or

(ii) For those elements of an evaluation for initial qualification approved as necessary by the NSPM.

(2) The NSPM or the TPAA advises the sponsor that an evaluation is not necessary.

(c) In making the determinations described in paragraph (b) of this section, the NSPM considers factors including the number of inspections and recurrent evaluations missed, the amount of disassembly and re-assembly of the FSD that was accomplished, and the care that had been taken of the device since the last evaluation.

§ 60.29 Other losses of qualification and procedures for restoration of qualification.

(a) Except as provided in paragraph (c) of this section, when the NSPM or the TPAA notifies the sponsor that the FSD no longer meets qualification standards, the following procedure applies:

(1) The NSPM or the TPAA notifies the sponsor in writing that the FSD no longer meets some or all of its qualification standards.

(2) The NSPM or the TPAA sets a reasonable period (but not less than 7 days) within which the sponsor may submit written information, views, and arguments on the FSD qualification.

(3) After considering all material presented, the NSPM or the TPAA notifies the sponsor about the NSPM's or TPAA's determination with regard to the qualification of the FSD.

(4) If the NSPM or the TPAA notifies the sponsor that some or all of the FSD is no longer qualified, it becomes effective not less than 30 days after the sponsor receives notice of it unless—

(i) The NSPM or the TPAA find under paragraph (c) of this section that there is an emergency requiring immediate action with respect to safety in air transportation or air commerce; or

(ii) The sponsor petitions the Director of Flight Standards Service for reconsideration of the NSPM or the TPAA finding under paragraph (b) of this section.

(b) When a sponsor seeks reconsideration of a decision from the NSPM or the TPAA concerning the FSD qualification, the following procedure applies:

(1) The sponsor must petition for reconsideration of that decision within 30 days of the date that the sponsor receives a notice that some or all of the FSD is no longer qualified.

(2) The sponsor must address its petition to the Director, Flight Standards Service, AFS-1, Federal Aviation Administration, 800 Independence Ave., SW., Washington, DC 20591.

(3) A petition for reconsideration, if filed within the 30-day period, suspends the effectiveness of the determination by the NSPM or the TPAA that the FSD is no longer qualified unless the NSPM or the TPAA has found, under paragraph (c) of this section, that an emergency

exists requiring immediate action with respect to safety in air transportation or air commerce.

(c) If the NSPM or the TPAA find that an emergency exists requiring immediate action with respect to safety in air transportation or air commerce that makes the procedures set out in this section impracticable or contrary to the public interest:

(1) The NSPM or the TPAA withdraws qualification of some or all of the FSD and makes the withdrawal of qualification effective on the day the sponsor receives notice of it.

(2) In the notice to the sponsor, the NSPM or the TPAA articulates the reasons for its finding that an emergency exists requiring immediate action with respect to safety in air transportation or air commerce or that makes it impracticable or contrary to the public interest to stay the effectiveness of the finding.

§ 60.31 Recordkeeping and reporting.

(a) The FSD sponsor must maintain the following records for each FSD it sponsors:

(1) The MQTG and each amendment thereto.

(2) A copy of the programming used during the evaluation of the FSD for initial qualification and for any subsequent upgrade qualification, and a copy of all programming changes made since the evaluation for initial qualification.

(3) A copy of all of the following:

(i) Results of the evaluations for the initial and each upgrade qualification.

(ii) Results of the quarterly objective tests and the approved performance demonstrations conducted in accordance with § 60.19(a) for a period of 2 years.

(iii) Results of the previous three recurrent evaluations, or the recurrent evaluations from the previous 2 years, whichever covers a longer period.

(iv) Comments obtained in accordance with § 60.9(b)(1) for a period of at least 18 months.

(4) A record of all discrepancies entered in the discrepancy log over the previous 2 years, including the following:

(i) A list of the components or equipment that were or are missing, malfunctioning, or inoperative.

(ii) The action taken to correct the discrepancy.

(iii) The date the corrective action was taken.

(5) A record of all modifications to FSD hardware configurations made since initial qualification.

(b) The FSD sponsor must keep a current record of each certificate holder

using the FSD. The sponsor must provide a copy of this list to the NSPM at least semiannually.

(c) The records specified in this section must be maintained in plain language form or in coded form, if the coded form provides for the preservation and retrieval of information in a manner acceptable to the NSPM.

(d) The sponsor must submit an annual report, in the form of a comprehensive statement signed by the management representative, certifying that the FSD continues to perform and handle as qualified by the NSPM.

§ 60.33 Applications, logbooks, reports, and records: Fraud, falsification, or incorrect statements.

(a) No person may make, or cause to be made, any of the following:

(1) A fraudulent or intentionally false statement in any application or any amendment thereto, or any other report or test result required by this part or the QPS.

(2) A fraudulent or intentionally false statement in or a known omission from any record or report that is kept, made, or used to show compliance with this part or the QPS, or to exercise any privileges under this chapter.

(3) Any reproduction or alteration, for fraudulent purpose, of any report, record, or test result required under this part or the QPS.

(b) The commission by any person of any act prohibited under paragraph (a) of this section is a basis for any one or any combination of the following:

(1) A civil penalty.

(2) Suspension or revocation of any certificate held by that person that was issued under this chapter.

(3) The removal of FSD qualification and approval for use in a training program.

(c) The following may serve as a basis for removal of qualification of an FSD including the withdrawal of authorization for use of an FSD; or denying an application for a qualification:

(1) An incorrect statement, upon which the FAA relied or could have relied, made in support of an application for a qualification or a request for approval for use.

(2) An incorrect entry, upon which the FAA relied or could have relied, made in any logbook, record, or report that is kept, made, or used to show compliance with any requirement for an FSD qualification or an approval for use.

§ 60.35 Specific simulator compliance requirements.

(a) After [date 18 months from the effective date of this rule], no simulator

will be eligible for initial or upgrade qualification under this part unless it simulates the operation of all equipment and appliances installed and operating on the aircraft being simulated, if such equipment or appliances have controls or indications that are located in the aircraft cockpit.

(b) After [date 2 years from the effective date of this rule], any flight simulator used for meeting flightcrew member training, evaluation, or flight experience requirements of this chapter for certification or qualification that cannot perform satisfactorily in the following areas will no longer be qualified as a simulator.

(1) Ground operations;

(2) The takeoff, climb, cruise, descent, and approach portions of the simulated aircraft's operating envelope, including abnormal and emergency operations; and

(3) The landing maneuver, including normal, abnormal, and emergency landings.

§ 60.37 Simulator qualification on the basis of a Bilateral Aviation Safety Agreement (BASA).

(a) The evaluation and qualification of an airplane simulator by a contracting State to the Convention on International Civil Aviation for the sponsor of an aircraft simulator located in that contracting State may be used as the basis for issuing a U.S. statement of qualification (see appropriate QPS, attachment 5, figure 4) by the NSPM to the sponsor of that simulator in accordance with—

(1) A BASA between the United States and the Contracting State that issued the original qualification; and

(2) A Simulator Implementation Procedure (SIP) established under the BASA.

(b) The SIP will contain any conditions and limitations on validation and issuance of such qualification by the U.S.

Appendix A to Part 60—Qualification Performance Standards for Airplane Flight Simulators

Begin Information

This appendix establishes the standards for Airplane Flight Simulator evaluation and qualification. The Flight Standards Service, National Simulator Program (NSP) staff, under the direction of the NSP Manager (NSPM), is responsible for the development, application, and interpretation of the standards contained within this appendix.

The procedures and criteria specified in this appendix will be used by the NSPM, or a person or persons assigned by the NSPM (e.g., FAA pilots and/or FAA aeronautical engineers, assigned to and trained under the

direction of the NSP—referred to as NSP pilots or NSP engineers, other FAA personnel, *etc.*) when conducting airplane flight simulator evaluations.

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1. Introduction

a. This appendix contains background information as well as information that is either directive or guiding in nature. Information considered directive is described in this appendix in terms such as “will,” “shall,” and “must,” and means that the actions are mandatory. Guidance information is described in terms such as “should,” or “may,” and indicate actions that are desirable, permissive, or not mandatory and provide for flexibility.

b. To assist the reader in determining what areas are directive or required and what areas are guiding or permissive—

(1) The text in this appendix is contained within sections, separated by horizontal lines; headings associated with these horizontal lines will indicate that a particular section begins or ends. All of the text falls into one of three sections: a direct quote or a paraphrasing of the Part 60 rule language; additional requirements that are also regulatory but are found only in this appendix; and advisory or informative material.

(2) The text presented between horizontal lines beginning with the heading "Begin Rule Language" and ending with the heading "End Rule Language," is a direct quote or is paraphrased from Part 60 of the regulations. For example: the rule uses the terms "flight simulation device (FSD)" and "aircraft;" however, in this appendix the rule is paraphrased and the term "simulator" is used instead of FSD, and "airplane" is used instead of aircraft. Additionally, the rule uses the terms "this part" and "appropriate QPS;" however, in this appendix the rule is paraphrased and the terms "Part 60" and "this appendix," respectively, are used instead. (Definitions are not paraphrased or modified in any way.) For ease of referral, the Part 60 reference is noted at the beginning and end of the bordered area.

(3) The text presented between horizontal lines beginning with the heading "Begin QPS Requirements" and ending with the heading "End QPS Requirements," is also regulatory but is found only in this appendix.

(4) The text presented between horizontal lines beginning with the heading "Begin Information" and ending with the heading "End Information," is advisory or informative.

(5) The tables in this appendix have rows across the top of each table—

(a) The data presented in columns under the heading "QPS REQUIREMENTS" is regulatory but is found only in this appendix.

(b) The data presented in columns under the heading "INFORMATION" is advisory or informative.

Important Note: While this appendix contains quotes and paraphrasing directly from the rule, the reader is cautioned *not* to rely solely on this appendix for regulatory requirements regarding flight simulators. For regulatory references for airplane flight simulators, the reader is referred to paragraphs 3. a through i of this appendix.

c. Questions regarding the contents of this publication should be sent to the U.S. Department of Transportation, Federal Aviation Administration, Flight Standards Service, National Simulator Program Staff, AFS-205, PO Box 20636, Atlanta, Georgia, 30320. Telephone contact numbers for the NSP are: phone, 404-305-6100; fax, 404-305-6118. The NSP Internet Web Site address is: <http://www.faa.gov/nspp>. On this Web Site you will find an NSP personnel list with contact information, a list of qualified flight simulation devices, advisory circulars, a description of the qualification process, NSP policy, and an NSP "In-Works" section. Also linked from this site are additional information sources, handbook bulletins,

frequently asked questions, a listing and text of the Federal Aviation Regulations, Flight Standards Inspector's handbooks, and other FAA links.

d. The NSPM encourages the use of electronic media for communication and the gathering, storage, presentation, or transmission of any record, report, request, test, or statement required by this appendix provided the media used has adequate provision for security and is acceptable to the NSPM. The NSPM recommends inquiries on system compatibility prior to any such activity. Minimum System requirements may be found on the NSP Website.

End Information

2. Definitions

Begin Information

See Attachment 4 for a list of definitions and abbreviations. Attachment 4 contains definitions directly quoted from Part 1 or Part 60, presented between horizontal lines beginning with the heading "Begin Rule Language" and ending with the heading "End Rule Language," and are a direct quote or are paraphrased from Part 1 or Part 60. These definitions are regulatory. Additional definitions and abbreviations used in reading and understanding this appendix are presented between horizontal lines beginning with the heading "Begin QPS Requirements" and ending with the heading "End QPS Requirements." These definitions are also regulatory but are found only in this appendix. For purposes of accuracy, the definitions listed are directly quoted, and are not paraphrased.

End Information

3. Related Reading References

Begin Information

- a. 14 CFR part 60.
- b. 14 CFR part 61.
- c. 14 CFR part 63.
- d. 14 CFR part 119.
- e. 14 CFR part 121.
- f. 14 CFR part 125.
- g. 14 CFR part 135.
- h. 14 CFR part 141.
- i. 14 CFR part 142.
- j. Advisory Circular (AC) 120-28C, Criteria for Approval of Category III Landing Weather Minima.
- k. AC 120-29, Criteria for Approving Category I and Category II Landing Minima for part 121 operators.
- l. AC 120-35B, Line Operational Simulations: Line-Oriented Flight Training, Special Purpose Operational Training, Line Operational Evaluation.
- m. AC 120-41, Criteria for Operational Approval of Airborne Wind Shear Alerting and Flight Guidance Systems.
- n. AC 120-57A, Surface Movement Guidance and Control System (SMGS).
- o. AC 150/5300-13, Airport Design.
- p. AC 150/5340-1G, Standards for Airport Markings.

q. AC 150/5340-4C, Installation Details for Runway Centerline Touchdown Zone Lighting Systems.

r. AC 150/5340-19, Taxiway Centerline Lighting System.

s. AC 150/5340-24, Runway and Taxiway Edge Lighting System.

t. AC 150/5345-28D, Precision Approach Path Indicator (PAPI) Systems.

u. International Air Transport Association document, "Flight Simulator Design and Performance Data Requirements," Fifth Edition (1996).

v. AC 25-7, Flight Test Guide for Certification of Transport Category Airplanes.

w. AC 23-8A, Flight Test Guide for Certification of Part 23 Airplanes.

x. International Civil Aviation Organization (ICAO) Manual of Criteria for the Qualification of Flight Simulators, First Edition, 1994 Doc 9625-AN/938.

y. Airplane Flight Simulator Evaluation Handbook, Volume I (February, 1995) and Volume II (July, 1996), The Royal Aeronautical Society, London, UK.

z. FAA Publication FAA-S-8081 series (Practical Test Standards for Airline Transport Pilot Certificate, Type Ratings, Commercial Pilot, and Instrument Ratings).

