121-166

federal register

Thursday
January 8, 1981

Part III

Department of Transportation

Federal Aviation Administration

Takeoff and Landing Minimums

FS-76-209-R

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 1, 91, and 121

[Docket No. 20060; Amdt. Nos. 1-30, 91-173, 121-166]

Takeoff and Landing Minimums

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: These amendments clarify the conditions under which a pilot may approach and land at an airport when the weather conditions do not allow the pilot to see the runway until shortly before landing. They also add certain requirements that must be met before a pilot may take off an air carrier aircraft in weather conditions that limit the pilot's visibility. These amendments are necessary to clarify the regulations and to provide the additional requirements needed for operating an aircraft safely under these weather conditions.

EFFECTIVE DATE: May 8, 1981.

FOR FURTHER INFORMATION CONTACT: Harold E. Smith, Regulatory Projects Branch (AVS-24), Safety Regulations Staff, Associate Administrator for Aviation Standards, Federal Aviation Administration, 800 Independence Avenue, SW., Washington, D.C. 20591; telephone (202) 755-8716.

SUPPLEMENTARY INFORMATION:

Notice of Proposed Rule Making

These amendments are based on Notice of Proposed Rule Making (NPRM), Notice No. 80-4, published in the **Federal Register** on March 6, 1980 (45 FR 14802). All interested persons have been given an opportunity to participate in the making of this rule and due consideration has been given to all information submitted. Except for the changes discussed below these amendments and the reasons for their adoption are the same as those stated in Notice 80-4.

Effective Date of Amended Rule

This rule is effective May 8, 1981 to provide a period for public dissemination of its provisions and to conduct the necessary pilot education regarding compliance.

Background

Part 97 of the Federal Aviation Regulations prescribes standard instrument approach procedures for instrument letdown to many airports in the United States and prescribes the weather minimums applicable to takeoffs and landings under instrument flight rules (IFR) at those airports for which procedures are prescribed. Rules applicable to the use of these instrument approach procedures previously were set out in §§ 91.6, 91.116, and 91.117 and for air carriers in §§ 121.651, 121.653, and 135.225. A recent addition of a new Part 125 of the Federal Aviation Regulations adds a § 125.381 for operation of certain large airplanes other than under Parts 121 or 135. Section 91.116(b) prohibited a person from landing an aircraft using a Part 97 instrument approach procedure unless the visibility is at or above the landing minimum prescribed for the particular procedure. Section 91.117(b) prohibited a person from operating an aircraft below the prescribed minimum descent altitude (MDA) or from continuing an approach below the decision height (DH) unless certain conditions are met. The conditions specified that to continue descent the aircraft must be in a position from which a normal approach to the runway of intended landing can be made, and the approach threshold of that runway, or approach lights or other markings identifiable with the approach end of that runway, must be clearly visible to the pilot. It also required that the pilot execute the appropriate missed approach procedure if the requirements of that paragraph were not met when the pilot reached the missed approach point or DH or at any time after that. Sections 121.651 and 121.653 formerly specified, and § 135.225 currently specifies, the conditions in which air carrier and commercial operator aircraft may initiate an approach if weather conditions are above published minimums, and they provide exceptions when weather conditions deteriorate below minimums while an approach is in progress.

A regulatory project was initiated in 1968 to clarify certain requirements applicable to instrument approach procedures and some of the landing rules discussed above. Notice 72-17 was issued on July 12, 1972, and a withdrawal notice was issued on December 7, 1975, due to adverse comments regarding the proposed elimination of the "look-see" privileges for Part 91 operators. An effort was initiated to resolve other changes needed to update the rules to be consistent with present standards. Comments received on Notice 72-17 were considered and changes made where appropriate for those sections of the rule being revised. Notice 80-4 was issued on March 6, 1980. Comments were received, reviewed, and necessary changes were made in the preparation of this final rule.

Need for Amendments

The revised rules, including §§ 1.1, 91.6, 91.116, and 121.651, are necessary based on operating experience to ensure an appropriate level of safety in instrument approaches and landings, and are necessary to clarify certain rules which, in some cases, have been misinterpreted. Other changes are necessary to make administrative corrections to the rules, to update them, or to make them consistent with current FAA and aviation system policies and practices. Any additional changes that may be needed to update § 135.225 or the recently issued § 125.381 to be consistent with the revised §§ 91.116 and 121.651 may be taken in a subsequent rulemaking proceeding.

Approach and landing accidents are the largest single cause of air carrier passenger fatalities and also represent a significant percentage of general aviation fatalities. Between 1964 and 1975, the National Transportation Safety Board recorded 259 air carrier approach and landing accidents which constituted 41% of the total number of air carrier accidents and 46% of the fatalities. Excluding the area of very low visibility approaches conducted under Category II and III where special equipment, training, and approval procedures are used resulting in a good safety record, 62 of these accidents occurred when the reported weather conditions were less than a ceiling of 1,200 feet and 3 miles visibility. Forty-six of these involved ceilings of less than 600 feet and visibility of less than 1½ miles. The following factors were cited as causing, or possible factors contributing to, the 62 accidents: continuation of the descent below the MDA or the DH with inadequate visual cues; unrecognized altitude loss or descent rate; disorientation; collision with obstacles well below the normal descent path; visual illusions; failure to monitor or cross check altitude; inadvertent descent below the glide slope; loss of sight of the runway while below the MDA or the DH; failure to initiate a missed approach; and other factors related to lack of adequate visual reference. Since 1975 investigations of numerous incidents and accidents, such as the 1979 commuter air carrier accidents at Hyannis, Massachusetts and Rockland, Maine, indicate the inappropriate use of limited visual references during approach and landing. Pilot use of inappropriate visual references also occurs in general aviation operations. For example, data from the FAA's General Aviation Accident Data System for 1979 indicate that use of inadequate visual references

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during the landing phase may have been a contributing factor in at least 35 accidents. Accordingly, the FAA is revising, clarifying, and combining the provisions regarding takeoff and landing under IFR now in § 91.116 and the limitations on the use of instrument approach procedures now in § 91.117 into a revised § 91.116 entitled "Takeoff and landing under IFR." New § 91.116 generally redesignates former paragraphs (c) through (f) as paragraphs (f) through (i) and makes necessary revisions throughout all paragraphs. Similar provisions in the former § 91.6(c) regarding Category II operations are clarified and in some cases revised to be consistent with current practice and the revised § 91.116.

Specific Changes to the Rule and Discussion of Comments

Fifty-five comments were submitted to the docket in response to Notice 80-4, representing the views of individuals, companies, associations of U.S. airlines, pilots, and manufacturers, various government organizations, and a consumer interest group. The comments largely favor the general intent of the rule but since the vast majority of comments include recommendations for revision of one or more sections, it is difficult to categorize the comments as a concurrence or nonconcurrence with the proposals in the notice. The problem of resolving the comments is compounded by the fact that any attempt to favorably resolve or adopt some suggestions would contradict or cause further complications with others. Although many commenters identify areas in which revisions should be made in the rule, very few offer specific suggestions that would resolve the alleged problem without making the rule so general that it would have little or no effect or contradict some other viewpoint. These issues are discussed in subsequent paragraphs referring to specific comments on the proposed rule.

It should be noted, however, that most comments submitted reflect a good appreciation for both the technical aspects of these rules and the difficulty of regulating in this area, as well as the need for amendment of these regulations. A number of commenters indirectly reinforce the need for rule making in this area because their comments show a misunderstanding of the application of the previous rules, and two commenters appear to misunderstand the rule to the point where they might be conducting operations in violation of the current rules.

Category II and Category III Operations

To appropriately address current FAA and industry practices and achieve uniformity of applications, the FAA is amending the former § 91.6, Category II operation: general operating rules, to extend its requirements to Category III operations. In general, Category III operations are conducted in accordance with an approved instrument approach procedure in visibility conditions less than 1,200 feet runway visual range (RVR) as described in FAA advisory circulars and International Civil Aviation Organization standards and recommended practices. A conforming change is made in Part 1 to include a definition of Category III operations. Previous changes to § 91.6, involving Category II operations, were made when the FAA did not have sufficient operating experience available to include Category III provisions. This is no longer the case since U.S. Category III operations have been conducted for over 8 years and regulatory safeguards similar to those for Category II operations are appropriate because administratively both types of operations are implemented in a similar way. For Parts 121, 125, and 135 operators, Category II and Category III authorizations are made under operations specifications provisions in those parts. Part 91 operators obtain letters of authorization from FAA district offices. For § 91.6(b) to apply to both Category II and Category III operations, references to ground equipment, inoperative components, and specific RVR locations and RVR readings are deleted. However, a minor change from the revisions proposed in the notice in paragraph (b) is made to delete additional references to ground components. Based on commenters' suggestions and further FAA review, the specific list in the former § 91.6(b), second sentence, is unnecessary because it is redundant to either the procedure itself, the specific authorization to conduct the operation, or because any adjustments to minimums are published in the Notices to Airmen. Including these references in § 91.6 is unnecessary because RVR inoperative components and ground equipment requirements are specifically provided for in the revised § 91.116(k), approved instrument approach procedures under Part 97, and Category II and Category III authorizations, when appropriate.

