NOTICE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Air Traffic Organization Policy

N JO 7210.645

Effective Date:
February 26, 2007

Cancellation Date:
February 25, 2008

SUBJ: Operational Errors Severity and Proximity Events

1. PURPOSE. This Notice implements the separation conformance method of classifying operational error severity and creates a new category of operational error (OE) to identify and track the most minor of airborne OEs. This Notice implements other process changes approved by the Air Traffic Organization (ATO) Executive Council and the Air Traffic Safety Oversight Service (AOV). The ATO's Safety Services office provides policy interpretations concerning administration of this Notice.

2. DISTRIBUTION. This Notice is distributed to all Washington headquarters, William J. Hughes Technical Center, Mike Monroney Aeronautical Center, regions, and Air Traffic Organization offices including all air traffic field facilities.

3. ACTION. Facility managers and safety assurance personnel will ensure that all provisions of this Notice are implemented on 02/26/07. At the following terminal radar approach control (TRACON) facilities, Charlotte (CLT), Chicago (C90), Dallas-Fort Worth (D10), Miami (MIA), New York (N90), & Southern California (SCT) implement this concurrently with the cancellation of Performance Tolerance on Final Approach (PTFA) evaluation (next paragraph). All facilities are obligated to implement this Notice by the date listed above.

4. CANCELLATION. This Notice cancels N JO 7210.644, Change to FAA Order 7210.56C, Air Traffic Quality Assurance, dated 02/01/07, regarding the Performance Tolerance on Final Approach (PTFA) evaluation that commenced February 2006 at six TRACONs. GENOT 6/53, N 7210.638, Change to FAA Order 7210.56C, Air Traffic Quality Assurance, dated 09/29/06, remains in effect. The following lists the portions of the existing Order that are being changed:

a. Sections 1-1-1 through 1-1-5. These sections of the previous version of Order (7210.56C) are superseded by this Notice.

b. Section 5-1-1, paragraphs c, f, g, h. These sections of the previous version of Order (7210.56C) are superseded by this Notice.

c. Section 5-1-3. This section of the previous version of Order (7210.56C) is superseded by this Notice.

d. Section 5-1-5, paragraph c. This section of the previous version of Order (7210.56C) is superseded by this Notice.

e. Section 5-1-7. This section of the previous version of Order (7210.56C) is superseded by this Notice.

f. Section 5-1-8, paragraphs b, c, d. These sections of the previous version of Order (7210.56C) are superseded by this Notice.

g. Sections 5-1-13, paragraphs d, f, g. These sections of the previous version of Order (7210.56C) are superseded by this Notice.

h. Sections 5-1-15 and 5-1-16. These sections of the previous version of Order (7210.56C) are superseded by this Notice.

i. Sections 6-1-1 through 6-1-5. These sections of the previous version of Order (7210.56C) are superseded by this Notice.

5. DOCUMENT AVAILABILITY. This notice is available on the Directives Management Information System (DMIS) at http://dmis.faa.gov. Requirements and responsibilities contained in this order will be included in revisions to FAA Order 7210.56, Air Traffic Quality Assurance.

6. BACKGROUND. Recent safety analysis indicates the minor losses of airborne separation (≤ 10% of required separation) are not significant safety risks. An assessment of OEs at a major TRACON during 2005 and the Performance Tolerance on Final Approach (PTFA) during 2006 provide evidence that minor losses of airborne separation not involving wake turbulence criteria do not increase system safety risk. Minor losses of airborne separation are difficult to detect, and may often result from the conscious pressure to move traffic efficiently. The ATO is undertaking further studies of airborne separation to see if a tolerance envelope can be effectively applied to all separation minima and if some separation minima may be reduced under certain conditions. While studies of airborne separation are on-going, the changes described in this Notice are effective and will be incorporated in the next revision of FAA Order 7210.56.

7. DEFINITIONS.

a. Category A OE. A loss of airborne separation where the composite slant range retained is less than 34 percent.

b. Category B OE. A loss of airborne separation where the composite slant range retained is 34 or more percent, but not more than 75 percent.

c. Category C OE. A loss of airborne separation where the composite slant range retained is more than 75, but both the horizontal and vertical separation retained are less than 90 percent.

d. Closest Proximity. The point at which the minimum lateral separation existed between the aircraft, and the vertical separation associated with that point.

e. Composite Slant Range. The mathematical result when the percentage of horizontal separation retained and the percentage of vertical separation retained is combined to create a single number that best represents the resultant airborne separation.

f. Final Report. Refers to FAA Form 7210-3, “Final Operational Error/Deviation Report.”