End Information

4. Background

Begin Information

a. In the late 1980's several regulatory authorities around the world, including the FAA, published new or revised documents stating the requirements for the qualification of flight simulators as applicable under their respective country's rules, regulations, and/or policies. As a result, those who used airplane flight simulators to train and/or check flightcrew members flying under more than one country's regulatory authority found themselves having to provide unique documentation for each authority. With the encouragement of persons from several wide-ranging governmental and non-governmental interests, the Flight Simulation Group of the United Kingdom's Royal Aeronautical Society (RAeS) agreed to organize and conduct two international seminars to focus attention on this situation. The result was the formulation of an RAeS working group consisting of recognized simulation experts and regulatory authority's representatives from around the world. Utilizing the FAA's Advisory Circular (AC) 120-40B document as its practical foundation, this working group devoted over 10,000 man-hours toward the development of a set of simulator evaluation criteria that was acceptable to all parties involved.

b. This set of evaluation criteria was presented for review and comment in an international conference hosted by RAeS in London on January 16 and 17, 1992. Following detailed explanation and considerable discussion, the conference delegates unanimously agreed to forward these criteria to the International Civil Aviation Organization (ICAO), recommending that ICAO adopt these criteria as appropriate for international flight

simulator evaluation criteria. After reviewing this material, ICAO agreed to translate the information into the appropriate language necessary for ICAO purposes; and the resulting ICAO document, "Manual of Criteria for the Qualification of Flight Simulators," 1st Ed., 1994, is available through the Office of the Secretary General.

c. As a primary participant in the development of the information forwarded to

the ICAO by the RAeS, the FAA had planned to modify the criteria and standards used for simulator evaluation conducted under U.S. authority to match this set of internationally developed information. The requirements in this appendix match the ICAO requirements for the evaluation and qualification of the highest two levels of airplane simulators addressed herein: *i.e.*, the requirements for Level C and Level D simulators set out in this

appendix match the requirements for ICAO simulators at Level I and Level II, respectively.

d. For information purposes, the following is a chronological listing of the documents preceding this appendix that have addressed the qualification criteria for airplane simulator evaluation and qualification by the FAA, including the effective dates of those documents:

14 CFR part 121, appendix B	01/09/65 to 02/02/70
AC 121-14	12/19/69 to 02/09/76
AC 121-14A	02/09/76 to 10/16/78
AC 121-14B	10/16/78 to 08/29/80
14 CFR part 121, appendix H	06/30/80 to (date TBD)
AC 121-14C	08/29/80 to 01/31/83
AC 120-40	01/31/83 to 07/31/86
AC 120-40A	07/31/86 to 07/29/91
AC 120-40B	07/29/91 to (date TBD)

End Information

5. Quality Assurance Program

Begin Rule Language (§ 60.5)

a. After [date 6 months after the effective date of the final rule], no sponsor may use or allow the use of or offer the use of a simulator for flightcrew member training or evaluation or for obtaining flight experience to meet any requirement of 14 CFR chapter I unless the sponsor has established and follows a quality assurance (QA) program, acceptable to the NSPM, for the continuing surveillance and analysis of the sponsor's performance and effectiveness in providing a satisfactory simulator for use on a regular basis as described in this QPS appendix.

b. The QA program must provide a process for identifying deficiencies in the program and for documenting how the program will be changed to address these deficiencies.

c. Whenever the NSPM finds that the QA program does not adequately address the procedures necessary to meet the requirements of 14 CFR part 60, the sponsor must, after notification by the NSPM, change the program so the procedures meet the requirements of part 60.

d. Each sponsor of a simulator must identify to the NSPM and to the TPAA, by name, one individual, who is an employee of the sponsor, to be the management representative (MR) and the primary contact point for all matters between the sponsor and the FAA regarding the qualification of that simulator as provided for in part 60.

End Rule Language (§ 60.5)

Begin QPS Requirements

e. The Director of Operations for a Part 119 certificate holder, the Chief Instructor for a Part 141 certificate holder, or the equivalent for a Part 142 or Flight Engineer School sponsor, must designate a management representative who has the responsibility and authority to establish and modify the sponsor's policies, practices, and procedures regarding the QA program for the recurring

qualification of, and the day-to-day use of, each simulator.

f. An acceptable Quality Assurance (QA) Program must contain a complete, accurate, and clearly defined written description of and/or procedures for—

(1) The method used by management to communicate the importance of meeting the regulatory standards contained in Part 60 and this QPS appendix and the importance of establishing and meeting the requirements of a QA Program as defined in this paragraph f.

(2) The method(s) used by management to determine that the regulatory standards and the QA program requirements are being met, and if or when not met, what actions are taken to correct the deficiency and prevent its recurrence.

(3) The method used by management to determine that the sponsor is, on a timely and regular basis, presenting a qualified simulator.

(4) The criteria for and a definition or description of the workmanship expected for normal upkeep, repair, parts replacement, modification, *etc.*, on the simulator and how, when, and by whom such workmanship is determined to be satisfactorily accomplished.

(5) The method used to maintain and control appropriate technical and reference documents, appropriate training records, and other documents for—

- (a) continuing simulator qualification; and
- (b) the QA program.

(6) The criteria the sponsor uses (*e.g.*, training, experience, *etc.*) to determine who may be assigned to duties of inspection, testing, and maintenance (preventive and corrective) on simulators.

(7) The method used to track inspection, testing, and maintenance (preventive and corrective) on each simulator.

(8) The method used by the sponsor to inform the TPAA in advance of each scheduled NSPM-conducted evaluation and after the completion, the results of each such evaluation.

(9) The method used to ensure that instructors, check airmen, and those who conduct the daily preflight, are capable of determining what circumstance(s) constitute(s) a discrepancy regarding the simulator and its operation.

(10) The method used to ensure that instructors, check airmen, and those who conduct the daily preflight, record in the simulator discrepancy log each simulator discrepancy and each missing, malfunctioning, or inoperative simulator component.

(11) The method used to ensure that instructors and check airmen are completely and accurately logging the number of disruptions and time not available for training, testing, checking, or for obtaining flight experience during a scheduled simulator use-period, including the cause(s) of the disruption.

(12) The method used by the sponsor to notify users of the simulator of missing, malfunctioning, or inoperative components that restrict the use of the simulator.

(13) The method of recording NSPM-conducted evaluations and other inspections (*e.g.*, daily preflight inspections, NASIP inspections, sponsor conducted quarterly inspections, *etc.*), including the evaluation or inspection date, test results, discrepancies and recommendations, and all corrective actions taken.

(14) The method for ensuring that the simulator is configured the way the airplane it represents is configured and that if the configuration is authorized to be changed that the newly configured system(s) function(s) correctly.

(15) The method(s) for:

(a) Determining whether or not proposed modifications of the airplane will affect the performance, handling, or other functions or characteristics of the airplane; and

(b) Determining whether or not proposed modifications of the simulator will affect the performance, handling, or other functions or characteristics of the simulator; and

(c) Coordinating and communicating items 5. f. (15)(a) and (b) of this appendix, as appropriate, with the sponsor's training organization, other users (*e.g.*, lease or service contract users), the TPAA, and the NSPM.

(16) How information found in the discrepancy log is used to correct discrepancies and how this information is used to review and, if necessary, modify existing procedures for simulator maintenance.

(17) The method for how and when software or hardware modifications are accomplished and tracked, documenting all changes made from the initial submission.

(18) The method used for determining that the simulator meets appropriate standards each day that it is used.

(19) The method for acquiring independent feedback regarding simulator operation (from persons recently completing training, evaluation, or obtaining flight experience; instructors and check airmen using the simulator for training, evaluation or flight experience sessions; and simulator technicians and maintenance personnel) including a description of the process for addressing these comments.

(20) How devices used to test, measure, and monitor correct simulator operation are calibrated and adjusted for accuracy, including traceability of that accuracy to a recognized standard, and how these devices are maintained in good operating condition.

(21) How, by whom, and how frequently internal audits of the QA program are conducted and where and how the results of such audits are maintained and reported to Responsible Management, the NSPM, and the TPAA.

End QPS Requirements

Begin Information

g. Additional Information.

(1) In addition to specifically designated QA evaluations, the NSPM will evaluate the sponsor's QA program as part of regularly scheduled recurrent simulator evaluations and no-notice simulator evaluations, focusing in part on the effectiveness and viability of the QA program and its contribution to the overall capability of the simulator to meeting the requirements of 14 CFR part 60.

(2) The sponsor, through the MR, may delegate duties associated with maintaining the qualification of the simulator (*e.g.*, corrective and preventive maintenance, scheduling for and the conducting of tests and/or inspections, functional preflight checks, *etc.*) but retains the responsibility and authority for the day-to-day qualification and quality of the simulator. One person may serve in this capacity for more than one simulator, but one simulator would not have more than one person serving in this capacity.

(3) Should a sponsor include a "foreign simulator" (*i.e.*, one maintained by a non-US certificate holder) under their sponsorship, the sponsor remains responsible for the QA program for that simulator. However, if that foreign simulator is maintained under a QA program accepted by that foreign regulatory authority and that authority and the NSPM have agreed to accept each other's QA programs (*e.g.*, the Joint Aviation Authorities, JAA, of Europe), the sponsor will be required only to perform an "external audit" of the non-US certificate holder's compliance with the accepted foreign QA program, with the results of that audit submitted to and accepted by the NSPM.

End Information

6. Sponsor Qualification Requirements

Begin Rule Language (§ 60.7)

a. A person is eligible to apply to be a sponsor of a simulator if the following conditions are met:

(1) The person holds, or is an applicant for, a certificate under part 119, 141, or 142 of 14 CFR chapter I; or holds, or is an applicant for, an approved flight engineer course in accordance with part 63 of 14 CFR chapter I.

(2) The simulator will be used, or will be offered for use, in the sponsor's FAA-approved flight training program for the airplane being simulated as evidenced in a request for evaluation submitted to the NSPM through the TPAA.

b. A person is a sponsor of the simulator if the following conditions are met:

(1) The person is a certificate holder under part 119, 141, or 142 of 14 CFR chapter I or has an approved flight engineer course in accordance with part 63 of 14 CFR chapter I.

(2) The person has operations specifications authorizing the use of the airplane type being simulated by the simulator or has training specifications or a course of training authorizing the use of a simulator for that airplane type.

(3) The person has an approved quality assurance program in accordance with § 60.5.

(4) The NSPM has approved the person as the sponsor of the simulator and that approval has not been withdrawn by the FAA.

c. A person continues to be a sponsor of a simulator, if the following conditions are met:

(1) Beginning 12 calendar months after the initial qualification and every 12 calendar months thereafter, the simulator must have been used within the sponsor's FAA-approved flight training program for the airplane type for a minimum of 600 hours.

(2) The use of the simulator described in paragraph (c)(1) of this section must be dedicated to meeting the requirements of parts 61, 63, 91, 121, or 135 of 14 CFR chapter I.

(3) If the use requirements of paragraphs (c)(1) and (2) of this section are not met, the person will continue to sponsor the simulator on a provisional basis for a period not longer than 12 calendar months; and—

(a) If the simulator is used as described in paragraphs (c)(1) and (2) of this section within this additional 12 calendar month period, the provisional status will be removed and regular sponsorship resumed; or

(b) If the simulator is not used as described in paragraphs (c)(1) and (2) of this section within the additional 12 calendar month period, the simulator is not qualified and the sponsor will not be eligible to apply to sponsor that simulator for at least 12 calendar months.

End Rule Language (§ 60.7)

7. Additional Responsibilities of the Sponsor

Begin Rule Language (§ 60.9)

a. The sponsor must not allow the simulator to be used for flightcrew member training or evaluation or for attaining flight experience for the flightcrew member to meet any of the requirements under 14 CFR chapter I unless the sponsor, upon request, allows the NSPM to inspect immediately the simulator, including all records and documents relating to the simulator, to determine its compliance with 14 CFR part 60.

b. The sponsor must, for each simulator—

(1) Establish a mechanism for the following persons to provide comments regarding the simulator and its operation and provide for receipt of those comments:

(a) Flightcrew members recently completing training or evaluation or recently obtaining flight experience in the simulator;

(b) Instructors and check airmen using the simulator for training, evaluation, or flight experience sessions; and

(c) Simulator technicians and maintenance personnel performing work on the simulator.

(2) Examine each comment received under paragraph (b)(1) of this section for content and importance and take appropriate action.

(3) Maintain a liaison with the manufacturer of the airplane being simulated by the simulator to facilitate compliance with § 60.13(f) when necessary.

(4) Post in or adjacent to the simulator the Statement of Qualification issued by the NSPM.