Section 91.6(d) is revised to provide definitive guidance for the pilot conducting the approach by explicitly stating those visual references the sighting of which permits the continuation of an approach below the authorized DH, when the approach procedure provides for a DH. The visual references are the same as those required in the revised § 91.116, with the exception of the runway end identifier lights and the visual approach slope indicator (VASI) which are not appropriate visual references for a Category II or Category III operation. VASI's and runway end identifier lights generally are installed on runways which do not have electronic glide slope guidance.

Under § 91.6(d)(2)(i) the approach lights may be used as a visual reference to 100 feet above the touchdown zone elevation. Thereafter, the approach lights may be used as a visual reference for continued descent only if either the red terminating bars or the red side row bars also are distinctly visible and identifiable. This provision is appropriate because of the characteristics of approach light systems with sequenced flashing lights in an Instrument Landing System Category I configuration (ALSF I) or Category II configuration (ALSF II) which are designed so that the pilot should see these visual references during a Category II approach if at least landing minimum weather conditions are present. Either the ALSF I or ALSF II approach light system may be used at present for Category II operations.

The pilot should see one of the visual references specified in § 91.6(d)(2): (1) at, or before reaching, 100 feet above the touchdown zone during a Category II approach, or (2) at, or before, DH during a Category III approach which requires use of a DH. Therefore, if the pilot does not see one of these visual references, Category II and Category III approach procedures that use a DH require the pilot to execute a missed approach.

One commenter states that sighting of the red terminating bars of an ALSF I approach light system may not be certain in cases of wide-body aircraft conducting a Category II approach when weather is at minimums. While this may be valid in certain unusual instances, the requirement to see the red terminating bars as a condition for continuation below 100' is necessary to ensure that appropriate visual reference is present. Further, this situation is rare because only a few aircraft types are involved, and weather conditions would have to be uniform, and exactly at minimums for this situation to occur. Further, only some runways used for Category II have the ALSF I lighing system, and the FAA is in the process of upgrading the ALSF I approach light systems to the ALSF II configuration for

which the situation described by the commenter does not occur.

For Category III approaches which do not specify a DH, any necessary provision for application of landing minimums will be listed in the operations specifications or letter of authorization covering the operation. A number of commenters express concern relative to the fact that proposed § 91.6 does not clearly distinguish between fail-passive Category III operations which apply a DH and fail-operational Category III operations without a DH. A new § 91.6(f) is added to clearly distinguish and acknowledge the requirements for operations without a DH. An additional qualification is also added to § 91.6(c) to clarify that the decision height provision of § 91.6(c) does not apply to those Category III operations which do not use a decision height.

Commenters suggest, and the FAA agrees, that a further clarification is necessary for terminology previously used in § 91.117(b)(1) and proposed under §§ 91.6(d)(1), 91.116(b)(1), and 121.651(c)(1) regarding a normal descent to the runway. In addition to the former provision that for continuation of a descent the aircraft must be "continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers," another provision is added. The phrase "and where (such a) descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing" is added to clarify the intent of the former wording requiring a "normal approach to the runway of intended landing". The provision is applied for all landings in Category II or Category III and for Part 121 and 135 operations. For Part 91 and 125 operations, in other than Category II or Category III landings, this provision is not mandatory because there are aircraft types, runways, and circumstances where the additional requirement may not always be necessary for safety. Thus, the provision of § 91.116(c)(1) for touchdown in the touchdown zone is limited to Part 121 and 135 operators and for all approaches in Category II and Category III. However, it should be noted that compliance with the provision to "touchdown in the touchdown zone" is a good operating practice for all operations. The fact that it is not mandatory for Part 91 operations should not be taken as an encouragement to complete an approach by a steep descent and touchdown beyond the touchdown zone because visual references on an approach such as a nonprecision approach are not acquired until well after passing the visual descent point (VDP), or near the missed approach point.

Use of the word "touchdown" in the context of § 91.6(d)(1), § 91.116(c)(1), or § 121.651(d)(1) regarding the requirement for a normal descent to a landing is appropriate to denote the particular event (touchdown) which must take place within the touchdown zone. Use of the word "landing" in this instance could be incorrectly taken to include other situations such as flare or rollout to a full stop, a touch and go, or landing to the point of turnoff from the runway which may or may not completely take place within the touchdown zone. Thus the word "touchdown" is used in § 91.6(d)(1) and §§ 91.116(c)(1) and 121.651(d)(1) even though the word "landing" is retained in other provisions of §§ 91.6, 91.116, and 121.651.

Other comments on the proposed changes to §§ 1.1 and 91.6 are generally supportive. A number of minor revisions were suggested such as including in the definition of "Category III operations" in § 1.1 the term "landing on" the runway in addition to an "ILS approach" to the runway. This suggestion is adopted since Category III operations specifically provide for safe rollout in reduced visibilities as well as a safe approach to touchdown. However, it should be noted that the case of a Category III approach which terminates in a missed approach rather than a landing is still considered to be a Category III operation even though a landing may not be completed.

Based on other comments, the words "straight-in" in proposed § 1.1 in conjunction with an ILS approach are unnecessary for the definition of a CAT III operation since the other type of approach is a circling approach and there are no CAT III circling approaches. Thus the term "straight-in" is deleted.

References to Part 125 are added to §§ 91.6 and 91.116 to be consistent with issuance of the new part on October 2, 1980. Part 125 is effective February 1, 1981.

The changes to §§ 1.1 and 91.6 are adopted as proposed and discussed above to uniformly apply the criteria used under current operations specifications and letters of authorization and appropriately update the rules to be consistent with current FAA and industry practice.

Landing

Section 91.116(b) prohibited a person operating an aircraft (except a military aircraft of the United States) from landing that aircraft using a standard instrument approach procedure prescribed in Part 97 unless the visibility is at or above the landing minimum prescribed in that part for the procedure used. The revised rule clarifies this point to specify that no pilot may operate an aircraft below MDA or DH unless the "flight visibility is not less than the visibility prescribed in the standard instrument approach procedure being used." This revised requirement is necessary to make it clear that the visibility referred to is the visibility from the aircraft. Section 91.116(c)(2) and (c)(3) also make it clear that the pilot must have this flight visibility from descent below MDA or DH until touchdown.

In particular need of clarification is the phrase "other markings identifiable with the approach end of the runway" found in the former §§ 91.117(b)(2) and 91.6(c)(2). In some instances, pilots interpret this phrase to include towers, smoke stacks, buildings, and other landmarks which may be located far from the end of the runway, and pilots may be descending below the MDA using these landmarks. This language also has been interpreted erroneously by some pilots to allow the use of a series of landmarks as progress points for instrument approaches. Use of such landmarks can result in mistaken identification of position or aircraft flight path.

To correct these practices, the revised rule specifies the visual references which are intended to allow descent below MDA or DH. The rule now precludes use of references not listed, which under the previous rule may sometimes have been used as the basis for continued descent even though they were not appropriate. Accordingly, revised § 91.116(c) prohibits descent below MDA and the continuation of an approach below DH unless at least one of the following is distinctly visible to and identifiable by the pilot for the intended runway: approach light system; threshold; threshold markings; threshold lights; runway end identifier lights; visual approach slope indicator; touchdown zone or touchdown zone markings; touchdown zone lights; runway or runway markings; or runway lights.

In Notice 80-4 the words "clearly visible" are used. However, commenters note, and the FAA agrees, that in low visibility operations visual references could rarely be considered clearly visible in the strict sense of the word due to factors such as the distortion of rain on the windshield, backscattered light of landing lights, and other reasons.

The words "distinctly visible and identifiable" were suggested by commenters and are adopted because they appropriately denote the intention that the visual references be discrete and unmistakably identifiable. The change from "clearly visible" to "distinctly visible and identifiable" should not be taken to mean that descent below MDA or DH can be based on a general glow of approach lights through a layer of fog or other obscurations where the visual references themselves are not discretely identifiable.

In accordance with concerns expressed by several commenters, an exclusion is added to § 91.116(c)(3) which limits applicability of this provision to approaches other than Category II or III. This is necessary to address possible misinterpretations of the applicability of § 91.116(c)(3) regarding Category II and Category III visual reference requirements. The commenters note, and the FAA agrees, that visual aids such as runway end identifier lights or VASI are not appropriate aids on which to base continuation of a Category II or Category III approach and that operations specifications, letters of authorization, or § 91.6(d)(2) provide the means to address any necessary limitations or conditions that may be appropriate in lieu of § 91.116(c)(3).

To preclude premature descents and unnecessary maneuvering at low altitudes, an additional requirement is added to § 91.116(b) for straight-in, nonprecision instrument approach procedures. For approaches which incorporate a VDP, the rule provides that the pilot may not descend below MDA until the VDP is reached if the pilot has the means to establish that point and if a normal descent to the runway can be made from that point. However, since the Department of Defense, Air Transport Association, and other commenters express concern over certain aspects of the VDP provisions of § 91.116(b)(2) as proposed, an additional exception is added. The comments suggest that the inflexible provisions of the proposed rule limit initiation of descent prior to reaching the VDP, which may adversely affect safety in cases where descent prior to the VDP is necessary to maintain a normal descent profile to the runway. A review of these comments results in the identification of cases where certain combinations of aircraft types, approach speeds, flap settings, and descent rate capability taken with possible VDP placement could possibly lead to abnormal descents from MDA to the runway if strict compliance with the rule as proposed in the notice is necessary. The commenters note, and the FAA agrees, that literal compliance with the proposal to "never descend until reaching the VDP" could adversely affect safety in unusual cases where the normal descent gradient and use of normal procedures requires the initiation of a descent shortly before reaching the VDP for some aircraft types or circumstances. Examples of situations in which it may be necessary for a pilot to descend shortly before reaching the VDP would be the case of an aircraft making a no flap approach, or an aircraft that must maintain a more shallow descent angle to provide for power settings compatible with engine anti-ice requirements. Therefore, the rule allows an exclusion in cases where literal compliance with the requirement to delay descent until passing the VDP is not appropriate for certain aircraft or situations because it would lead to an abnormal descent path to the runway, high rates of descent, or other unusual piloting procedures if descent is delayed until reaching the VDP.

One commenter questions the applicability of the VDP provisions of proposed § 91.116(b)(2) to Part 121 operations because the VDP provisions were not repeated in proposed § 121.651. Since no exclusion of particular operations was proposed, the VDP provisions of § 91.116(c)(4) as adopted apply to Part 91, 121, 125, 135 and other operators conducting a Part 97 approach procedure. However, to clarify this issue and prevent further misunderstanding in the special case of continuation of an approach in deteriorated weather, VDP provisions are repeated in § 121.651(c)(4).

In § 91.116(c) the qualification "where an MDA or DH is applicable" is added to clearly relate the use of the MDA or DH to the specific procedure used. In cases where both an MDA or DH are provided in a single procedure, such as an ILS or localizer approach, or where either a DH or MDA is not provided, this qualification clarifies the use of either the MDA or DH as appropriate to the specific type of approach used.

The terminology used in § 91.6(d)(2)(i) regarding the limitations on use of approach lights as an exclusive condition for descent below 100' is added for consistency in §§ 91.116(c)(3)(i), 121.651(c)(3)(i), and 121.651(d)(3)(i) because of the design of lighting systems and instrument approach procedures. When an aircraft is at or below 100' above the touchdown zone, the red side row bars on an ALSF II approach light system, red terminating bars of the ALSF I approach light system, or the threshold or other references listed in § 91.116(c)(3) should be in sight. If the approach is flown to a runway which does not have one of the two approach light systems mentioned above, then at or below 100' one of the other references in § 91.116(c)(3) must also be in sight to continue descent to a landing. For other than Category II or III, regardless of the type of straight-in or nonprecision approach flown, when at or below 100' above the touchdown zone, one of the visual references specified in § 91.116(c)(3)(ii) through § 91.116(c)(3)(x) should be visible if flight visibility is at or above the specified minimums. Conversely, if the approach lights are visible, but red terminating bars or red side row bars are not visible either due to poor visibility or because they are not installed, and the other visual references specified in § 91.116(c)(3) are not visible either, then regardless of the type of approach (other than Category II or III) the flight visibility is substantially less than minimums and continued descent below 100' may not be safe and is not appropriate. Further, to apply the provision to see the red side row bars or red terminating bars only to § 91.6(d)(2)(i) and not § 91.116(c)(3) or § 121.651 would lead to the anomalous situation in which if the pilot misjudged the flight visibility required in § 91.116(c)(2), continued descent would be permitted on a basic ILS or nonprecision approach with less flight visibility and visual reference than required for a Category II or Category III approach. Thus the proposed limitations § 91.6(d)(2)(i) to see the red side row bars or red terminating bars below 100' when using the approach lights as a sole reference for descent, is repeated in §§ 91.116(c)(3)(i), 121.651(c)(3)(i), and 121.651(d)(3)(i).

New § 91.116(d) continues to provide that no person operating an aircraft (except military aircraft of the United States) may land that aircraft when the flight visibility is less than the visibility prescribed in the standard instrument approach procedure being used. The word "touchdown" was used in the notice in lieu of "landing" because of problems with the definition of what constitutes a landing. Commenters stated that, in most instances use of the word "touchdown" instead of "land" did not improve the clarity of the rule. These comments caused the FAA to reconsider the necessity for use of the word "touchdown" in this section. Therefore, based on commenters' suggestions and subsequent review, the term "land" is retained with the exception of a special

case where the word "touchdown" is retained in § 91.116(c)(3) as discussed earlier with respect to § 91.6(d)(1).

Any deliberate touchdown of an aircraft when the flight visibility is less than the visibility prescribed is clearly contrary to the intent of the rule, regardless of whether a full stop landing is completed or not. However, the FAA recognizes that inadvertent and momentary contact of the wheels with the runway may occur during rare instances in which a missed approach must be conducted from a very low altitude. This inadvertent contact may result even though proper procedures are used. This contact is not considered to be landing the aircraft within the meaning of § 91.116(d), and special piloting techniques or procedures are not required to avoid contact by the wheels with the runway under these circumstances. Therefore, most of the detailed references to touchdown are deleted in favor of the word "land" in §§ 91.6, 91.116, and 121.651. Retention of the word "touchdown" in §§ 91.116(c)(1) and 121.651(d)(1) is discussed in the section under § 91.6(d)(1).

One commenter indicates that retaining the provision for pilot determination of visibility does not improve safety because of the possibility of distraction of the pilot. However, there is no evidence that this responsibility alone has caused an unsafe condition. In fact, accident statistics and reports indicate the opposite is true. Causal factors of some accidents appear to be related to continued pilot descent below MDA or DH with only limited visual contact and inadequate visual reference to safely continue the approach to a landing. Thus, §§ 91.116(c)(2) and 91.116(d) retain the concept of pilot determination of the specified visibility and clarify the frequently misunderstood point that the visibility referred to is flight visibility.

Missed Approach Procedures

Additional missed approach requirements are added in § 91.116(e) to preclude unsafe situations resulting from misidentification of ground references. For the same reasons stated for retaining of the provisions of flight visibility in §§ 91.116(c)(2) and 91.116(d), a missed approach is required whenever the flight visibility required by paragraph (c)(2) is lacking, even though the pilot may have one of the visual cues required by paragraph (c)(3) distinctly in sight. A pilot is also required to follow an appropriate missed approach procedure whenever an identifiable part of the airport is not distinctly in sight during a circling maneuver.

Some commenters express concern that the FAA's use of the general term "identifiable part of the airport" in the circling maneuver provision of § 91.116(e) is inconsistent with the FAA's statement that the former § 91.117(b)(2) regarding "markings identifiable with the approach end of the runway" was inadequate and needed revision. However, these two cases are not contradictory. Formerly there were no regulatory provisions during a circling approach restricting a pilot to maintain visual contact with the airport. The revised rule adds the "identifiable part of the airport" requirement to preclude situations where the circling maneuver could be conducted far from the airport with the possibility of misidentification of landmarks not associated with the airport. Since the circling approach provisions of § 91.116(e) specifically refer to a "part of the airport," the misinterpretation associated with the former § 91.117(b)(2) should not occur.

Some commenters express concern that the wording of proposed § 91.116(e) requiring visual contact with the airport during a circling approach might be interpreted to unnecessarily restrict pilots in the selection of a circling maneuver after establishing visual contact and while maneuvering to the point of descent from MDA for final alignment with the landing runway. However, revised § 91.116(e)(2) does not impose additional restrictions on pilots regarding selecting the direction of turn or the type of turn, such as a teardrop, 80°–260° turn, or standard traffic pattern. Such choices of a circling approach maneuver should be selected by the pilot based on good operating practice and are restricted only by limitations that may be specified in the standard approach procedure itself. There is no implication that the rule requires any particular type or direction of turn to maintain visual contact based on angle of sight or windshield view for the pilot or co-pilot depending on which pilot may be flying the approach or other such factors. Good operating practices described in the Airman's Information Manual or other instrument flight training references may continue to be used and are encouraged.