End Rule Language (§ 60.9)

8. Simulator Use

Begin Rule Language (§ 60.11)

No person may use or allow the use of or offer the use of a simulator for meeting training, evaluation, or flight experience requirements of 14 CFR chapter I for flightcrew member certification or qualification unless, in accordance with the QPS for the specific device "—a. It has a single sponsor who is qualified under § 60.9. The sponsor may arrange with another person for services of document preparation and presentation, as well as simulator inspection, maintenance, repair, and servicing; however, the sponsor remains responsible for ensuring that these functions are conducted in a manner and with a result of continually meeting the requirements of 14 CFR part 60. b. It is qualified as described in the Statement of Qualification that is required to be posted pursuant to § 60.9(b)(4) —

(1) For the make, model, and series of airplane; and

(2) For all tasks and configurations. c. It remains qualified, through satisfactory inspection, recurrent evaluations, appropriate maintenance, and use requirements in accordance with 14 CFR part 60 and the appropriate QPS. d. Its software and active programming used during the training, evaluation, or flight experience is the same as the software and active programming that was evaluated by the NSPM.

End Rule Language (§ 60.11)**Begin QPS Requirements**

e. Only those simulators that are used by a certificate holder (as defined for use in Part 60 and this QPS appendix) will be evaluated by the NSPM. However, other simulator evaluations may be conducted on a case-by-case basis as the Administrator deems appropriate, but only in accordance with applicable agreements.

End QPS Requirements**Begin Information**

f. Each simulator must be evaluated as completely as possible. To ensure a thorough and uniform evaluation, each simulator is subjected to the performance demonstrations in attachment 1, the objective tests listed in attachment 2, and the subjective tests listed in attachment 3 of this appendix. The evaluation(s) described in this paragraph f will include, but not necessarily be limited to the following, as appropriate, for the qualification level of the simulator:

(1) Aerodynamic responses, including longitudinal and lateral-directional control responses (see attachment 2 of this appendix);

(2) Performance in authorized portions of the simulated airplane's operating envelope, to include tasks suitable to the NSPM in the areas of ground operations, takeoff, climb, cruise, descent, approach, and landing as well as abnormal and emergency operations (see paragraph 23 and attachment 2 of this appendix);

(3) Control checks (see attachment 1 and attachment 2 of this appendix);

(4) Cockpit configuration (see attachment 1 of this appendix);

(5) Pilot, flight engineer, and instructor station functions checks (see attachment 1 and attachment 3 of this appendix);

(6) Airplane systems and sub-systems (as appropriate) as compared to the airplane simulated (see attachment 1 and attachment 3 of this appendix);

(7) Simulator systems and sub-systems, including force cueing (motion), visual, and aural (sound) systems, as appropriate (see attachment 1 and attachment 2); and

(8) Certain additional requirements, depending upon the complexity of the simulator qualification level sought, including equipment or circumstances that may become hazardous to the occupants. The sponsor may be subject to Occupational Safety and Health Administration requirements.

g. The NSPM administers the objective and subjective tests, which includes an examination of functions. The tests include a qualitative assessment of the simulator by an NSP pilot. The NSP evaluation team leader may assign other qualified personnel to assist in accomplishing the functions examination and/or the objective and subjective tests performed during an evaluation when required.

(1) Objective tests are used to compare simulator and airplane data objectively to ensure that the simulator performance and

handling qualities are within specified tolerances.

(2) Subjective tests provide a basis for:

(a) Evaluating the capability of the simulator to perform over a typical utilization period;

(b) Determining that the simulator satisfactorily meets the appropriate training/testing/checking objectives and competently simulates each required maneuver, procedure, or task; and

(c) Verifying correct operation of the simulator controls, instruments, and systems.

h. The tolerances for the test parameters listed in attachment 2 of this appendix are the maximum acceptable to the NSPM for simulator validation and are not to be confused with design tolerances specified for simulator manufacture. In making decisions regarding tests and test results, the NSPM relies on the use of operational and engineering judgment in the application of data (including consideration of the way in which the flight test was flown and way the data was gathered and applied) data presentations, and the applicable tolerances for each test.

i. In addition to the scheduled recurrent evaluation (see paragraph 14), each simulator is subject to evaluations conducted by the NSPM at any time with no prior notification to the sponsor. Such evaluations would be accomplished in a normal manner (*i.e.*, requiring exclusive use of the simulator for the conduct of objective and subjective tests and an examination of functions) if the simulator is not being used for flightcrew member training, testing, or checking. However, if the simulator were being used, the evaluation would be conducted in a non-exclusive manner. This non-exclusive evaluation will be conducted by the simulator evaluator accompanying the check airman, instructor, Aircrew Program Designee (APD), or FAA inspector aboard the simulator along with the student(s) and observing the operation of the simulator during the training, testing, or checking activities. While the intent is to observe the operation and interaction of the device and not the check airman, instructor, APD, FAA inspector, or student(s), the simulator evaluator is a qualified FAA operations inspector and must, without question, report any obvious lack of proficiency to the appropriate POI or TPCM.

End Information**9. Simulator Objective Data Requirements****Begin Rule Language (§ 60.13)**

a. Except as provided in paragraphs (b) and (c) of this section, for the purposes of validating simulator performance and handling qualities during evaluation for qualification, the sponsor must submit the airplane manufacturer's flight test data to the NSPM.

b. The sponsor may submit flight test data from a source in addition to or independent of the airplane manufacturer's data to the NSPM in support of a simulator qualification, but only if this data is gathered and developed by that source in accordance with

flight test methods, including a flight test plan, as described in the appropriate QPS.

c. The sponsor may submit alternative data acceptable to the NSPM for consideration, approval and possible use in particular applications for simulator qualification.

d. Data or other material or elements must be submitted in a form and manner acceptable to the NSPM.

e. The NSPM may require additional flight testing to support certain simulator qualification requirements.

f. When a simulator sponsor learns, or is advised by an airplane manufacturer or supplemental type certificate (STC) holder, that an addition to, an amendment to, or a revision of the data used to program and operate a simulator used in the sponsor's training program is available, the sponsor must immediately notify the NSPM.

End Rule Language (§ 60.13)**Begin QPS Requirements**

g. Flight test data used to validate simulator performance and handling qualities must have been gathered in accordance with a flight test program containing the following:

(1) A flight test plan, that contains:

(a) The required maneuvers and procedures.

(b) For each maneuver or procedure—

(i) The procedures and control input the flight test pilot and/or engineer are to use.

(ii) The atmospheric and environmental conditions.

(iii) The initial flight conditions.

(iv) The airplane configuration, including weight and center of gravity.

(v) The data that is to be gathered.

(vi) Any other appropriate factors.

(2) Appropriately qualified flight test personnel.

(31) An understanding of the accuracy of the data to be gathered.

(4) Appropriate and sufficient data acquisition equipment or system(s), including appropriate data reduction and analysis methods and techniques, as would be acceptable to the FAA's Aircraft Certification Service.

(5) Calibration of data acquisition equipment and airplane performance instrumentation must be current and traceable to a recognized standard.

h. The data presented, regardless of source, must be presented:

(1) In a format that supports the flight simulator validation process;

(2) In a manner that is clearly readable and annotated correctly and completely;

(3) With resolution sufficient to determine compliance with the tolerances set forth in attachment 2 of this appendix;

(4) With any necessary guidance information provided; and

(5) Without alteration, adjustments, or bias; however the data may be re-scaled, digitized, or otherwise manipulated to fit the desired presentation.

i. After completion of any additional flight test, a flight test report must be submitted in support of the objective data. The report must contain sufficient data and rationale to

support qualification of the simulator at the level requested.

End QPS Requirements

Begin Information

j. Any necessary data and the flight test plan should be reviewed with the NSP staff well in advance of commencing the flight test.

End Information

10. Special Equipment and Personnel Requirements for Qualification of the Simulator

Begin Rule Language (§ 60.14)

a. When notified by the NSPM, the sponsor must make available all special equipment and specifically qualified personnel needed to accomplish or assist in the accomplishment of tests during initial, recurrent, or special evaluations.

End Rule Language (§ 60.14)

Begin Information

b. Examples of a special evaluation would be an evaluation conducted at the request of the TPAA or as a result of comments received from users of the simulator that, upon analysis and confirmation, might cause a question as to the continued qualification or use of the simulator.

c. The NSPM will notify the sponsor at least 24 hours in advance of the evaluation if special equipment or personnel will be required to conduct the evaluation. Examples of special equipment include spot photometers, flight control measurement devices, sound analyzer, *etc.* Examples of special personnel would be those specifically qualified to install or use any special equipment when its use is required.

End Information

11. Initial (and Upgrade) Qualification Requirements

Begin Rule Language (§ 60.15)

a. For each simulator, the sponsor must submit a request through the TPAA to have the NSPM evaluate the simulator for initial qualification at a specific level. The request must be submitted in the form and manner described in the appropriate QPS.

b. The request must include all of the following:

(1) A statement that the simulator meets all of the applicable provisions of 14CFR, part 60.

(2) A statement that the sponsor has established a procedure to verify that the configuration of hardware and software present during the evaluation for initial qualification will be maintained, except where modified as authorized in § 60.23. The statement must include a description of the procedure.

(3) A statement signed by at least one pilot who meets the requirements of paragraph c of this section asserting that each pilot so approved has determined that the following requirements have been met:

(a) The simulator systems and sub-systems function equivalently to those in the airplane.

(b) The performance and flying qualities of the simulator are equivalent to those of the airplane.

(c) The cockpit configuration conforms to the configuration of the airplane make, model, and series being simulated.

(4) A list of all of the operations tasks or simulator systems in the subjective test attachment of the appropriate QPS for which the simulator has not been subjectively tested (*e.g.*, circling approaches, windshear training, *etc.*) and for which qualification is not sought.

(5) A qualification test guide (QTG) that includes all of the following:

(a) Objective data obtained from airplane testing or another approved source.

(b) Correlating objective test results obtained from the performance of the simulator as prescribed in the appropriate QPS.

(c) The general simulator performance or demonstration results prescribed in the appropriate QPS.

(d) A description of the equipment necessary to perform the evaluation for initial qualification and the recurrent evaluations for continuing qualification.

c. The pilot or pilots who make the statement required by paragraph (b)(3) of this section must—

(1) Be designated by the sponsor;

(2) Be approved by the TPAA; and

(3) Be qualified in—

(a) The airplane being simulated; or

(b) For airplane types not yet issued a type certificate, an airplane type similar in size and configuration.

d. The subjective tests that form the basis for the statements described in paragraph (b)(3) of this section and the objective tests referenced in paragraph (b)(5) of this section must be accomplished at the sponsor's training facility except as provided for in the appropriate QPS.

e. The person seeking to qualify the simulator must provide the NSPM access to the simulator for the length of time necessary for the NSPM to complete the required evaluation of the simulator for initial qualification, which includes the conduct and evaluation of objective and subjective tests, including general simulator requirements, as described in the appropriate QPS, to determine that the simulator meets the standards in that QPS.

f. When the simulator passes an evaluation for initial qualification, the NSPM issues a Statement of Qualification that includes all of the following:

(1) Identification of the sponsor.

(2) Identification of the make, model, and series of the airplane being simulated.

(3) Identification of the configuration of the airplane being simulated (*e.g.*, engine model or models, flight instruments, navigation or other systems, *etc.*).

(4) A statement that the simulator is qualified.

(5) Identification of the qualification level of the simulator.

(6) A list of all of the operations tasks or simulator systems in the subjective test attachment of the appropriate QPS for which the simulator has not been subjectively tested and for which the simulator is not qualified (*e.g.*, circling approaches, windshear training, *etc.*).

g. After the NSPM completes the evaluation for initial qualification, the sponsor must update the QTG, with the results of the FAA-witnessed tests and demonstrations together with the results of all the objective tests and demonstrations described in the appropriate QPS.

h. Upon issuance of the Statement of Qualification the updated QTG becomes the MQTG and must then be made available to the FAA upon request.

End Rule Language (§ 60.15)

Begin QPS Requirements

i. The QTG described in paragraph 11.b.(4) of this appendix, must provide the documented proof of compliance with the simulator objective tests in attachment 2 of this appendix.

j. The QTG is prepared and submitted by the sponsor, or the sponsor's agent on behalf of the sponsor, through the TPAA to the NSPM for review and approval, and must include, for each objective test:

(1) Parameters, tolerances, and flight conditions;

(2) Pertinent and complete instructions for the conduct of automatically and manually conducted tests;

(3) A means of comparing the simulator's test results to the objective data;

(4) Statements of how a particular test was accomplished or that certain requirements have been met (see attachments to this appendix for additional information);

(5) Other information appropriate to the qualification level of the simulator.

k. The QTG described in paragraph 11.b.(4) of this appendix, must include the following:

(1) A QTG cover page with sponsor and FAA approval signature blocks (see Attachment 5, Figure 2, for a sample QTG cover page).

(2) A recurrent evaluation schedule requirements page—to be used by the NSPM to establish and record the frequency with which recurrent evaluations must be conducted and any subsequent changes that may be determined by the NSPM. See Attachment 5, Figure 4, for a sample Recurrent Evaluation Schedule Requirements page.

(3) A simulator information page that provides the information listed in this paragraph k.(3) (see Attachment 5, Figure 3, for a sample simulator information page). For convertible simulators, a separate page is submitted for each configuration of the simulator.

(a) The sponsor's simulator identification number or code.

(b) The airplane model and series being simulated.

(c) The aerodynamic data revision number or reference.

(d) The engine model(s) and its data revision number or reference.

(e) The flight control data revision number or reference.

(f) The flight management system identification and revision level.

(g) The simulator model and manufacturer.

(h) The date of simulator manufacture.

(i) The simulator computer identification.

(j) The visual system model and manufacturer, including display type.

(k) The motion system type and manufacturer, including degrees of freedom.

(4) A Table of Contents.

(5) A log of revisions and a list of effective pages.

(6) The source data.