Another subject on which comments were received relates to the § 91.116(e) requirement to immediately initiate an "appropriate" missed approach if visual reference is lost. The commenters correctly note that it is unsafe in some cases to initiate an immediate missed approach which strictly follows the published procedure. This, however, is the reason why the word "appropriate" missed approach is used. Under § 91.116(e) pilots must continue to be aware that the published missed approach procedure provides obstacle clearance only when the missed approach is conducted on the missed approach segment from or above the missed approach point. If the aircraft initiates a missed approach at a point prior to the missed approach point, from below MDA or DH, or on a circling approach, obstacle clearance is not necessarily provided by following the published missed approach procedure. In this situation obstacle clearance is the pilot's responsibility. When a missed approach is initiated in this situation, the pilot must consider other factors such as the aircraft's geographical location with respect to the prescribed missed approach point, direction of flight and/or minimum turning altitudes in the prescribed missed approach procedure, aircraft performance, visual climb restrictions, charted obstacles, IFR departure procedures, takeoff visual climb requirements as expressed by nonstandard takeoff minima, or other factors not specifically expressed by the approach procedures. During a missed approach, the aircraft must be on, or must reintercept, a published segment of the procedure at or above the altitude specified in the procedure, and must maintain a climb gradient equal to or greater than the standard (1:40 or 2.5%) *unless otherwise published, for obstacle* clearance to be ensured by the published missed approach procedure alone. For these reasons the wording of *former § 91.117(b)(2) with respect to an* "appropriate" missed approach is retained in § 91.116(e).

Due to the need for exclusions approved by the Administrator, and to consolidate provisions for alternate approvals, the authority of the Administrator in sections of § 91.116, for approval of a circling maneuver where a part of the airport may not be in sight is removed from this section. Such *approval is now included under* § 91.116(a) in the general provisions for alternate approvals by the Administrator for § 91.116(a) through (k).

Procedure Turns

As described in the notice, due to the possibility of misinterpretation, the current limitation on procedure turns is revised in § 91.116(j) to more clearly require the pilot to obtain an Air Traffic Control (ATC) clearance before making a procedure turn under specified conditions. The former § 91.116(h) required the pilot simply to advise ATC of his intention to make a procedure turn when final approach clearance is received. The revised rule specifies that

such a clearance must be issued by ATC. This precludes situations in which the pilot advises ATC but due to communication difficulties ATC does not receive the request or cannot comply with the pilot's request. In addition, the reference to the designation "FINAL" in the former § 91.116(h), which is no longer used in the context of limitations on procedure turns, is deleted from this provision.

The words "final approach course" have been adopted in § 91.116(j) to be consistent with terminology used in instrument approach and air traffic control procedures rather than the term "final approach segment" used in the notice.

A question was raised regarding applicability of revised § 91.116(j) for a case where the segment of an instrument approach being flown does not specify a "No procedure turn (No PT)" limitation, but other transition segments for the procedure not used by the aircraft do have the limitation. A procedure turn may be made following segments not limited by the "No PT" restriction, but a procedure turn is prohibited unless ATC clearance is received for those segments to which the "No PT" limitation applies. No major comments suggest changing this proposed provision and it is as adopted as proposed.

Inoperative or Unusable Components and Visual Aids

The revised rule incorporates the substance of § 91.117(c), Inoperative or unusable components and visual aids, into § 91.116(k), except the inoperative component tables are deleted. Making the increased minimums mandatory by those tables is unnecessary because the essential limitations are uniformly being incorporated into the instrument approach procedures under Part 97 where necessary.

A number of commenters question the philosophy and method of dealing with the middle marker as an inoperative component of an ILS as proposed. A major supplier of instrument approach procedure charts points out that it is unnecessary to uniquely consider middle marker outages in landing rules. Instead the regulatory means for accommodating middle marker beacon outages should be the same as that used for other components such as approach lights. Further consideration of this point indicates that the comment is valid and that middle marker inoperative situations are not unique in terms of the need for adjustments to minima. Safety can be maintained and such outages can be more appropriately handled by the same administrative means as other inoperative components, such as through the U.S. standard for Terminal Instrument Procedures, in combination with inclusion on FAA 8260 series forms which define Part 97 instrument approach procedures and establish minimums. This provides an equivalent regulatory basis for any adjustments necessary to minimums due to the middle marker being inoperative, but allows the adjustments to be processed and implemented with the same procedures as for approach lights or other items. It also standardizes, simplifies, and increases the likelihood of correct application of these provisions by pilots. Other commenters also point out that provisions for inoperative components, including unusable middle markers, may be adequately addressed through Part 97 instrument approach procedures as defined by FAA Form 8260. Therefore, inoperative component tables may continue to be published as a description of the adjustments made to approach procedures, but they would be based on United States Standard for Terminal Instrument Approach (TERPS) or used for training or informational purposes since the procedure itself specifies any necessary limitations. Accordingly, the middle marker inoperative adjustments are removed from § 91.116 and any necessary adjustments are accommodated in the same way as lighting or other inoperative components as part of the Part 97 instrument approach procedure or Notices to Airmen.

Since § 91.116(f) is deleted, the Department of Defense suggestion to add a military exclusion for the middle marker inoperative situation in the revised § 91.116 is unnecessary. Any special provisions for military use of civil approach procedures which specify minimums adjustments may continue to be appropriately addressed or waived by the military as necessary, and development of military standard approach procedures may be done in accordance with applicable military directives. Other than for explanation of civil approach procedure applicability and use when military aircraft land at civil airports, no provision of § 91.116 regarding elimination of the inoperative components table from § 91.116(f) requires a charge to military procedures.

ILS Components

New § 91.116(k) describes the basic components of an ILS and specifies what airborne and ground equipment may be substituted for those components. As proposed, these components include the localizer, glideslope, outer marker, and middle marker. For consistency, provisions are also added to the rule to address the applicability of the inner marker for Category II and Category III operations since commenters appropriately note that the former § 91.117(c) and the notice did not specifically provide for these cases. Applicability and substitution provisions are added to § 91.116(k) for the inner marker for Category II and Category III to ensure that the provisions of § 91.116(k) are complete and consistent with current practice.

Other Comments on Section 91.116

In several provisions of § 91.116, the phrase "except a military aircraft of the United States" is added to accommodate Department of Defense comments and requirements.

Some comments indicate that the rule is too specific and should be kept only as a good operating practice, or that certain provisions of the rules should not apply to particular operators such as helicopter operations. However, comments such as these do not have supporting evidence and are vague or general and request further relaxation of the rule. It is not clear how the FAA can delete flight visibility and visual reference requirements from § 91.116 and still provide the necessary safety provisions in view of the poor accident and incident record discussed in Notice 80–4. The purpose of this rule making is to clarify and make necessary changes to the rules to increase safety. Therefore the provisions of § 91.116 described in the notice are retained with the revisions noted in the previous paragraphs. The revisions include clarification of flight visibility, specific listing of visual references, incorporation of provisions limiting descent prior to reaching a VDP, and deletion of the inoperative components table in § 91.117 as redundant with Part 97, and provisions of TERPS.

Revision of Part 121

For consistency, § 121.651 combines the former takeoff and landing weather minimums for domestic and flag air carriers (§ 121.651) and those for supplemental air carriers and commercial operators (§ 121.653). For the purposes of this section, the operations of domestic, flag, and supplemental carriers are sufficiently similar that the distinction in takeoff and landing minimums is no longer necessary. This is consistent with the reduced emphasis on distinctions among these carriers which results from the Airline Deregulation Act of 1978 (Pub. L. 95–504) and is responsive to the President's goal of regulatory simplification. Comments on the

simplification of these rules are generally supportive. One commenter suggests even further reorganization of these rules to provide separate sections for takeoff and landing minima and to simplify the redundancy between Parts 91, 121, and 135 for takeoff and landing under IFR. Although the FAA recognizes that such reorganization may have merit, it does not appear practical at this time to make such changes without further public comment. Additional action on such proposals may be a subject for future rulemaking.

Section 121.651(a) prohibits a pilot from beginning takeoff when the weather conditions reported by the U.S. National Weather Service, a source approved by that Service, or a source approved by the Administrator, are less than those specified for the takeoff airport in the certificate holder's operations specifications or, if the operations specifications do not contain minimums for the airport, the minimums specified under the Part 97 procedure. This allows weather reports by sources other than the U.S. National Weather Service or sources approved by it, but which are approved by the Administrator, to apply for takeoff minimums at foreign airports. Thus this change uniformly applies takeoff minimums where weather is reported by sources approved by the Administrator, as well as at locations having U.S. National Weather Service-operated or approved weather facilities. There were no specific comments identifying problems with this section and the section is adopted essentially as proposed.

Proposed § 121.651(b) clarifies that a pilot at an airport within the United States or at a U.S. military installation which has one of the three specified acceptable weather report sources may not continue an approach past a final approach fix or, if a fix is not established in the standard instrument approach procedure, begin the final approach segment of an instrument approach procedure unless a weather report is issued for that airport. At foreign airports, weather services for Part 121 operators are approved by the Administrator rather than the U.S. National Weather Service. Thus § 121.651(b) allows initiation of the final approach segment of instrument approaches at foreign airports not having weather reporting facilities under the jurisdiction of the U.S. National Weather Service.

U.S. National Weather Service expresses concern regarding the language used in § 121.651(b) which states that no person may continue an approach past a final approach fix unless a weather report is issued by the U.S. National Weather Service, a source approved by that service, or a source approved by the Administrator. The concern relates to the fact that it approves weather observations within the United States, whereas the proposed rule also provides for use of sources approved by the Administrator rather than the National Weather Service. However, the provision for approval of the Administrator is necessary in this case, and must be considered in context with current § 121.101(b)(1), and (b)(2), and § 121.119. Sections 121.101 and 121.119 state the conditions under which the Administrator may approve sources of weather reports. Section 121.651(b)(1) and (b)(2) must address operations at airports other than those at which the National Weather Service approves weather observations as provided in § 121.101 and § 121.119. It is therefore necessary to provide for approval of a report by the Administrator in § 121.651 for clarity, to be consistent with established practice, and to be compatible with §§ 121.101 and 121.119.

In § 121.651(b), the provision that "no pilot may * * * *continue an approach past the final approach fix, or where o final approach fix is not used,* begin the final segment of an instrument approach procedure * * *" (emphasis added) is added to provide for the situation where a final approach segment may begin prior to a final approach fix depicted on the procedure. As proposed in such situations an aircraft waiting for a weather improvement above minimums before commencing an approach may have incorrectly held at a point further from the airport than intended because of a misinterpretation of the rule. The adopted rule clarifies the intent that the aircraft in such instances may proceed at least to the depicted final approach fix while waiting for a weather improvement even though some final approach segment in the procedure may begin earlier.

A typographical error regarding the incorrect use of the word "or" versus the correct word "and" is corrected between § 121.651(b)(1) and § 121.651(b)(2) in accordance with the original intent of the provisions of these sections discussed in Notice 80-4.

Sections 121.651(c) and (d), which govern the receipt of a later weather report indicating below minimum conditions and initiation of an approach when weather is below minimums if ILS and precision approach radar (PAR) are used simultaneously is revised. Section 121.651(c) provides that a pilot who has begun the final approach segment of an instrument approach procedure to an airport in accordance with § 121.651(b) and then receives a below minimum report or a pilot who initiates the approach under § 121.651(d) may continue the approach and touchdown if the same safeguards prescribed in § 91.116(c) are met.

The applicable provisions of § 91.116(c) are repeated in §§ 121.651(c) and 121.651(d) to clarify and simplify use of this section without the need to cross reference § 91.116(c). Sections 121.651(c) and (d) are also revised from the wording used in Notice 80-4 to retain the word "landing" in lieu of the word "touchdown" for the same reasons explained in the discussion of § 91.116(d).

Section 121.651(c) provides additional safety in the case of deteriorating weather by revising the conditions for continuation of an approach when variable weather may go below minimums after the aircraft has passed the final approach fix. The former § 121.651(d)(2) required that aircraft on a nonprecision approach must have reached MDA as a condition for continuation of an approach. This is believed in some instances to have led to aircraft descending to MDA at higher than normal descent rates after passing the final approach fix when weather was variable and deteriorating, to be able to continue the approach if weather was subsequently reported below minima. This practice could encourage high sink rates near the ground and unstabilized approaches due to the pilot's effort to reach MDA soon after passing the final approach fix. Accordingly, § 121.651(c) only applies the condition that the aircraft be past the final approach fix to continue an *approach in the situation of* deteriorating weather, for both precision and nonprecision approaches, this encouraging stabilized descents and use of normal descent gradients.

As proposed, the exception of § 121.651(d), allowing initiation of an approach when weather is below minimums if ILS and PAR are simultaneously used, is retained. However, commenters correctly note that air carriers apply this provision rarely and only at a very few airports due to PAR being phased out at civil airports. Further, it is suggested that these provisions are no longer appropriate for air carrier operations. As a result, further revision or deletion of § 121.651(d) may be considered in future rule making but the provision is retained at this time.

Section 121.651(d) applies the same safeguards as in § 91.116(c) with the exception of paragraph (c)(4) which

relates to operations prior to reaching a VDP in straight-in, nonprecision instrument approach procedures and does not apply in the instance of a precision approach.

The revisions to §§ 121.651(c) and (d) are necessary to be consistent with the revised § 91.116. They upgrade and clarify the requirements for instrument approaches for air carrier operations. They are adopted substantially as proposed in the notice.

Foreign Airports

Finally, a new § 121.651(f) is added to require a pilot making an IFR takeoff, approach, or landing at a foreign airport to comply with the applicable instrument approach procedures and weather minimums prescribed by the authority having jurisdiction over the airport, unless otherwise authorized in the certificate holder's operations specifications. This ensures that U.S. operators comply with appropriate foreign governmental regulations when conducting international operations. No specific comments were received on this section and it is adopted as proposed.

Pilots Continuously Determining Flight Visibility

Based on comments, difficult issues to resolve are the various sections dealing with requirements for the pilot to continuously determine that the flight visibility is not less than the visibility specified in the procedure used (§§ 91.116(b)(3), 121.651(c)(3) and 121.651(d)(3) in the notice and §§ 91.116(c)(2), 121.651(c)(2), and 121.651(d)(2)). Comments on these issues range from strong support for the concept and wording to significant disagreement with the concept. Some commenters state that this provision could adversely affect safety. A main objection to this provision centers on the interpretation of the phrase "continuously determine" flight visibility. It is suggested that this might be interpreted by some to mean that the pilot or pilots cannot conduct a normal cross check of cockpit instruments while below MDA or DH. Use of the term "continuous" in this context is inappropriate if it is taken to mean that scanning of instruments such as airspeed, altitude, and vertical speed is not acceptable in conjunction with scanning of outside visual references. Such an interpretation is certainly not the intent, and if this interpretation is applied, it could very well be detrimental to flight safety. Accordingly, the word "continuously" is dropped from these sections as being potentially confusing and redundant to § 91.116(e) which provides for conditions in which a missed approach must be initiated.

Another point raised in the comments is the fact that pilots do not have a means to numerically assess flight visibility and compare it with the published minimums and that the list of visual references specified in § 91.116(c)(3)(i) thru (x) is adequate alone. Although these comments are to some degree valid in the sense that visual estimation of visibility by either a pilot or ground observer does require judgement and may not necessarily be numerically exact, it nevertheless remains a concept that provides for the necessary safety during landing. Such assessment of visibility has been the basis for many years for both ground weather observations and pilot use in compliance with the landing minima and visual flight rules. Although alternative concepts such as mandatory use of ground-reported visibility or RVR have been suggested, no other concept adequately replaces the provisions of §§ 91.116(c)(3) and 91.116(d) and provides equivalent safety without further restricting flight operations. The intent of §§ 91.116 and 121.651 is not to remove the requirement for assessment of visibility, but to further clarify its applicability by clearly specifying the often misunderstood point that the rule refers to "flight" visibility as opposed to ground-reported visibility. The associated changes to §§ 91.6, 91.116, and 121.651 provide an increase in safety by explicitly listing the references that must be in sight as a condition for continued descent below MDA or DH even though the pilot may have determined that the required flight visibility is present. Conversely, having one of these specific references in sight is not sufficient alone to safely continue descent if the flight visibility is below minimums. Thus the addition of a specific list of visual references in § 91.116(c)(3) further clarifies the runway environment terminology previously used in § 91.117(b)(2) rather than the long-standing concept of use of flight visibility.

Associated comments relate to the need for slant visual range measurements, and to the relationship between § 121.655, which addresses the precedence of ground-reported RVR in weather reports, and § 121.651. A commenter indicates that minima are not and cannot be measured in terms of slant visual range, and that horizontal flight visibility at altitude may be less than the authorized reported visibility observed at ground level.

Regarding the first point, this statement is partially true. The FAA acknowledges that slant visual range (SVR) is not used now, and the FAA agrees with the commenter that there are presently no ground measurement systems available which are practical for operational measurement of SVR. The FAA plans to continue to monitor technical developments in this area for any advances which may overcome the many technical problems and practical limitations which remain. Even if numerous problems with ground measurement of SVR are resolved, it is not clear that having this information in addition to RVR contributes to or is essential for safe descent below MDA or DH. In a number of accident and incident cases, pilots have continued the approach below MDA or DH in spite of the fact that little or no visual reference existed and the pilot observed that slant visibility was poor. It is not clear how providing ground reports of SVR to the pilot would have prevented the accident or incident since the pilot already had actual slant visibility information which could not have been provided by a ground sensor as accurately or in real time. Conversely, if the pilots applied the conditions specified in § 91.116(c) which clarifies the applicability of the use of flight visibility and lists acceptable visual references for continuation of descent, the continued descent below MDA or DH in marginal visibility well below that specified in the standard instrument approach procedure would clearly have been inappropriate.