(7) A glossary of terms and symbols used (including sign conventions and units).

(8) Statements of compliance and capability (SOC's) with certain requirements. SOC's must provide references to the sources of information for showing the capability of the simulator to comply with the requirement, a rationale explaining how the referenced material is used, mathematical equations and parameter values used, and the conclusions reached; *i.e.* that the simulator complies with the requirement. Refer to the "Additional Details" column in attachment 1, "Simulator Standards," or in the "Test Details" column in attachment 2, "Simulator Objective Tests," to see when SOC's are required.

(9) Recording procedures or equipment required to accomplish the objective tests.

(10) The following information for each objective test designated in attachment 2, as applicable to the qualification level sought:

(a) Name of the test.

(b) Objective of the test.

(c) Initial conditions.

(d) Manual test procedures.

(e) Automatic test procedures (if applicable).

(f) Method for evaluating simulator objective test results.

(g) List of all parameters driven or constrained during the automatically conducted test(s).

(h) List of all parameters driven or constrained during the manually conducted test(s).

(i) Tolerances for relevant parameters.

(j) Source of Airplane Test Data (document and page number).

(k) Copy of the Airplane Test Data (if located in a separate binder, a cross reference for the identification and page number for pertinent data location must be provided).

(l) Simulator Objective Test Results as obtained by the sponsor. Each test result must reflect the date completed and must be clearly labeled as a product of the device being tested.

1. Form and manner of presentation of objective test results in the QTG:

(1) The sponsor's simulator test results must be recorded in a manner, acceptable to the NSPM, that will allow easy comparison of the simulator test results to airplane test data (*e.g.*, use of a multi-channel recorder, line printer, cross plotting, overlays, transparencies, *etc.*).

(2) Simulator results must be labeled using terminology common to airplane parameters

as opposed to computer software identifications.

(3) Airplane data documents included in a QTG may be photographically reduced only if such reduction will not alter the graphic scaling or cause difficulties in scale interpretation or resolution.

(4) Scaling on graphical presentations must provide the resolution necessary to evaluate the parameters shown in attachment 2 of this appendix.

(5) For tests involving time histories, flight test data sheets (or transparencies thereof) and simulator test results must be clearly marked with appropriate reference points to ensure an accurate comparison between simulator and airplane with respect to time. Time histories recorded via a line printer are to be clearly identified for cross-plotting on the airplane data. Over-plots must not obscure the reference data.

m. The sponsor may elect to complete the QTG objective tests at the manufacturer's facility. Tests performed at this location must be conducted after assembly of the simulator has been essentially completed, the systems and sub-systems are functional and operate in an interactive manner, and prior to the initiation of disassembly for shipment. The sponsor must substantiate simulator performance at the sponsor's training facility by repeating a representative sampling of all the objective tests in the QTG and submitting these repeated test results to the NSPM. This sample must consist of at least one-third of the QTG objective tests. The QTG must be clearly annotated to indicate when and where each test was accomplished.

n. The sponsor may elect to complete the subjective tests at the manufacturer's facility. Tests performed at this location will be conducted after assembly of the simulator has been essentially completed, the systems and sub-systems are functional and operate in an interactive manner, and prior to the initiation of disassembly for shipment. The sponsor must substantiate simulator performance at the sponsor's training facility by having the pilot(s) who performed these tests originally (or similarly qualified pilot(s)), repeat a representative sampling of these subjective tests and submit a statement to the NSPM that the simulator has not changed from the original determination. The report must clearly indicate when and where these repeated tests were completed, but need not take more than one normal simulator period (*e.g.*, 4 to 8 hours) to complete.

o. The sponsor must maintain a copy of the MQTG at the simulator location. After [date 6 years from the effective date of the final rule] all MQTG's, regardless of initial qualification date of the simulator, must be available in an electronic format, acceptable to the NSPM. The electronic MQTG must include all objective data obtained from airplane testing, or another approved source (reformatted or digitized), together with correlating objective test results obtained from the performance of the simulator (reformatted or digitized) as prescribed in this appendix, the general simulator performance or demonstration results (reformatted or digitized) prescribed in this appendix, and a description of the equipment

necessary to perform the evaluation for initial qualification and the recurrent evaluations for continuing qualification. This electronic MQTG must include the original airplane flight test data used to validate simulator performance and handling qualities in either the original digitized format from the data supplier or an electronic scan of the original flight test time-history plots that were provided by the data supplier. An electronic copy of MQTG must be provided to the NSPM.

End QPS Requirements

Begin Information

p. Problems with objective test results are handled according to the following:

(1) If a problem with an objective test result is detected by the NSP evaluation team during an evaluation, the test may be repeated and/or the QTG may be amended.

(2) If it is determined that the results of an objective test do not support the level requested but do support a lower level, the NSPM may qualify the simulator at that lower level. For example, if a Level D evaluation is requested and the simulator fails to meet sound test tolerances, it could be qualified at Level C.

q. After the NSPM issues a statement of qualification to the sponsor when a simulator is successfully evaluated, the simulator is recommended to the TPAA, who will exercise authority on behalf of the Administrator in approving the simulator in the appropriate airplane flight training program.

r. Under normal circumstances, the NSPM establishes a date for the initial or upgrade evaluation within ten (10) working days after determining that a complete QTG is acceptable. Unusual circumstances may warrant establishing an evaluation date before this determination is made; however, once a schedule is agreed to, any slippage of the evaluation date at the sponsor's request may result in a significant delay, perhaps 45 days or more, in rescheduling and completing the evaluation. A sponsor may commit to an initial evaluation date under this early process, in coordination with and the agreement of the NSPM, but the request must be in writing and must include an acknowledgment of the potential schedule impact if the sponsor slips the evaluation from this early-committed date. See Attachment 5, figure 5, Sample Request for Initial Evaluation Date.

s. A convertible simulator is addressed as a separate simulator for each model and series airplane to which it will be converted and for the FAA qualification level sought. An NSP evaluation is required for each configuration. For example, if a sponsor seeks qualification for two models of an airplane type using a convertible simulator, two QTG's, or a supplemented QTG, and two evaluations are required.

t. The numbering system used for objective test results in the QTG should closely follow the numbering system set out in attachment 2, Simulator Objective Tests.

End Information

12. Additional Qualifications for a Currently Qualified Simulator

Begin Rule Language (§ 60.16)

a. A currently qualified simulator is required to undergo an additional qualification process if a user intends to use the simulator for meeting training, evaluation, or flight experience requirements of 14 CFR chapter I beyond the qualification issued to the sponsor. This process consists of the following—

(1) The sponsor:

(a) Must submit to the NSPM all modifications to the MQTG that are required to support the additional qualification.

(b) Must describe to the NSPM all modifications to the simulator that are required to support the additional qualification.

(c) Must submit a statement to the NSPM that a pilot, designated by the sponsor in accordance with § 60.15(c) and approved by the TPAA for the user, has subjectively evaluated the simulator in those areas not previously evaluated.

(2) The simulator must successfully pass an evaluation—

(a) For initial qualification, in accordance with § 60.15, in those circumstances where the NSPM has determined that a full evaluation for initial qualification is necessary; or

(b) For those elements of an evaluation for initial qualification (e.g., objective tests, performance demonstrations, or subjective tests) designated as necessary by the NSPM.

b. In making the determinations described in paragraph (a)(2) of this section, the NSPM considers factors including the existing qualification of the simulator, any modifications to the simulator hardware or software that are involved, and any additions or modifications to the MQTG.

c. The simulator is qualified for the additional uses when the NSPM issues an amended Statement of Qualification in accordance with § 60.15(f).

d. The sponsor may not modify the simulator except as described in § 60.23.

End Rule Language (§ 60.16)

13. Previously Qualified Simulators

Begin Rule Language (§ 60.17)

a. Unless otherwise specified by an FSD Directive, further referenced in the appropriate QPS, or as specified in paragraph (e) of this section, a simulator qualified before [the effective date of this rule] will retain its qualification as long as it continues to meet the standards, including the performance demonstrations and the objective test results recorded in the MQTG, under which it was originally evaluated, regardless of sponsor, and as long as the sponsor complies with the applicable provisions of 14 CFR part 60.

b. If the simulator qualification is lost under § 60.27 and not restored under § 60.27 for two (2) years or more, the qualification basis for the re-qualification will be those

standards in effect and current at the time of re-qualification application.

c. Except as provided in paragraph (d) of this section, any change in simulator qualification level initiated on or after [the effective date of the final rule] requires an evaluation for initial qualification in accordance with 14 CFR part 60.

d. The NSPM may downgrade a qualified simulator without requiring and without conducting an initial evaluation for the new qualification level. Subsequent recurrent evaluations will use the existing MQTG, modified as necessary to reflect the new qualification level.

e. When the sponsor has appropriate validation data available and receives approval from the NSPM, the sponsor may adopt tests and associated tolerances described in the current qualification standards as the tests and tolerances applicable for the continuing qualification of a previously qualified simulator. The updated test(s) and tolerance(s) must be made a permanent part of the MQTG.

End Rule Language (§ 60.17)

Begin Information

f. Other certificate holders or persons desiring to use a flight simulator may contract with simulator sponsors to use those simulators already qualified at a particular level for an airplane type and approved for use within an FAA-approved flight training program. Such simulators are not required to undergo an additional qualification process, except as described in paragraph 12 of this appendix.

Note: The reader is reminded of the requirement that each simulator user must obtain approval from the appropriate TPAA to use any simulator in an FAA-approved flight training program.

End Information

14. Inspection, Maintenance, and Recurrent Evaluation Requirements

Begin Rule Language (§ 60.19)

a. Inspection. No sponsor may use or allow the use of or offer the use of a simulator for meeting training, evaluation, or flight experience requirements of 14 CFR, Chapter I for flightcrew member certification or qualification unless the sponsor does the following:

(1) Accomplishes all appropriate QPS Attachment 1 performance demonstrations and all appropriate QPS Attachment 2 objective tests each year. To do this, the sponsor must conduct a minimum of four evenly spaced inspections throughout the year, as approved by the NSPM. The performance demonstrations and objective test sequence and content of each inspection in this sequence will be developed by the sponsor and submitted to the NSPM for approval. In deciding whether to approve the test sequence and the content of each inspection, the NSPM looks for a balance and a mix from the performance demonstrations

and objective test requirement areas listed as follows:

- (a) Performance.
- (b) Handling qualities.
- (c) Motion system.
- (d) Visual system.
- (e) Sound system (where appropriate).
- (f) Other simulator systems.

(2) Completes a functional preflight check in accordance with the appropriate QPS each calendar day prior to the start of the first simulator period of use that begins in that calendar day.

(3) Completes at least one functional preflight check in accordance with the appropriate QPS in every seven (7) consecutive calendar days.

(4) Maintains a discrepancy log.

(5) Ensures that, when a discrepancy is discovered, the following requirements are met:

(a) Each discrepancy entry must be maintained in the log until the discrepancy is corrected as specified in § 60.25(b) and for at least 30 days thereafter.

(b) The corrective action taken for each discrepancy and the date that action is taken must be entered in the log. This entry concerning the corrective action must be maintained for at least 30 days thereafter.

(c) The discrepancy log is kept in a form and manner acceptable to the Administrator and is kept in or immediately adjacent to the simulator.

b. Recurrent evaluation.

(1) This evaluation consists of performance demonstrations, objective tests, and subjective tests, including general simulator requirements, as described in the appropriate QPS or as may be amended by an FSD Directive.

(2) The sponsor must contact the NSPM to schedule the simulator for recurrent evaluations not later than 60 days before the recurrent evaluation is due.

(3) The sponsor must provide the NSPM access to the objective test results and general simulator performance or demonstration results in the MQTG, and access to the simulator for the length of time necessary for the NSPM to complete the required recurrent evaluations, weekdays between 6 o'clock a.m. (local time) and 6 o'clock p.m. (local time).

(4) No sponsor may use, or allow the use of, or offer the use of, a simulator for flightcrew member training or evaluation or for obtaining flight experience for the flightcrew member to meet the requirements of 14 CFR chapter I unless the simulator has passed an NSPM-conducted recurrent evaluation within the previous 12 calendar months or as otherwise provided for in the MQTG.

(5) Recurrent evaluations conducted in the calendar month before or after the calendar month in which these recurrent evaluations are required will be considered to have been conducted in the calendar month in which they were required.

c. Maintenance. The sponsor is responsible for continuing corrective and preventive maintenance on the simulator to ensure that it continues to meet the requirements of § 60.15(b).

End Rule Language (§ 60.19)**Begin QPS Requirements**

d. The preflight inspections described in paragraphs 14.a.(2) and (3) of this appendix, must consist of, as a minimum—

(1) An exterior inspection of the simulator for appropriate hydraulic, pneumatic, and electrical connections (*e.g.*, in place, not leaking, appear serviceable);

(2) A check that the area around the simulator is free of potential obstacles throughout the motion system range;

(3) A review of the simulator discrepancy log;

(4) A functional check of the major simulator systems and simulated airplane systems (*e.g.*, visual, motion, sound, cockpit instrumentation, and control loading, including adequate air flow for equipment cooling) by doing the following:

(a) Turn on main power, including motion system, and allow to stabilize.

(b) Connect airplane power. This may be connected through “quick start” of airplane engines, auxiliary power unit, or ground power. Airplane operations will require operating engines.

(c) A general look for light bulb function, lighted instruments and switches, *etc.*, as well as inoperative “flags” or other such indications.

(d) Check Flight Management System(s) (and other date-critical information) for proper date range.

(e) Select takeoff position and from either pilot position, observe the visual system, for proper operation; *e.g.*, light-point color balance and convergence, edge-matching and blending, *etc.*

(f) Adjust visibility value to inside of the far end of the runway and release “position freeze or flight freeze.” From either pilot position, advance power to taxi down the runway (observe visual system, check sound system and engine instrument response) and apply spoiler/speed brake, if appropriate, and wheel brakes (to check spoiler/speed brake and wheel brake operation as applicable and to exercise simulator motion system); select reverse thrust, if applicable, to check normal operation and continued deceleration.

(g) Select position on final approach, at least five (5) miles out (observe visual scene). From either pilot position, adjust airplane configuration appropriately (check for normal gear and flap operation). Adjust visibility to see entire airport. Release “position freeze” or “flight freeze.” Make a rapid left and right bank (check control feel and freedom; observe proper airplane response; and exercise motion system). Observe visual system and simulated airplane systems operation.

(h) Extend gear and flaps,

(i) Fly to and land at airport, or select takeoff position.

(j) Shut down engines, turn off lights, turn off main power supply and motion system.

(k) Record “functional preflight” in the simulator discrepancy log book, including any item found to be missing, malfunctioning, or inoperative.

End QPS Requirements**Begin Information**

e. If the NSP evaluator plans to accomplish specific tests during a normal recurrent evaluation that requires the use of special equipment or technicians, the sponsor will be notified as far in advance of the evaluation as practical; usually not less than 24 hours. These tests include latencies, control dynamics, sounds and vibrations, motion, and/or some visual system tests.

f. The recurrent evaluations described in paragraph 13.a.(7) of this appendix, require approximately eight (8) hours of simulator time and consist of the following:

(1) Review of the results of the objective tests and all the designated simulator performance demonstrations conducted by the sponsor since the last scheduled recurrent evaluation.

(2) At the discretion of the evaluator, a selection of approximately 20 percent of those objective tests conducted since the last scheduled recurrent evaluation and a selection of approximately 10 percent of the remaining objective tests in the MQTG. The tests chosen will be performed either automatically or manually, at the discretion of the evaluator.

(3) Subjective test of the simulator to perform a representative sampling of the tasks set out in attachment 3 of this appendix, selected at the discretion of the evaluator.

(4) An examination of the functions of the simulator, including, but not necessarily limited to the motion system, visual system, sound system, instructor operating station, and the normal and simulated malfunctions of the simulated airplane systems.

End Information**15. Logging Simulator Discrepancies****Begin Rule Language (§ 60.20)**

Each instructor, check airman, or representative of the Administrator conducting training or evaluation, or observing flight experience for flightcrew member certification or qualification, and each person conducting the preflight inspection (§ 60.19(a)(2), (3), and (4)), who discovers a discrepancy, including any missing, malfunctioning, or inoperative components in the simulator, must write or cause to be written a description of that discrepancy into the discrepancy log at the end of the simulator preflight or simulator use session.

End Rule Language (§ 60.20)**16. Interim Qualification of Simulators for New Airplane Types or Models****Begin Rule Language (§ 60.21)**

a. A sponsor may apply for and the NSPM may issue an interim qualification level for a simulator for a new type or model of airplane, even though the flight test data used has not received final approval by the airplane manufacturer, if the sponsor

provides the following to the satisfaction of the NSPM—

(1) The airplane manufacturer’s predicted data, validated by a limited set of flight test data;

(2) The airplane manufacturer’s description of the prediction methodology used to develop the predicted data; and

(3) The QTG test results.

b. A simulator that has been issued interim qualification will be deemed to have been issued initial qualification unless the NSPM rescinds the qualification. Interim qualification terminates one year after its issuance, unless the NSPM determines that specific conditions warrant otherwise.

c. Within six months of the release of the final flight test data package by the airplane manufacturer but no later than one year after the issuance of the interim qualification status the sponsor must apply for initial qualification in accordance with § 60.15 based on the final flight test data package approved by the airplane manufacturer, unless the NSPM determines that specific conditions warrant otherwise.

d. A simulator with interim qualification may be modified only in accordance with § 60.23.

End Rule Language (§ 60.21)**17. Modifications to Simulators****Begin Rule Language (§ 60.23)**

a. When the sponsor or the FAA determines that any of the following circumstances exist and the FAA determines that the simulator cannot be used adequately to train, evaluate, or provide flight experience for flightcrew members, the sponsor must modify the simulator accordingly.

(1) The airplane manufacturer or another approved source develops new data regarding the performance, functions, or other characteristics of the airplane being simulated;

(2) A change in airplane performance, functions, or other characteristics occurs;

(3) A change in operational procedures or requirements occurs; or

(4) Other circumstances as determined by the NSPM.

b. When the FAA determines that simulator modification is necessary for safety of flight reasons, the sponsor of each affected simulator must ensure that the simulator is modified according to the FSD Directive regardless of the original qualification standards applicable to any specific simulator.

c. Before modifying a qualified simulator, the sponsor must notify the NSPM and the TPAA as follows:

(1) The notification must include a complete description of the planned modification, including a description of the operational and engineering effect the proposed modification will have on the operation of the simulator.

(2) The notification must be submitted in a form and manner as specified in the appropriate QPS.

d. If the sponsor intends to add additional equipment or devices intended to simulate airplane appliances; modify hardware or software which would affect flight or ground dynamics, including revising simulator programming or replacing or modifying the host computer; or if the sponsor is changing or modifying the motion, visual, or control loading systems (or sound system for simulator levels requiring sound tests and measurements), the following applies:

(1) The sponsor must meet the notification requirements of paragraph c of this section and must include in the notification the results of all objective tests that have been re-run with the modification incorporated, including any necessary updates to the MQTG.

(2) However, the sponsor may not use, or allow the use of, or offer the use of, the simulator with the proposed modification for flightcrew member training or evaluation or for obtaining flight experience for the flightcrew member to meet the requirements of 14CFR, Chapter I unless or until the sponsor receives written notification from the NSPM approving the proposed modification. Prior to approval, the NSPM may require that the modified simulator be evaluated in accordance with the standards for an evaluation for initial qualification or any part thereof before it is placed in service.

e. The sponsor may not modify a qualified simulator until one of the following has occurred:

(1) For circumstances described in paragraph b or d of this section, the sponsor receives written approval from the NSPM that the modification is authorized.

(2) For circumstances other than those described in paragraph b or d of this section, either:

(a) Twenty-one days have passed since the sponsor notified the NSPM and the TPAA of the proposed modification and the sponsor has not received any response from the NSPM or TPAA; or

(b) The NSPM or TPAA approves the proposed modification in fewer than 21 days since the sponsor notified the NSPM and the TPAA of the proposed modification.

f. When a modification is made to a simulator, the sponsor must notify each certificate holder planning to use that simulator of that modification prior to that certificate holder using that simulator the first time after the modification is complete.

g. The MQTG must be updated with current objective test results in accordance with § 60.15(b)(5) and appropriate flight test data in accordance with § 60.13, each time a simulator is modified and an objective test is affected by the modification. If this update is initiated by an FSD Directive, the direction to make the modification and the record of the modification completion must be filed in the MQTG.

End Rule Language (§ 60.23)

Begin QPS Requirements

h. The notification described in paragraph 17.c.(1) of this appendix, will include a statement signed by a pilot, qualified in the airplane type being simulated and designated

by the sponsor, that, with the modification proposed—

(1) The simulator systems and sub-systems function equivalently to those in the airplane being simulated;

(2) The performance and flying qualities of the simulator are equivalent to those of the airplane being simulated; and

(3) The cockpit configuration conforms to the configuration of the airplane being simulated.

End QPS Requirements

18. Operation With Missing, Malfunctioning, or Inoperative Components

Begin Rule Language (§ 60.25)

a. No person may use or allow the use of or offer the use of a simulator with a missing, malfunctioning, or inoperative component for meeting training, evaluation, or flight experience requirements of 14 CFR chapter I for flightcrew member certification or qualification during maneuvers, procedures, or tasks that require the use of the correctly operating component.

b. Each missing, malfunctioning, or inoperative component must be repaired or replaced within 30 calendar days unless otherwise authorized by the NSPM. Failure to repair or replace this component within the prescribed time may result in loss of simulator qualification.

c. Each missing, malfunctioning, or inoperative component must be placarded as such on or adjacent to that component in the simulator and a list of the currently missing, malfunctioning, or inoperative components must be readily available in or immediately adjacent to the simulator for review by users of the device.

End Rule Language (§ 60.25)

19. Automatic Loss of Qualification and Procedures for Restoration of Qualification

Begin Rule Language (§ 60.27)

a. A simulator is not qualified if any of the following occurs:

(1) The simulator is not used in the sponsor's FAA-approved flight training program in accordance with § 60.9(b)(4).

(2) The simulator is not maintained and inspected in accordance with § 60.19.

(3) The simulator is physically moved from one location to another, regardless of distance.

(4) The simulator is disassembled (*e.g.*, for repair or modification) to such an extent that it cannot be used for training, evaluation, or experience activities.

(5) The MQTG is missing or otherwise not available and a replacement is not made within 30 days.

b. If simulator qualification is lost under paragraph (a) of this section, qualification is restored when either of the following provisions are met:

(1) The simulator successfully passes an evaluation:

(a) For initial qualification, in accordance with § 60.15 in those circumstances where

the NSPM has determined that a full evaluation for initial qualification is necessary; or

(b) For those elements of an evaluation for initial qualification approved as necessary by the NSPM.

(2) The NSPM or the TPAA advises the sponsor that an evaluation is not necessary.

c. In making the determinations described in paragraph (b) of this section, the NSPM considers factors including the number of inspections and recurrent evaluations missed, the amount of disassembly and re-assembly of the simulator that was accomplished, and the care that had been taken of the device since the last evaluation.

End Rule Language (§ 60.27)

20. Other Losses of Qualification and Procedures for Restoration of Qualification

Begin Rule Language (§ 60.29)

a. Except as provided in paragraph c of this section, when the NSPM or the TPAA notifies the sponsor that the simulator no longer meets qualification standards, the following procedure applies:

(1) The NSPM or the TPAA notifies the sponsor in writing that the simulator no longer meets some or all of its qualification standards.

(2) The NSPM or the TPAA sets a reasonable period (but not less than 7 days) within which the sponsor may submit written information, views, and arguments on the simulator qualification.

(3) After considering all material presented, the NSPM or the TPAA notifies the sponsor of the simulator qualification.

(4) If the NSPM or the TPAA notifies the sponsor that some or all of the simulator is no longer qualified, it becomes effective not less than 30 days after the sponsor receives notice of it unless—

(a) The NSPM or the TPAA find under paragraph c of this section that there is an emergency requiring immediate action with respect to safety in air transportation or air commerce; or

(b) The sponsor petitions for reconsideration of the NSPM or the TPAA finding under paragraph b of this section.

b. When a sponsor seeks reconsideration of a decision from the NSPM or the TPAA concerning the simulator qualification, the following procedure applies:

(1) The sponsor must petition for reconsideration of that decision within 30 days of the date that the sponsor receives a notice that some or all of the simulator is no longer qualified.

(2) The sponsor must address its petition to the Director, Flight Standards Service.

(3) A petition for reconsideration, if filed within the 30-day period, suspends the effectiveness of the determination by the NSPM or the TPAA that the simulator is no longer qualified unless the NSPM or the TPAA has found, under paragraph c of this section, that an emergency exists requiring immediate action with respect to safety in air transportation or air commerce.

c. If the NSPM or the TPAA find that an emergency exists requiring immediate action

with respect to safety in air transportation or air commerce that makes the procedures set out in this section impracticable or contrary to the public interest:

(1) The NSPM or the TPAA withdraws qualification of some or all of the simulator and makes the withdrawal of qualification effective on the day the sponsor receives notice of it.

(2) In the notice to the sponsor, the NSPM or the TPAA articulates the reasons for its finding that an emergency exists requiring immediate action with respect to safety in air transportation or air commerce or that makes it impracticable or contrary to the public interest to stay the effectiveness of the finding.

End Rule Language (§ 60.29)

21. Recordkeeping and Reporting

Begin Rule Language (§ 60.31)

a. The simulator sponsor must maintain the following records for each simulator it sponsors:

(1) The MQTG and each amendment thereto.

(2) A copy of the programming used during the evaluation of the simulator for initial qualification and for any subsequent upgrade qualification and a copy of all programming changes made since the evaluation for initial qualification.

(3) A copy of all of the following:

(a) Results of the evaluations for the initial and each upgrade qualification.

(b) Results of the quarterly objective tests and the approved performance demonstrations conducted in accordance with § 60.19(a) for a period of 2 years.

(c) Results of the previous three recurrent evaluations, or the recurrent evaluations from the previous 2 years, whichever covers a longer period.

(d) Comments obtained in accordance with § 60.9(b)(1) for a period of at least 18 months.

(4) A record of all discrepancies entered in the discrepancy log over the previous 2 years, including the following:

(a) A list of the components or equipment that were or are missing, malfunctioning, or inoperative.

(b) The action taken to correct the discrepancy.

(c) The date the corrective action was taken.