The FAA also does not agree with the commenters' views that assessment of flight visibility is impossible for pilots to do. As pointed out in earlier discussions, for many years pilots have been making such judgments to safely operate aircraft, as well as to comply with former §§ 91.105, 91.116, 121.651, and 121.653, even though such judgments may not be numercially exact. For example § 91.105 requires pilots to estimate horizontal visibilities of 1 mile and 3 miles and to estimate horizontal and vertical distances from clouds of 500 feet, 1,000 feet, and 2,000 feet. Sections 91.116, 121.651, and 91.105 all require pilots to estimate flight visibility in situations where slant range and other factors such as horizontal visibility, aircraft height above ground, obscuration due to fog, rain or snow, scud, low cloud or other restrictions to visibility must be considered.

Regarding the points that horizontal visibility at altitude may be less than the authorized reported visibility at ground level, the FAA agrees. However, this is not sufficient reason to remove the requirement for assessment of flight

visibility from §§ 91.116 or 121.651. In fact, the possibility of this situation is an important reason why revised §§ 91.116 and 121.651 continue to require assessment of flight visibility. Technical literature[1] from a variety of sources suggest instances where slant visibility as seen by the pilot can be very much less than the horizontal visibility at ground level. Thus if the requirement for flight visibility assessment by the pilot is removed, it would be permissible to continue a descent below MDA or DH in the unsafe situation where visibility is reported above minimums and one or more visual references listed in § 91.116(c)(3) may be distinctly in sight but the flight visibility is much less than the visibility specified in the procedure and is inadequate to safely complete the landing.

In all these cases, the commenters' recommended resolution of the issues appears to be less restrictive than the former rules. The previous §§ 91.116(b) and 121.651(d) required that no person land unless the visibility is at or above (greater than or equal to) the published minimums, and that for continuation of an approach in deteriorating weather for Part 121 operators, the actual weather be at or above published minimums. The commenters' suggested changes to delete sections such as § 91.116(c)(2) or § 121.651(c)(2) relating to flight visibility would lead to the rules permitting the approach to be continued in unsafe conditions.

For example, in a case where weather is reported to be above minimums, if the requirements of § 91.116(c)(2) were deleted and § 91.116(c)(3) regarding visual references alone was met by having one or more of the listed visual references distinctly in sight, a pilot could have continued the approach even though the flight visibility was very poor and much less than the published minimums. This situation is unsafe because the necessary visual reference for assessment or control of the aircraft's approach path may not be present. Other alternatives suggested by commenters, such as making ground-reported weather exclusively controlling, would require unnecessary missed approaches and diversions to alternate airports when weather is better than reported and safe for an approach and landing. The suggestion to make ground-reported RVR or meteorological visibility exclusively controlling for continuation of a descent below MDA or DH could lead to restrictions on operations with little or no overall benefit to safety. An example of this would be the case where the pilot has the listed references of § 91.116(c)(3) distinctly in sight and has determined that the flight visibility is at or above the published minimums as in § 91.116(c)(2), but the visibility or RVR is reported below minimums due to commonly recognized weather measuring and reporting inaccuracies. In this case, the commenter's suggestion requires an unnecessary missed approach and a diversion to an alternate airport could result.

The comment that § 121.655 establishes precedence of RVR over ground-reported prevailing visibility is correct. However, the commenter's implication that this has any affect on the pilot's assessment of visibility for continuation of an approach below MDA or DH is not valid. Section 121.655 requires that the main body of the weather report, rather than other portions of the report, applies regarding compliance with § 121.651(b) for determining the weather conditions necessary for the initiation of an approach. If an RVR report is currently available, it supersedes other weather reports that may apply to initiation of an approach under § 121.651(b). It does not relieve or take precedence over the pilot's responsibility below MDA or DH to ensure that the required flight visibility exists. Once a pilot has passed the final approach fix, no provision of § 121.655 supersedes the pilot's responsibility to assess visual reference below the MDA or DH. Thus even though a report of RVR may indicate that weather is above minimums and the RVR reports take precedence over other weather reports under § 121.655 for initiating an approach, when below MDA or DH the pilot must, in his judgment, determine that the actual weather conditions are at least equal to the prescribed minimums to continue an approach. Conversely, once past the final approach fix, if the pilot determines that the visual requirements of §§ 121.651(c) and 91.116 (c), (d) and (e) are met, the approach may continue and a landing may be made.

It is important to note the provision to continue an approach below MDA or DH if flight visibility is considered by the pilot to be above minimums and one of the acceptable visual references is in sight is not an encouragement for pilots to deliberately misestimate visibility to land in unsafe conditions with ground reported prevailing visibility or RVR reported below minimums. The FAA intends to continue to closely review the circumstances related to any landings made when weather is reported below minimums. To assess compliance with §§ 91.116(c) and 121.651(c) and for enforcement cases, the FAA will continue to consider a variety of factors such as ground-reported weather, variability of the weather, reports of other pilots who attempted or completed landings, pilots awaiting departure located in a position to judge visual reference in the area of the touchdown zone, reports of visual reference seen by other crewmembers on the aircraft, air traffic personnel, or ground observer reports, or many other such factors. Should evidence of a poor safety record continue or there be evidence of deliberate disregard of the visual reference provisions of §§ 91.116(c) and 121.651(c), the FAA will reconsider both the applicability and precedence of ground-reported visibility and RVR and the potential applicability of additional rules. If necessary, provisions similar to §§ 121.651(b), 135.225, and 125.381 may then be developed to apply to all operations.

Because of the problems identified with alternatives suggested by commenters and the fact that the primary intent of the proposal is to explicitly state the necessary visual references and make it clear that the visibility referred to is flight visibility, §§ 91.116(c), 91.116(d), 121.651(c), and 121.651(d) are adopted as discussed above.

Special Cases Requiring Authorization of the Administrator

Numerous commenters correctly identify areas in proposed § 91.116 where the Administrator must be able to approve approach procedures which vary from the provisions of § 91.116(a) through (k). For example, in the case of an aircraft operating on a straight-in or circling approach, it is sometimes necessary for an instrument approach procedure to provide for a visual segment from the missed approach point to the airport, as at numerous Alaskan airports and airports such as Palm Springs, California, and Missoula, Montana. Thus the Administrator must retain the authority to approve instrument approach procedures where the pilot may not necessarily have one of the visual references specified in § 91.116(c)(3) in sight. There are other cases where the Administrator's authority to issue special provisions must also be available to approve visual approaches, contact approaches, helicopter procedures, or other items such as waivers for all-weather takeoff and landing research and development. Accordingly, the provisions of former §§ 91.116 and 91.117 regarding the authority of the Administrator to authorize deviations is retained in

[1] Copies of these documents are contained in the docket.

§ 91.116, but is consolidated in § 91.116(a) for applicability to § 91.116(a) through (k).

List of Visual References

One commenter suggests that the list of approved visual references proposed in § 91.116(b)(4) and adopted in § 91.116(c)(3) and § 121.651(c)(3) be expanded to include additional items such as lead-in lights and runway markings. In the case of lead-in lights, the comment is not adopted because there are numerous types of approach light systems, of which lead-in lights are just one type, and each would have to be listed and updated as frequent changes in these systems are made. Since lead-in lights and other such visual aids are specific types of approach lights, and are considered and approved by the Administrator to be credited in an instrument approach procedure, it is unnecessary to specifically list each type. In the case of runway markings, the difference in meaning of "runway markings" from the word "runway" is considered sufficient to warrant being included separately to clarify the rule. Runway markings generally consist of standard patterns painted on the runway surface which show the threshold, runway identification number, centerline, touchdown aiming point, and distance coding. In contrast, the term "runway" may refer only to the surface of the pavement. This may not be as distinctly visible as lights or markings, for example, during a night approach on a wet runway.

One comment suggests adding centerline lights to the list in § 91.6(b). This, however, is inappropriate and unnecessary because of the design of the lighting systems. Centerline lights are intended to be installed along with touchdown zone lights, and since touchdown zone lights are set at an intensity greater than centerline lights, they should, in normal circumstances, be visible at the same time or before the centerline lights. Further, if the aircraft has inadvertently passed the touchdown zone prior to touchdown, and the touchdown zone lights or other items in § 91.6(b) are not visible but the centerline lights are visible, continued descent based on the centerline lights alone is not appropriate. Not only is it unlikely that weather is above minimums, but the pilot may also have no way of knowing how far along the runway the aircraft has traveled or how much runway remains for landing. If touchdown occurs past the touchdown zone, by the time the aircraft reaches the color-coded centerline lights at the opposite end of the runway there may be insufficient runway remaining to stop. Therefore, this item is not added to the list.