(5) A record of all modifications to simulator hardware configurations made since initial qualification.

b. The simulator sponsor must keep a current record of each certificate holder using the simulator. The sponsor must provide a copy of this list to the NSPM at least semiannually.

c. The records specified in this section must be maintained in plain language form or in coded form, if the coded form provides for the preservation and retrieval of information in a manner acceptable to the NSPM.

d. The sponsor must submit an annual report, in the form of a comprehensive statement signed by the quality assurance primary contact point, certifying that the

simulator continues to perform and handle as qualified by the NSPM.

End Rule Language (§ 60.31)

22. Applications, Logbooks, Reports, and Records: Fraud, Falsification, or Incorrect Statements

Begin Rule Language (§ 60.33)

a. No person may make, or cause to be made, any of the following:

(1) A fraudulent or intentionally false statement in any application or any amendment thereto, or any other report or test result required by 14 CFR part 60 or the QPS.

(2) A fraudulent or intentionally false statement in or omission from any record or report that is kept, made, or used to show compliance with 14 CFR part 60 or the QPS, or to exercise any privileges under 14 CFR chapter I.

(3) Any reproduction or alteration, for fraudulent purpose, of any report, record, or test result required under 14 CFR part 60 or the QPS.

b. The commission by any person of any act prohibited under paragraph a of this section is a basis for any one or any combination of the following:

(1) A civil penalty.

(2) Suspension or revocation of any certificate held by that person that was issued under 14 CFR chapter I.

(3) The removal of simulator qualification and approval for use in a training program.

c. The following may serve as a basis for removal of qualification of a simulator including the withdrawal of authorization for use of a simulator; or denying an application for a qualification.

(1) An incorrect statement, upon which the FAA relied or could have relied, made in support of an application for a qualification or a request for approval for use.

(2) An incorrect entry, upon which the FAA relied or could have relied, made in any logbook, record, or report that is kept, made, or used to show compliance with any requirement for a simulator qualification or an approval for use.

End Rule Language (§ 60.33)

23. Specific Simulator Compliance Requirements

Begin Rule Language (§ 60.35)

a. After [date 18 months from the effective date of the final rule], no simulator will be eligible for initial or upgrade qualification under 14 CFR part 60 unless it simulates the operation of all equipment and appliances installed and operating on the airplane being simulated, if such equipment or appliances have controls or indications that are located in the airplane cockpit.

b. After [date 2 years from the effective date of this final rule], any flight simulator used for meeting flightcrew member training, evaluation, or flight experience requirements of 14 CFR chapter I for certification or

qualification that cannot perform satisfactorily in the following areas will no longer be qualified as a simulator.

(1) Ground operations;

(2) The takeoff, climb, cruise, descent, and approach portions of the simulated airplane's operating envelope, including abnormal and emergency operations; and

(3) The landing maneuver, including normal, abnormal, and emergency landings.

End Rule Language (§ 60.35)

24. [Reserved]

25. Simulator Qualification on the Basis of a Bilateral Aviation Safety Agreement (BASA)

Begin Rule Language (§ 60.37)

a. The evaluation and qualification of an airplane simulator by a contracting State to the Convention on International Civil Aviation for the sponsor of an airplane simulator located in that contracting State may be used as the basis for issuing a U.S. statement of qualification (see attachment 5, figure 4) by the NSPM to a U.S. sponsor of that simulator in accordance with—

(1) A BASA between the United States and the Contracting State that issued the original qualification; and

(2) A Simulator Implementation Procedure (SIP) established under the BASA.

b. The SIP will contain any conditions and limitations on validation and issuance of such qualification by the U.S.

End Rule Language (§ 60.37)

Attachment 1 to Appendix A to Part 60—General Simulator Requirements

1. General

Begin QPS Requirements

a. Requirements. (1) Certain simulator and visual system requirements included in this attachment must be supported with a Statement of Compliance and Capability (SOC) and, in designated cases, simulator performance must be recorded and the results made part of the QTG. In the following tabular listing of simulator standards, requirements for SOC's are indicated in the "Additional Details" column.

(2) Airports represented in visual scenes required by this document must be representations of real-world, operational airports or representations of fictional airports, designed specifically for use in training, testing, and/or checking of flight crewmembers.

(a) If real-world, operational airports are simulated, the visual representation and scene content is compared to that of the actual airport. This comparison requires accurate simulation of that airport to the extent set out in this document and as required by the qualification level sought. It

also requires the visual scene to be modified when the airport is modified; *e.g.*, when additional runways or taxiways are added; when existing runway(s) are lengthened or permanently closed; when magnetic bearings to or from a runway are changed; when significant and recognizable changes are made to the terminal, other airport buildings, or surrounding terrain; *etc.*

(b) If fictional airports are used, the navigational aids and all appropriate maps, charts, and other navigational reference material for such airports (and surrounding areas as necessary), are evaluated for compatibility, completeness, and accuracy. These items are compared to the visual presentation and scene content of the fictional airport and require simulation to the extent set out in this document and as required by the qualification level sought. An

SOC must be submitted that addresses navigation aid installation and performance (including obstruction clearance protection, *etc.*) and other criteria for all instrument approaches that are available in the simulator. The SOC must reference and account for information in the Terminal Instrument Procedures Manual (“Terps” Manual, FAA Handbook 8260.3, as amended) and the construction and availability of the required maps, charts, and other navigational material. This material must be appropriately marked “for training purposes only.”

End QPS Requirements

Begin Information

- b. Discussion.
 - (1) This attachment describes the minimum simulator requirements for

qualifying airplane simulators. To determine the complete requirements for a specific level simulator the objective tests in attachment 2 and the examination of functions and subjective tests listed in attachment 3 must also be consulted.

(2) The material contained in this attachment is divided into the following categories:

- (a) General cockpit configuration.
- (b) Simulator programming.
- (c) Equipment operation.
- (d) Equipment and facilities for instructor/evaluator functions.
- (e) Motion system.
- (f) Visual system.
- (g) Sound system.

End Information

TABLE OF MINIMUM SIMULATOR REQUIREMENTS

General simulator requirements	QPS requirements				Additional details	Information notes
	Simulator level					
	A	B	C	D		
2. General Cockpit Configuration						
a. The simulator must have a cockpit that is a full-scale replica of the airplane simulated with controls, equipment, observable cockpit indicators, circuit breakers, and bulkheads properly located, functionally accurate and replicating the airplane. The direction of movement of controls and switches must be identical to that in the airplane.	X	X	X	X	Pilot seats must afford the capability for the occupant to be able to achieve the design “eye position” established for the airplane being simulated.	For simulator purposes, the cockpit consists of all that space forward of a cross section of the fuselage at the most extreme aft setting of the pilots’ seats including additional, required crewmember duty stations and those required bulkheads aft of the pilot sets.
b. Those circuit breakers that affect procedures and/or results in observable cockpit indications must be properly located and functionally accurate.	X	X	X	X		
3. Programming						
a. The effect of aerodynamic changes for various combinations of drag and thrust normally encountered in flight must correspond to actual flight conditions, including the effect of change in airplane attitude, thrust, drag, altitude, temperature, gross weight, center of gravity location, and configuration.	X	X	X	X		
b. The simulator must have the computer capacity, accuracy, resolution, and dynamic response needed to meet the qualification level sought.	X	X	X	X	An SOC is required.	
c. Simulator hardware and programming must be updated within 6 months of any airplane modifications or appropriate data releases unless, with prior coordination, the NSPM authorizes otherwise.	X	X	X	X		

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	QPS requirements				Additional details	Information notes
	Simulator level					
	A	B	C	D		
d. Ground operations must be represented to the extent that allows turns within the confines of the runway and adequate controls of the landing and roll-out from a crosswind approach to a landing.	X					
e. Ground handling and aerodynamic programming must include the following:					An SOC is required. Simulator performance must be recorded and the results made part of the QTG.	
(1) Ground effect		X	X	X	This requires data on lift, drag, pitching moment, trim, and power while in ground effect.	Applicable areas include: roundout, flare, and touchdown.
(2) Ground reaction		X	X	X	This requires data on strut deflections, tire friction, side forces, etc.	This is the reaction of the airplane upon contact with the runway during landing, and may differ with changes in gross weight, airspeed, rate of descent on touchdown, etc.
(3) Ground handling characteristics, including aerodynamic and ground reaction modeling including steering inputs, operations with crosswind, braking, thrust reversing, deceleration, and turning radius.		X	X	X		
f. The simulator must employ windshear models that provide training for recognition of windshear phenomena and the execution of recovery procedures. Models must be available to the instructor/evaluator for the following critical phases of flight: (1) Prior to takeoff rotation (2) At liftoff (3) During initial climb (4) On final approach, below 500 ft. AGL.			X	X	Required only for turbo-jet powered, transport category airplanes. Simulator performance must be recorded and the results made part of the QTG; see Attachment 6 of this appendix. The QTG must reference the FAA Windshear Training Aid or present alternate airplane related data, including the implementation method(s) used. If the alternate method is selected, wind models from the Royal Aerospace Establishment (RAE), the Joint Airport Weather Studies (JAWS) Project and other recognized sources may be implemented, but must be supported and properly referenced in the QTG. Only those simulators meeting these requirements may be used to satisfy the training requirements of part 121 pertaining to a certificate holder's approved low-altitude windshear flight training program as described in § 121.409.	If desired, Level A and B simulators may qualify for windshear training by meeting these standards; see Attachment 6 of this appendix. Windshear models may consist of independent variable winds in multiple simultaneous components. The FAA Windshear Training Aid presents one acceptable means of compliance with simulator wind model requirements.
g. The simulator must include a means for quickly and effectively testing simulator programming and hardware.			X	X	An SOC is required	This may include an automated system, which could be used for conducting at least a portion of the tests in the QTG.

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	QPS requirements				Additional details	Information notes
	Simulator level					
	A	B	C	D		
h. The simulator must provide for automatic testing of simulator hardware and software programming to determine compliance with simulator objective tests as prescribed in Attachment 2.			X	X	An SOC is required. Simulator test results must include simulator number, date, time, conditions, tolerances, and appropriate dependent variables portrayed in comparison to the airplane standard.	Automatic “flagging” of out-of-tolerance situations is encouraged.
i. Relative responses of the motion system, visual system, and cockpit instruments must be coupled closely to provide integrated sensory cues.	X				Response must be within 300 milliseconds of the airplane response.	
		X	X	X	Response must be within 150 milliseconds of the airplane response.	
(1) Latency: These systems must respond to abrupt input at the pilot’s position. The response must not be prior to that time when the airplane responds and may respond up to 150/300 milliseconds after that time. Visual change may start before motion response, but motion acceleration must be initiated before completion of the visual scan of the first video field containing different information.					Simultaneously record: the analog output from the pilot’s control column, wheel, and pedals; the output from an accelerometer attached to the motion system platform located at an acceptable location near the pilots’ seats; the output signal to the visual system display (including visual system analog delays); and the output signal to the pilot’s attitude indicator or an equivalent test approved by the Administrator. Simulator performance must be recorded. These results must be compared to airplane response data in the takeoff, cruise, and approach or landing configuration and must be recorded in the QTG.	The intent is to verify that the simulator provides instrument, motion, and visual cues that are, within the stated time delays, like the airplane responses. Acceleration in the appropriate rotational axis is preferred. Simulator Latency is measured from the start of a control input to the appropriate perceivable change in flight instrument indication; visual system response; or motion system response.
(2) Transport Delay: (As an alternative to the Latency requirement, above, a transport delay demonstration may be used to demonstrate that the simulator system does not exceed the specified limit of 300 milliseconds for Level A simulators or 150 milliseconds for Level B, C, or D simulators. The sponsor must measure all the delay encountered by a step signal migrating from the pilot’s control through the control loading electronics and interfacing through all the simulation software modules in the correct order, using a handshaking protocol, finally through the normal output interfaces to the instrument displays, the motion system, and the visual system).					An SOC is required. A recordable start time for the test must be provided with the pilot flight control input. the migration of the signal must permit normal computation time to be consumed and must not alter the flow of information through the hardware/software system. While transport delay need only be measured once in each axis, independent of flight conditions, if this method is chosen, the sponsor must also demonstrate the latency of the simulator with respect to that of the aircraft with at least one demonstration in pitch, in roll, and in yaw as described above. Simulator performance must be recorded and the results must be recorded in the QTG.	The transport delay is the delay time between the control input and the individual hardware (i.e., instruments, motion system, visual system) responses.
j. The simulator must accurately reproduce the stopping time and distances for at least the following runway conditions:.			X	X	An SOC is required. Simulator performance must be recorded and the results made part of the QTG.	Objective tests are described in Attachment 2 for dry, wet, and icy runway conditions.
(1) Patch Wet (2) Patch Icy						