To clarify and uniformly apply the provisions regarding use of approach lights as a visual reference, the wording is standardized in §§ 91.6, 91.116, and 121.651 as "approach light system." The question is raised by commenters whether the entire approach light system must be visible to the pilot. It is intended that the entire system need not necessarily be in view under either § 91.6 or § 91.116 when descending below MDA or DH. At the time Notice 80-4 was issued, the special description in proposed § 91.6 clarifying descent below 100' was considered sufficient. It was not considered necessary in § 91.116 or § 121.651 because of the relatively infrequent occurrence of this situation. However, since commenters raise the issue and are uncertain as to whether "approach lights" and "approach light systems" have different meanings and whether it was necessary to see all or just part of the approach light system, the FAA has clarified the rule by adopting the wording used in proposed § 91.6 in §§ 91.116(b)(3) and 121.651(c)(3). It should be noted, however, that even though only a part of the approach light system need be visible during descent below MDA or DH to 100' above the touchdown zone elevation, the requirements of § 91.116(c) regarding adequate flight visibility must also be met to continue an approach.

A question is raised regarding the intent of § 91.116(e)(1) as far as missed approaches are concerned. The commenter is uncertain as to the applicability of a rule in the case where visual references may be temporarily lost while below MDA or DH. The commenter asks whether the rule requires that a missed approach be conducted even though visual references reappear. The rule provides that any time the conditions of the rule are met, a missed approach is not required. During the time when the visual references are not available below MDA or DH, however, the pilot is expected to initiate a missed approach. When below MDA or DH, any deliberate delay in initiation of a missed approach in the hope that visual references will soon reappear, is not appropriate, such as in the case of deliberate descent through low cloud, scud, or fog in which the requirements of § 91.116(c) cannot be met. If the pilot uses normal procedures, however, and does not deliberately delay taking action to transit the intermittent condition, but still has not initiated the missed approach when the visual references reappear, a missed approach is not required.

Use of Person or Pilot

Some provisions of the rules are intended to refer only to a pilot because the rule can only be used by a pilot crewmember during flight, for example sighting visual references during a landing as specified in § 91.116(c). However, other provisions of the revised rules may apply to an operator or someone other than a pilot flight crewmember, for example § 91.6(g) concerning operations specifications. In an instance such as § 91.6(g), "operation of an aircraft" may apply to other persons as well as the pilot because other persons may also be responsible for correct application of a certificate holder's operations specifications. The revised rules provide for this situation by retaining the word "person" where someone other than the pilot of an aircraft may also be involved with application of the rules, and the rules use the term "pilot" where a rule clearly is intended for use by a pilot crewmember during flight.

The Amendments

Accordingly, the Federal Aviation Administration amends Parts 1, 91, and 121 of the Federal Aviation Regulations (14 CFR Parts 1, 91, and 121), as follows effective:

PART 1—DEFINITIONS AND ABBREVIATIONS

§ 1.1 [Amended]

1. By amending § 1.1 of Part 1 by adding a definition of "Category III Operations" immediately following the definition of "Category II Operations" as follows:

* * * * *

"Category III operations," with respect to the operation of aircraft, means an ILS approach to, and landing on, the runway of an airport using a Category III ILS instrument approach procedure issued by the Administrator or other appropriate authority.

* * * * *

PART 91—GENERAL OPERATING AND FLIGHT RULES

2. By revising § 91.6 to read as follows:

§ 91.6 Category II and III operations: general operating rules.

(a) No person may operate a civil aircraft in a Category II or Category III operation unless:

(1) The flightcrew of the aircraft consists of a pilot in command and a second in command who hold the appropriate authorizations and ratings prescribed in § 61.3 of this chapter;

(2) Each flight crewmember has adequate knowledge of, and familiarity with, the aircraft and the procedures to be used; and

(3) The instrument panel in front of the pilot who is controlling the aircraft has appropriate instrumentation for the type of flight control guidance system that is being used.

(b) Unless otherwise authorized by the Administrator, no person may operate a civil aircraft in a Category II or Category III operation unless each ground component required for that operation and the related airborne equipment is installed and operating.

(c) For the purpose of this section, when the approach procedure being used provides for and requires use of a DH, the authorized decision height is the DH prescribed by the approach procedure, the DH prescribed for the pilot in command, or the DH for which the aircraft is equipped, whichever is higher.

(d) Unless otherwise authorized by the Administrator, no pilot operating an aircraft in a Category II or Category III approach that provides and requires use of a DH may continue the approach below the authorized decision height unless the following conditions are met:

(1) The aircraft is in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers, and where that descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing.

(2) At least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:

(i) The approach light system, except that the pilot may not descend below 100 feet above the touchdown zone elevation using the approach lights as a reference unless the red terminating bars or the red side row bars are also distinctly visible and identifiable.

(ii) The threshold.

(iii) The threshold markings.

(iv) The threshold lights.

(v) The touchdown zone or touchdown zone markings.

(vi) The touchdown zone lights.

(e) Unless otherwise authorized by the Administrator, each pilot operating an aircraft shall immediately execute an appropriate missed approach whenever prior to touchdown the requirements of paragraph (d) of this section are not met.

(f) No person operating an aircraft using a Category III approach without decision height may land that aircraft except in accordance with the provisions of the letter of authorization issued by the Administrator.

(g) Paragraphs (a) through (f) of this section do not apply to operations conducted by the holders of certificates issued under Parts 121, 123, 125, 129, or 135 of this chapter. No person may operate a civil aircraft in a Category II or Category III operation conducted by the holder of a certificate issued under Parts 121, 123, 125, 129, or 135 of this chapter unless the operation is conducted in accordance with that certificate holder's operations specifications.

3. By revising § 91.116 to read as follows:

§ 91.116 Takeoff and landing under IFR.

(a) *Instrument approaches to civil airports.* Unless otherwise authorized by the Administrator for paragraphs (a) through (k) of this section, when an instrument letdown to a civil airport is necessary, each person operating an aircraft, except a military aircraft of the United States, shall use a standard instrument approach procedure prescribed for the airport in Part 97 of this chapter.

(b) *Authorized DH or MDA.* For the purpose of this section, when the approach procedure being used provides for and requires use of a DH or MDA, the authorized decision height or authorized minimum descent altitude is the DH or MDA prescribed by the approach procedure, the DH or MDA prescribed for the pilot in command, or the DH or MDA for which the aircraft is equipped, whichever is higher.

(c) *Operation below DH or MDA.* Where a DH or MDA is applicable, no pilot may operate an aircraft, except a military aircraft of the United States, at any airport below the authorized MDA or continue an approach below the authorized DH unless—

(1) The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers, and for operations conducted under Part 121 or Part 135 unless that descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing;

(2) The flight visibility is not less than the visibility prescribed in the standard instrument approach procedure being used;

(3) Except for a Category II or Category III approach where any necessary visual reference requirements are specified by the Administrator, at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:

(i) The approach light system, except that the pilot may not descend below 100 feet above the touchdown zone elevation using the approach lights as a reference unless the red terminating bars or the red side row bars are also distinctly visible and identifiable.

(ii) The threshold.

(iii) The threshold markings.

(iv) The threshold lights.

(v) The runway end identifier lights.

(vi) The visual approach slope indicator.

(vii) The touchdown zone or touchdown zone markings.

(viii) The touchdown zone lights.

(ix) The runway or runway markings.

(x) The runway lights; and

(4) When the aircraft is on a straight-in nonprecision approach procedure which incorporates a visual descent point, the aircraft has reached the visual descent point, except where the aircraft is not equipped for or capable of establishing that point or a descent to the runway cannot be made using normal procedures or rates of descent if descent is delayed until reaching that point.

(d) *Landing.* No pilot operating an aircraft, except a military aircraft of the United States, may land that aircraft when the flight visibility is less than the visibility prescribed in the standard instrument approach procedure being used.

(e) *Missed approach procedures.* Each pilot operating an aircraft, except a military aircraft of the United States, shall immediately execute an appropriate missed approach procedure when either of the following conditions exist:

(1) Whenever the requirements of paragraph (c) of this section are not met at either of the following times:

(i) When the aircraft is being operated below MDA; or

(ii) Upon arrival at the missed approach point, including a DH where a DH is specified and its use is required, and at any time after that until touchdown.

(2) Whenever an identifiable part of the airport is not distinctly visible to the pilot during a circling maneuver at or above MDA, unless the inability to see an identifiable part of the airport results only from a normal bank of the aircraft during the circling approach.

(f) *Civil airport takeoff minimums.* Unless otherwise authorized by the Administrator, no pilot operating an aircraft under Part 121, 123, 125, 129, or 135 of this chapter may take off from a civil airport under IFR unless weather conditions are at or above the weather minimums for IFR takeoff prescribed for that airport under Part 97 of this chapter. If takeoff minimums are not prescribed

under Part 97 of this chapter for a particular airport, the following minimums apply to takeoffs under IFR for aircraft operating under those parts:

(1) For aircraft having two engines or less—1 statute mile visibility.

(2) For aircraft having more than two engines—½ statute mile visibility.

(g) *Military airports.* Unless otherwise prescribed by the Administrator, each person operating a civil aircraft under IFR into or out of a military airport shall comply with the instrument approach procedures and the takeoff and landing minimums prescribed by the military authority having jurisdiction of that airport.

(h) *Comparable values of RVR and ground visibility.*

(1) Except for Category II or Category III minimums, if RVR minimums for takeoff or landing are prescribed in an instrument approach procedure, but RVR is not reported for the runway of intended operation, the RVR minimum shall be converted to ground visibility in accordance with the table in paragraph (h)(2) of this section and shall be the visibility minimum for takeoff or landing on that runway.

(2)

RVR (feet)	Visibility (statute miles)
1,600	¼
2,400	½
3,200	⅝
4,000	¾
4,500	⅞
5,000	1
6,000	1¼

(i) *Operations on unpublished routes and use of radar in instrument approach procedures.* When radar is approved at certain locations for ATC purposes, it may be used not only for surveillance and precision radar approaches, as applicable, but also may be used in conjunction with instrument approach procedures predicated on other types of radio navigational aids. Radar vectors may be authorized to provide course guidance through the segments of an approach procedure to the final approach course or fix. When operating on an unpublished route or while being radar vectored, the pilot, when an approach clearance is received, shall, in addition to complying with § 91.119, maintain the last altitude assigned to that pilot until the aircraft is established on a segment of a published route or instrument approach procedure unless a different altitude is assigned by ATC. After the aircraft is so established, published altitudes apply to descent within each succeeding route or approach segment unless a different altitude is assigned by ATC. Upon reaching the final approach course or fix, the pilot may either complete the instrument approach in accordance with a procedure approved for the facility or continue a surveillance or precision radar approach to a landing.

(j) *Limitation on procedure turns.* In the case of a radar vector to a final approach course or fix, a timed approach from a holding fix, or an approach for which the procedure specifies "No PT", no pilot may make a procedure turn unless cleared to do so by ATC.

(k) *ILS components.* The basic ground components of an ILS are the localizer, glide slope, outer marker, middle marker, and, when installed for use with Category II or Category III instrument approach procedures, an inner marker. A compass locator or precision radar may be substituted for the outer or middle marker. DME, VOR, or nondirectional beacon fixes authorized in the standard instrument approach procedure or surveillance radar may be substituted for the outer marker. Applicability of, and substitution for, the inner marker for Category II or III approaches is determined by the appropriate Part 97 approach procedure, letter of authorization, or operations specification pertinent to the operation.

4. By removing § 91.117 and marking it as follows:

§ 91.117 [Reserved]

PART 121—CERTIFICATION AND OPERATIONS: DOMESTIC, FLAG, AND SUPPLEMENTAL AIR CARRIERS AND COMMERCIAL OPERATORS OF LARGE AIRCRAFT

5. By revising § 121.651 to read as follows:

§ 121.651 Takeoff and landing weather minimums: IFR: all certificate holders.

(a) Notwithstanding any clearance from ATC, no pilot may begin a takeoff in an airplane under IFR when the weather conditions reported by the U.S. National Weather Service, a source approved by that Service, or a source approved by the Administrator, are less than those specified in—

(1) The certificate holder's operations specifications; or

(2) Parts 91 and 97 of this chapter, if the certificate holder's operations specifications do not specify takeoff minimums for the airport.

(b) Except as provided in paragraph (d) of this section, no pilot may continue an approach past the final approach fix, or where a final approach fix is not used, begin the final approach segment of an instrument approach procedure—

(1) At any airport, unless the U.S. National Weather Service, a source approved by that Service, or a source approved by the Administrator, issues a weather report for that airport; and

(2) At airports within the United States and its territories or at U.S. military airports, unless the latest weather report for that airport issued by the U.S. National Weather Service, a source approved by that Service, or a source approved by the Administrator, reports the visibility to be equal to or more than the visibility minimums prescribed for that procedure. For the purpose of this section, the term "U.S. military airports" means airports in foreign countries where flight operations are under the control of U.S. military authority.

(c) If a pilot has begun the final approach segment of an instrument approach procedure in accordance with paragraph (b) of this section and after that receives a later weather report indicating below-minimum conditions, the pilot may continue the approach to DH or MDA. Upon reaching DH or at MDA, and at any time before the missed approach point, the pilot may continue the approach below DH or MDA and touch down if—

(1) The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers, and where that descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing;

(2) The flight visibility is not less than the visibility prescribed in the standard instrument approach procedure being used;

(3) Except for Category II or Category III approaches where any necessary visual reference requirements are specified by authorization of the Administrator, at least one of the following visual references for the intended runway is distinctly visable and identifiable to the pilot:

(i) The approach light system, except that the pilot may not descend below 100 feet above the touchdown zone elevation using the approach lights as a reference unless the red terminating bars or the red side row bars are also distinctly visible and identifiable.

(ii) The threshold.

(iii) The threshold markings.

(iv) The threshold lights.

(v) The runway end identifier lights.
(vi) The visual approach slope indicator.
(vii) The touchdown zone or touchdown zone markings.
(viii) The touchdown zone lights.
(ix) The runway or runway markings.
(x) The runway lights; and

(4) When the aircraft is on a straight-in nonprecision approach procedure which incorporates a visual descent point, the aircraft has reached the visual descent point, except where the aircraft is not equipped for or capable of establishing that point, or a descent to the runway cannot be made using normal procedures or rates of descent if descent is delayed until reaching that point.

(d) A pilot may begin the final approach segment of an instrument approach procedure other than a Category II or Category III procedure at an airport when the visibility is less than the visibility minimums prescribed for that procedure if that airport is served by a operative ILS and an operative PAR, and both are used by the pilot. However, no pilot may operate an aircraft below the authorized MDA, or continue an approach below the authorized DH, unless—

(1) The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers and where such a descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing;

(2) The flight visibility is not less than the visibility prescribed in the standard instrument approach procedure being used; and

(3) Except for Category II or Category III approaches where any necessary visual reference requirements are specified by the authorization of the Administrator, at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:

(i) The approach light system, except that the pilot may not descend below 100 feet above the touchdown zone elevation using the approach lights as a reference unless the red terminating bars or the red side row bars are also distinctly visible and identifiable.
(ii) The threshold.
(iii) The threshold markings.
(iv) The threshold lights.
(v) The runway end identifier lights.
(vi) The visual approach slope indicator.
(vii) The touchdown zone or touchdown zone markings.
(viii) The touchdown zone lights.
(ix) The runway or runway markings.
(x) The runway lights.

(e) For the purpose of this section, the final approach segment begins at the final approach fix or facility precribed in the instrument approach procedure. When a final approach fix is not prescribed for a procedure that includes a procedure turn, the final approach segment begins at the point where the procedure turn is completed and the aircraft is established inbound toward the airport on the final approach course within the distance prescribed in the procedure.

(f) Unless otherwise authorized in the certificate holder's operations specifications, each pilot making an IFR takeoff, approach, or landing at a foreign airport shall comply with the applicable instrument approach procedures and weather minimums prescribed by the authority having jurisdiction over the airport.

6. By removing § 121.653 and marking it as follows:

§ 121.653 [Reserved]

(Sec. 307, 313(a), 501, 601, 601(a) and 604, Federal Aviation Act of 1958, as amended (49 U.S.C. 1348, 1354(a), 1401, 1421, 1421(a), and 1424); and sec. 6(c) of the Department of Transportation Act (49 U.S.C. 1655(c)))

Note.—The Federal Aviation Administration has determined that this document involves a regulation which is not significant under Executive Order 12044, as implemented by DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979). A copy of the evaluation prepared for this action is contained in the regulatory docket. A copy of it may be obtained by writing to the person identified under "For Further Information Contact:"

Note.—This rule is a final order of the Administrator as defined by the Federal Aviation Act of 1958, as amended. As such, it is subject to review only by the courts of appeals of the United States or the United States Court of Appeals for the District of Columbia.

Issued in Washington, D.C. on December 30, 1980.

Langhorne Bond,

Administrator.

[FR Doc. 81-459 Filed 1-7-81; 8:45 am]
BILLING CODE 4910-13-M