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	QPS requirements				Additional details	Information notes
	Simulator level					
	A	B	C	D		
(3) Wet on Rubber Residue in Touchdown Zone						
k. The simulator must accurately simulate brake and tire failure dynamics (including antiskid failure) and decreased brake efficiency due to high brake temperatures.			X	X	An SOC is required. A demonstration is required for initial and recurrent evaluations. Simulator performance must be recorded for decreased braking efficiency due to brake temperature and the results made part of the QTG.	Simulator pitch, side loading, and directional control characteristics should be representatives of the airplane.
l. The simulator must replicate the effects of airframe icing.			X	X	A demonstration is required for initial and recurrent evaluations.	
m. The aerodynamic modeling in the simulator must include: (1) Low-altitude level-flight ground effect; (2) Match effect at high altitude; (3) Effects of airframe icing; (4) Normal and reverse dynamic thrust effect on control surfaces; and (5) Aeroelastic representations of nonlinearities due to sideslip.				X	An SOC is required and must include references to computations of aeroelastic representations and nonlinearities due to sideslip. A demonstration of icing effects is required for initial and recurrent evaluations. Simulator performance must be recorded and the results made a part of the QTG.	See Attachment 2, paragraph 4, for further information on ground effect.
n. The simulator must have a software and hardware control methodology that is supported by diagnostic analysis programs(s) and resulting printouts.				X	An SOC is required.	
4. Equipment Operation						
a. All relevant instrument indications involved in the simulation of the airplane must automatically respond to control movement or external disturbances to the simulated airplane; e.g., turbulence or windshear.	X	X	X	X	Numerical values must be presented in the appropriate units for U.S. operations.	For example, fuel in pounds, speed in knots, and altitude in feet.
b. Communications and navigation equipment must be installed and operate within the tolerances applicable for the airplane.	X	X	X	X	See Attachment 3, paragraph 1c for further information regarding long-range navigation equipment.
c. Simulator systems must operate as the airplane systems would operate under normal, abnormal, and emergency operating conditions on the ground and in flight.	X	X	X	X		
d. The simulator must provide pilot controls with control force and control travel that correspond to the simulated airplane. The simulator must be also react in the same manner as in the airplane under the same flight conditions.	X	X	X	X		
5. Instructor or Evaluator Facilities						

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	QPS requirements				Additional details	Information notes
	Simulator level					
	A	B	C	D		
a. In addition to the flight crew member stations, the simulator must have two suitable seats for the instructor/check airman and FAA inspector. These seats must provide adequate vision to the pilot's panel and forward windows.	X	X	X	X	All seats other than flight crew seats need not represent those found in the airplane but must be equipped with similar positive restraint devices.	The NSPM will consider alternatives to this standard for additional seats based on unique cockpit configurations.
b. The simulator must have controls that enable the instructor/evaluator to control all required system variables and insert all abnormal or emergency conditions described in the sponsor's pilot operating manual into the simulated airplane systems.	X	X	X	X		
c. The simulator must have instructor controls for wind speed and direction.	X	X	X	X		
d. The simulator must provide the instructor or evaluator the ability to present ground and air hazards.			X	X	For example, another airplane crossing the active runway and converging airborne traffic; etc.
6. Motion System						
a. The simulator must have motion (force) cues perceptible to the pilot that are representative of the motion in an airplane.	X	X	X	X	For example, touchdown cues should be a function of the rate of descent (RoD) of the simulated airplane.
b. The simulator must have a motion system with a minimum of three degrees of freedom.	X				An SOC is required.	
c. The simulator must have a motion system with a minimum of four degrees of freedom (at least pitch, roll, sway, and heave).		X			An SOC is required.	
d. The simulator must have a motion (force cueing) system that produces cues at least equivalent to those of a six-degrees-of-freedom, synergistic platform motion system.			X	X	An SOC is required.	
e. The simulator must provide special effects programming that includes the following: (1) Thrust effect with brakes set. (2) Runway rumble, oleo deflections, effects of ground speed and uneven runway characteristics. (3) Buffets on the ground due to spoiler/speedbrake extension and thrust reversal. (4) Bumps after lift-off of nose and main gear. (5) Buffet during extension and retraction of landing gear. (6) Buffet in the air due to flap and spoiler/speedbrake extension.		X	X	X	A qualitative assessment is required to determine that the effect is representative of the airplane simulated.	

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	QPS requirements				Additional details	Information notes
	Simulator level					
	A	B	C	D		
(7) Stall buffet to, but not necessarily beyond, the FAA certificated stall speed, V_s , if applicable. (8) Representative touchdown cues for main and nose gear. (9) Nosewheel scuffing, if applicable. (10) Mach buffet.						
f. The simulator must provide characteristic buffet motions that result from operation of the airplane, or from atmospheric disturbances, which can be sensed in the cockpit; e.g., high-speed buffet, extended landing gear or flaps, nosewheel scuffing, stall buffet, air turbulence, etc.				X	Simulator performance (with emphasis on amplitude and frequency) must be recorded and compared to airplane data. The results must be made a part of the QTG. For air turbulence, general purpose disturbance models that approximate demonstrable flight test data are acceptable.	The simulator should be programmed and instrumented in such a manner that the characteristic buffet modes can be measured and compared to airplane data.
7. Visual System						
a. The simulator must have a visual system providing an out-of-the-cockpit view.	X	X	X	X	A demonstration is required for initial and recurrent evaluations.	
b. The simulator must provide a continuous minimum collimated field of view of 45° horizontally and 30° vertically per pilot seat. Both pilot seat visual systems must be operable simultaneously.	X	X			An SOC is required.	
c. The simulator must provide a continuous minimum collimated visual field of view of 75° horizontally and 30° vertically per pilot seat. Both pilot seat visual systems must be operable simultaneously.			X	X	An SOC is required. Wide angle systems providing cross cockpit viewing (for both pilots simultaneously) must provide a minimum field of view of 150° horizontally.	
d. The simulator must have operational landing lights for night scenes.	X	X	X	X	A demonstration is required for initial and recurrent evaluations. Where used, dusk (or twilight) scenes require operational landing lights.	
e. The simulator must have instructor controls for the following: (1) Cloudbase. (2) Visibility in statute miles (km) and runway visual range (RVR) in ft. (m). (3) Airport selection. (4) Airport lighting.	X	X	X	X	A demonstration is required for initial and recurrent evaluations.	
f. Each airport scene displayed must include the following:	X	X	X	X	A demonstration is required for initial and recurrent evaluations.	
(1) Airport runways and taxiways. (2) Runway definition. (i) Runway surface and markings. (ii) Lighting for the runway in use, including runway threshold, edge, centerline, touchdown zone, VASI (or PAPI), and approach lighting of appropriate colors.						

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	QPS requirements				Additional details	Information notes
	Simulator level					
	A	B	C	D		
(iii) Taxiway lights.						
g. The distances at which runway features are visible, as measured from runway threshold to an airplane aligned with the runway on an extended 3° glide slope must not be less than listed below:	X	X	X	X	A demonstration is required for initial and recurrent evaluations.	
(1) Runway definition, strobe lights, approach lights, runway edge white lights and Visual Approach Slope Indicator (VASI) or Precision Approach Path Indicator (PAPI) system lights from 5 statute miles (8 kilometers (km)) of the runway threshold.						
(2) Runway centerline lights and taxiway definition from 3 statute miles (4.8 km)..						
(3) Threshold lights and touchdown zone lights from 2 statute miles (3.2 km)..						
(4) Runway markings within range of landing lights for night scenes; as required by three (3) arc-minutes resolution on day scenes..						
h. The simulator must provide visual system compatibility with aerodynamic programming.	X	X	X	X		
i. The simulator must be verified for visual ground segment and visual scene content for the airplane in landing configuration and a main wheel height of 100 feet (30 meters) above the touchdown zone. Data submitted must include at least the following:	X	X	X	X	The QTG must contain appropriate calculations and a drawing showing the pertinent data used to establish the airplane location and the segment of the ground that is visible considering the airplane attitude (cockpit cut-off angle) and a runway visual range of 1,200 feet or 350 meters. Simulator performance must be measured against the QTG calculations. Sponsors must provide this data for each simulator (regardless of previous qualification standards) to qualify the simulator for all precision instrument approaches.	
(1) Static airplane dimensions as follows:					(iii) glideslope angle.	
(i) Horizontal and vertical distance from main landing gear (MLG) to glideslope reception antenna.					(iv) Airplane pitch angle on approach.	
(ii) Horizontal and vertical distance from MLG to pilot's eyepoint.					(3) Airplane data for manual testing:	
(iii) Static cockpit cutoff angle.					(i) Gross weight.	
(2) Approach data as follows:					(ii) Airplane configuration.	
(i) Identification of runway.					(iii) Approach airspeed.	
(ii) Horizontal distance from runway threshold to glideslope intercept with runway.						
j. The simulator must provide visual cues necessary to assess sink rates (provide depth perception) during landings, to include:		X	X	X	A demonstration is required for initial and recurrent evaluations.	
(1) Surface on runways, taxiways, and ramps.						
(2) Terrain features.						

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	QPS requirements				Additional details	Information notes
	Simulator level					
	A	B	C	D		
k. The simulator must have night and dusk (or twilight) visual scene capability, including general terrain characteristics and significant landmarks, free from apparent quantization.			X	X	A demonstration is required for initial and recurrent evaluations. Dusk (or twilight) scene must enable identification of a visible horizon and general terrain characteristics.	Examples of general terrain characteristics are fields, roads, and bodies of water.
i. The simulator must provide for (1) Accurate portrayal of the environment relating to the simulator attitude	X	X	X	X	A demonstration is required for initial evaluation. However, if there is any question regarding this function, the NSPM may require the demonstration be repeated during any inspection or subsequent recurrent evaluation.	
(2) Quick confirmation of visual system color, RVR, focus, and intensity.			X	X	An SOC is required. A demonstration is required for initial evaluation. However, if there is any question regarding this function, the NSPM may require the demonstration be repeated during any inspection or subsequent recurrent evaluation.	Visual attitude vs. simulator attitude is a comparison of pitch and roll of the horizon as displayed in the visual scene compared to the display on the attitude indicator.
m. The simulator must provide a minimum of three airport scenes including: (1) Surfaces on runways, taxiways, and ramps. (2) Lighting of appropriate color for all runways, including runway threshold, edge, centerline, VASI (or PAPI), and approach lighting for the runway in use. (3) Airport taxiway lighting. (4) Ramps and buildings that correspond to the sponsor's Line Oriented scenarios.			X	X	A demonstration is required for initial and recurrent evaluations.	
n. The simulator must be capable of producing at least 10 levels of occulting.			X	X	A demonstration is required for initial evaluation. However, if there is any question regarding this function, the NSPM may require this demonstration to be accomplished during any inspection or subsequent recurrent evaluation.	
o. The simulator must be able to provide weather representations including the following: (1) Variable cloud density. (2) Partial obscuration of ground scenes; <i>i.e.</i> , the effect of a scattered to broken cloud deck. (3) Gradual break out. (4) Patchy fog. (5) The effect of fog on airport lighting.			X	X	A demonstration is required for initial and recurrent evaluations. The weather representations must be provided at and below an altitude of 2,000 ft (610 m) height above the airport and within a radius of 10 miles (16 km) from the airport.	

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	QPS requirements				Additional details	Information notes
	Simulator level					
	A	B	C	D		
p. The surface resolution must be demonstrated by a test pattern of objects shown to occupy a visual angle of three (3) arc-minutes in the visual scene from the pilot's "eye point".			X	X	An SOC is required and must include the relevant calculations. A demonstration is required on initial evaluations. However, if there is any question regarding this function, the NSPM may require this demonstration to be accomplished during any inspection or subsequent recurrent evaluation.	
q. The lightpoint size must not be greater than six (6) arc-minutes.			X	X	An SOC is required and must include the relevant calculations. A demonstration is required on initial evaluations. However, if there is any question regarding this function, the NSPM may require this demonstration to be accomplished during any inspection or subsequent recurrent evaluation.	
r. The lightpoint contrast ratio must not be less than 25:1.			X	X	An SOC is required and must include the relevant calculations. A 1-degree spot photometer is used to measure a square of at least 1 degree, filled with lightpoints (where lightpoint modulation is just discernible) and compare the results to the measured adjacent background. A demonstration is required on initial evaluations. However, if there is any question regarding this function, the NSPM may require this demonstration to be accomplished during any inspection or subsequent recurrent evaluation.	
s. The simulator must have (1) daylight, (2) night, and (3) either dusk or twilight visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. The simulator cockpit ambient lighting must be dynamically consistent with the visual scene displayed.				X	A demonstration is required for initial and recurrent evaluations. The daylight visual scene must be part of a total daylight cockpit environment which at least represents the amount of light in the cockpit on an overcast day. For daylight scenes, such ambient lighting must not "washout" the displayed visual scene nor fall below 5 foot-lamberts (17 cd/m ²) of light as reflected from an instrument approach plate at knee height at both pilots' station. These requirements are applicable to any level of simulator equipped with a "daylight" visual system.	Brightness capability may be demonstrated with a test pattern of white light using a spot photometer. Daylight visual system is defined as a visual system capable of producing, at a minimum, full color presentations, scene content comparable in detail to that produced by 4,000 edges or 1,000 surfaces for daylight and 4,000 lightpoints for night and dusk scenes, 6 foot-lamberts (20 cd/m ²) of light measured at the pilot's eye position (highlight brightness) and a display which is free of apparent quantization and other distracting visual effects while the simulator is in motion.

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	QPS requirements				Additional details	Information notes
	Simulator level					
	A	B	C	D		
(1) The simulator visual system must provide a minimum contrast ratio of 5:1.					A raster-drawn pattern must be displayed that fills the entire visual scene (3 or more channels) consisting of a matrix of black and white squares no larger than 10° and no smaller than 5° per square, with a white square having a minimum threshold value of 2 foot-lamberts, or 7 cd/m ² in the center of each channel. The contrast ratio is the numerical value of the brightness measured for the center (white) square divided by the brightness value for any adjacent (dark) square.	A 1° spot photometer is used to measure the brightness values.
(2) The simulator visual system must provide a highlight brightness of not less than six (6) foot-lamberts (20 cd/m ²).					The test must use the full pattern described above, measuring the brightness of a white square, superimposed completely with a highlighted area covering the square. Use of calligraphic capabilities to enhance raster brightness is acceptable; however, individual light points or light point arrays are not acceptable.	A 1° spot photometer is used to measure the brightness values.
t. The simulator must provide operational visual scenes that portray physical relationships known to cause landing illusions to pilots.				X	A demonstration is required for initial and recurrent evaluations.	For example: short runways, landing approaches over water, uphill or downhill runways, rising terrain on the approach path, unique topographic features, etc.
u. The simulator must provide special weather representations of light, medium, and heavy precipitation near a thunderstorm on take-off and during approach and landing.				X	A demonstration is required for initial and recurrent evaluations. Representations need only be presented at and below an altitude of 2,000 ft. (610 m) above the airport surface and within 10 miles (16 km) of the airport.	
v. The simulator must present visual scenes of wet and snow-covered runways, including runway lighting reflections for wet conditions, partially obscured lights for snow conditions, or suitable alternative effects.				X	A demonstration is required for initial and recurrent evaluations.	
w. The simulator must present realistic color and directionality of all airport lighting.				X	A demonstration is required for initial and recurrent evaluations.	
8. Sound System						
a. The simulator must provide cockpit sounds that result from pilot actions that correspond to those that occur in the airplane.	X	X	X	X		

TABLE OF MINIMUM SIMULATOR REQUIREMENTS—Continued

General simulator requirements	QPS requirements				Additional details	Information notes
	Simulator level					
	A	B	C	D		
b. The simulator must accurately simulate the sound of precipitation, windshield wipers, and other significant airplane noises perceptible to the pilot during normal operations, and include the sound of a crash (when the simulator is landed in an unusual attitude or in excess of the structural gear limitations); normal engine and thrust reversal sounds; and the sounds of flap, gear, and spoiler extension and retraction.			X	X	An SOC is required. A demonstration is required for initial and recurrent evaluations.	
c. The simulator must provide realistic amplitude and frequency of cockpit noises and sounds.				X	Simulator performance must be recorded, compared to amplitude and frequency of the same sounds recorded in the airplane, and be made a part of the QTG. These sounds must include, at least, the sound of precipitation, windshield wipers, engine, and airframe sounds. When appropriate, the sounds must be coordinated with the weather representations required in paragraph 4.w.	

Attachment 2 to Appendix A to Part 60—Simulator Objective Tests

1. General

Begin QPS Requirements

a. Test requirements. (1) The ground and flight tests required for qualification are listed in the following Table of Objective Tests. Computer generated simulator test results must be provided for each test. If a flight condition or operating condition is required for the test but which does not apply to the airplane being simulated or to the qualification level sought, it may be disregarded (for example: An engine out missed approach for a single-engine airplane; a maneuver using reverse thrust for an airplane without reverse thrust capability; a landing test for a Level A simulator; *etc.*). Each test result is compared against Flight Test Data described in § 60.13, and Paragraph 9 in the main body of this appendix. Although use of a driver program designed to automatically accomplish the tests is encouraged for all simulators and required for Level C and Level D simulators, each test must be able to be accomplished manually while recording all appropriate parameters. The results must be produced on a multi-channel recorder, line printer, or other appropriate recording device acceptable to the NSPM. Time histories are required unless otherwise indicated in the Table of Objective Tests. All results must be labeled using the tolerances and units given.

(2) The Table of Objective Tests in this attachment sets out the test results required,

including the parameters, tolerances, and flight conditions for simulator validation. Tolerances are provided for the listed tests because aerodynamic modeling and acquisition/development of reference data are often inexact. All tolerances listed in the following tables are applied to simulator performance. When two tolerance values are given for a parameter, the less restrictive may be used unless otherwise indicated.

(3) Certain tests included in this attachment must be supported with a Statement of Compliance and Capability (SOC). In the following tabular listing of simulator tests, requirements for SOC's are indicated in the "Test Details" column.

(4) When operational or engineering judgment is used in making assessments for flight test data applications for simulator validity, such judgment must not be limited to a single parameter. For example, data that exhibit rapid variations of the measured parameters may require interpolations or a "best fit" data selection. All relevant parameters related to a given maneuver or flight condition must be provided to allow overall interpretation. When it is difficult or impossible to match simulator to airplane data throughout a time history, differences must be justified by providing a comparison of other related variables for the condition being assessed.

(5) Unless noted otherwise, simulator tests must represent airplane performance and handling qualities at operating weights and centers of gravity (CG) typical of normal operation. If a test is supported by airplane data at one extreme weight or CG, another test supported by airplane data at mid-conditions or as close as possible to the other

extreme must be included, except as may be authorized by the NSPM. Tests of handling qualities must include validation of augmentation devices.

(6) When comparing the parameters listed to those of the airplane, sufficient data must also be provided to verify the correct flight condition and airplane configuration changes. For example: to show that control force is within ±5 pounds (2.2 daN) in a static stability test, data to show the correct airspeed, power, thrust or torque, airplane configuration, altitude, and other appropriate datum identification parameters must also be given. If comparing short period dynamics, normal acceleration may be used to establish a match to the airplane, but airspeed, altitude, control input, airplane configuration, and other appropriate data must also be given. If comparing landing gear change dynamics, pitch, airspeed, and altitude may be used to establish a match to the airplane, but landing gear position must also be provided. All airspeed values must be clearly annotated as to indicated, calibrated, *etc.*, and like values used for comparison.

(7) The QTG provided by the sponsor must describe clearly and distinctly how the simulator will be set up and operated for each test. Overall integrated testing of the simulator must be accomplished to assure that the total simulator system meets the prescribed standards; *i.e.*, it is not acceptable to test only each simulator subsystem independently. A manual test procedure with explicit and detailed steps for completion of each test must also be provided.

(8) In those cases where the objective test results authorize a "snapshot" result in lieu of a time-history result, the sponsor must

ensure that a steady state condition exists from 5 seconds prior to, through 2 seconds after, the instant of time captured by the "snapshot."

(9) For previously qualified simulators, the tests and tolerances of this attachment may be used in subsequent recurrent evaluations for any given test providing the sponsor has submitted a proposed MQTG revision to the NSPM and has received NSPM approval.

(10) Simulators are evaluated and qualified with an engine model simulating the airplane manufacturer's flight test engine. For qualification of alternate engine models (either variations of the flight test engines or other manufacturer's engines) additional simulator tests with the alternate engine models are required. Where thrust is different by more than 5% from the flight test engine, flight test data from an airplane equipped with the alternate engine is required. Where the airplane manufacturer certifies that the only impact on the simulator model is thrust, and that other variables related to the alternate engine (such as drag and thrust vector) are unchanged or are insignificantly changed, additional simulator tests may be run with the same initial conditions using the thrust from the flight test data as a driven parameter for the alternate engine model.

(11) Motion System Tests:

(a) The minimum excursions, accelerations, and velocities for pitch, roll, and yaw must be measurable about a single, common reference point and must be achieved by driving one degree of freedom at a time.

(b) The minimum excursions, accelerations, and velocities for heave, sway, and surge may be measured about different but identifiable reference points and must also be achieved by driving one degree of freedom at a time.

(12) For testing Computer Controlled Airplane (CCA) simulators, or other highly augmented airplane simulators, flight test data are required for both the Normal (N) and Non-normal (NN) control states, as indicated in this attachment except that some tests

require data only in the Normal control state and are so noted. Where test results are independent of control state, Non-normal control data may be used. Tests for other levels of control state degradation may be required as detailed by the NSPM at the time of definition of a set of specific airplane tests for simulator data. Where Non-normal control states are required, test data must be provided for one or more Non-normal control states, and must include the least augmented state. All tests in the Table of Objective Tests require test results in the Normal control state unless specifically noted otherwise in the additional requirements section following the CCA designation. Where applicable, flight test data must record Normal and Non-normal states for:

(a) Pilot controller deflections or electronically generated inputs, including location of input; and

(b) Flight control surface positions unless test results are not affected by, or are independent of, surface positions.

(13) For computer controlled airplanes using airplane hardware (e.g., "side stick controller") in the simulator cockpit, some tests will not be required. Those tests are annotated in the "Additional Requirements" column with the Computer Controlled Airplane (CCA) note—"test not required if cockpit controller is installed in the simulator." However, in these cases the sponsor must supply a statement that the airplane hardware meets and will continue to meet the appropriate manufacturer's specifications and the sponsor must have supporting information to that fact available for NSPM review.

End QPS Requirements

b. Discussion

Begin Information

(1) If relevant winds are present in the objective data, the wind vector (magnitude

and direction) should be clearly noted as part of the data presentation, expressed in conventional terminology, and related to the runway being used for the test.

(2) The NSPM will not evaluate any simulator unless the required SOC indicates that the motion system is designed and manufactured to safely operate within the simulator's maximum excursion, acceleration, and velocity capabilities (see paragraph 3, Motion System, in the following table).

(3) In the following Table of Objective Tests, the last column is titled "Paragraph 8." A "yes" indication in that column directs the reader to paragraph 8 of this attachment for additional information relative to sources of data, procedures used to acquire the data, and instrumentation that may be used, as an alternative to those expected under normal flight test procedures and that may be used for that particular test for Level A or Level B simulators. Paragraph 8 also contains notes, reminders, and information applicable to that particular test for those simulator levels. These data sources, procedures, and instrumentation, if used, would be submitted in accordance with the alternative data provisions of § 60.13 of Part 60 and Section 9 of this QPS attachment.

(4) The reader is encouraged to review the Airplane Flight Simulator Evaluation Handbook, Volumes I and II, published by the Royal Aeronautical Society, London, UK, in February 1995 and July 1996, respectively, and FAA Advisory Circulars (AC) 25-7, Flight Test Guide for Certification of Transport Category Airplanes, and (AC) 23-8A, Flight Test Guide for Certification of Part 23 Airplanes, for references and examples regarding flight testing requirements and techniques.

End Information

TABLE OF OBJECTIVE TESTS

QPS requirements							Information notes	Paragraph 8	
Test	Tolerance	Flight conditions	Simulator level						Test details
			A	B	C	D			
2. Performance									
a. Taxi									
(1) Minimum Radius Turn	±3 ft (0.9m) or 20% of Airplane Turn Radius.	Ground/Takeoff		X	X	X	Record both Main and Nosegear turning radius. This test is to be accomplished without the use of brakes and only minimum thrust, except for airplanes requiring asymmetric thrust or braking to turn.	Yes.	

TABLE OF OBJECTIVE TESTS—Continued

QPS requirements							Information notes	Paragraph 8
Test	Tolerance	Flight conditions	Simulator level					
			A	B	C	D		
(2) Rate of Turn vs. Nosewheel Steering Angle.	±10% or ±2°/sec. Turn Rate ...	Ground/Takeoff		X	X	X	Record a minimum of two speeds, greater than minimum turning radius speed, with a spread of at least 5 knots.	Yes.
b. Takeoff (1) Ground Acceleration Time and Distance.	±5% Time and Distance or ±5% Time and ±200 ft (61 m) of Distance.	Ground/Takeoff	X	X	X	X	Record acceleration time and distance for a minimum of 80% of the segment from brake release to V _R . Preliminary aircraft certification data may be used..	Yes.
(2) Minimum Control Speed—Ground (V _{mcg}) using aerodynamic controls only (per applicable Airworthiness Standard) or Low Speed, Engine Inoperative Ground Control Characteristics.	±25% of Maximum Airplane Lateral Deviation or ±5 ft (1.5 m). Additionally, for those simulators of airplanes with reversible flight control systems: Rudder Pedal Force; ±10% or ± 5 lb (2.2 daN).	Ground/Takeoff	X	X	X	X	Engine failure speed must be within ±1 knot of airplane engine failure speed. Engine thrust decay must be that resulting from the mathematical model for the engine variant applicable to the simulator under test.	Yes.
(3) Minimum Unstick Speed (V _{mu}) or equivalent as provided by the airplane manufacturer.	±3 Kts Airspeed ±1.5° Pitch	Ground/Takeoff	X	X	X	X	Record main landing gear strut compression or equivalent air/ground signal. Record from 10 Kts before start of rotation. Elevator input must precisely match airplane data. See 14CFR § 25.107(d).	Yes.
(4) Normal Takeoff	±3 Kts Airspeed ±1.5° Pitch ±1.5° Angle of Attack ±20 ft (6 m) Altitude. Additionally, for those simulators of airplanes with reversible flight control systems: Stick/Column Force; ± 10% or ± 5 lb (2.2 daN).	Ground/Takeoff and First Segment Climb.	X	X	X	X	Record takeoff profile from brake release to at least 200 ft (61 m) above ground level (AGL).	Yes.
(5) Critical Engine Failure on Takeoff.	±3 Kts Airspeed ±1.5° Pitch, ±1.5° Angle of Attack, ±20 ft (6 m) Altitude, ±2° Bank and Sideslip Angle. Additionally, for those simulators of airplanes with reversible flight control systems: Stick/Column Force; ±10% or ±5 lb (2.2 daN)), Wheel Force; ±10% or ±1.3 daN (3 lb)); and Rudder Pedal Force; ±10% or ±5 lb (2.2 daN).	Ground/Takeoff and First Segment Climb.	X	X	X	X	Record takeoff profile at near maximum takeoff weight from prior to engine failure to at least 200 ft (61 m) AGL. Engine failure speed must be within ±3 Kts of airplane data. CCA: Test in Normal AND Non-normal control state.	Yes.