g. Operational Deviation (OD). Refers to FAA Order 7210.56C, section 5-1-1.

h. Operational Error (OE). Refers to FAA Order 7210.56C, section 5-1-1.

i. Performance. Human proficiency including actions (or inactions) leading to, during, and after an OE/OD.

j. Performance Tolerance. A defined envelope of separation (feet or nautical miles) below the prescribed (non-wake) separation minima that accounts for small losses of separation without requiring removal of the individual(s) from the position involved, without requiring technical performance actions, and without requiring documentation being added to the Training & Proficiency Record.

k. Preliminary Report. Refers to FAA Form 7210-2, "Preliminary Operational Error/Deviation Report."

l. Proximity Event. An OE where 90 percent or greater separation is retained in either the horizontal or vertical plane, and does not include any violation of wake turbulence separation minima.

m. Training & Proficiency Record. The prescribed record for recording operational training and OEs where the individual employee is found contributory or at fault; (FAA Form 3120-1)

n. Regional Operations Center (ROC). One of nine communications center serving the FAA's local Regional offices and the ATO's Service Area and Service Center offices.

o. Separation loss. The amount of separation (feet or nautical miles) less than the prescribed separation minima.

p. Separation retained. The amount of separation remaining (feet or nautical miles) when the separation loss is subtracted from the prescribed separation minima.

q. Separation Conformance. Percentage of the separation maintained as a function of the separation required at the point of minimum separation when the aircraft begin to diverge or the point at which visual separation is assured (including a controller-issued clearance and pilot acceptance, as indicated by the readback).

r. Separation Conformance Index. Aggregate number that results from adding multiple composite slant range numbers together and dividing by the total number of (events) numbers used in the aggregate.

s. Service Area. Replaces regional Air Traffic Division (ATD) throughout the previous version of Order 7210.56C.

t. Severity. Refers to the A, B, C, and Proximity Event scale used to classify OEs; each category refers to a group of OEs with similar proximity outcomes; Category A refers to the most severe form of OE, and Proximity Event refers to the least severe form of OE.

u. Wake Event. An OE where one (leading) aircraft is presumed to generate a wake turbulence threat to other (following, crossing) aircraft and the prescribed wake turbulence separation minima is violated. **Category A Wake Event** - a loss of airborne separation where the horizontal retained with suspected wake turbulence is less than 70 percent. **Category B Wake Event** - a loss of airborne separation where the horizontal retained with suspected wake turbulence is equal to 70 or more percent, but not more than 85 percent. **Category C Wake Event** - a loss of airborne separation where the horizontal retained with suspected wake turbulence is equal to 85 or more percent.

v. Washington Operations Center (WOC). Communications center serving the FAA's Headquarters and key ATO offices.

8. SUSPECTED EVENTS. All losses of separation must be individually analyzed to determine the performance of the air traffic control system, and to determine the correct actions to take to ensure that the providing of air traffic services is both predictable and maintains the target level of safety. The closest proximity is the point at which the minimum lateral separation existed between the aircraft, and the vertical separation associated with that point.

NOTE-
1. *Maintaining an efficient and safe air traffic control system requires that all deficiencies (including losses of separation) in our system be identified for analysis and reporting. Losses of separation, even small losses such as Proximity Events, must be immediately reported to any available management official or controller-in-charge (CIC), even if not electronically detected. Proximity Events must be reported regardless of the probable cause.*

2. *To support the agency's initial determination as to whether an investigation is warranted, employees must verbally provide the preliminary information of which they have knowledge, when requested by the management official or CIC. This phase is meant only to determine the need for an investigation and is not investigatory.*

9. INITIAL INVESTIGATIONS.

a. The initial investigation should be fact finding in nature. It determines what occurred in the system, ensures corrective action is initiated to maintain system integrity, and provides for appropriate reporting.

NOTE-
There are occasions when higher levels of management may require further review of a suspected incident, and this further review may result in the discovery of an incident not previously identified.

b. The management official, or the CIC when a management official is not available, must determine the validity of suspected OE/OD and, if valid must ensure the following items are accomplished.

NOTE-
Other facility personnel must help the management official and/or CIC gather data to conduct the initial investigation, when possible.

c. When information indicates that an OE/OD may have occurred in another facility, advise that facility's management official or CIC immediately, and proceed in accordance with section 4-1-2 of Order 7210.56C.

d. When preliminary review indicates that wake turbulence separation did not apply to an airborne loss of separation and at least 90% of the required vertical or lateral separation was maintained, consider the event to be a Proximity Event. An employee may be withheld from performing operational duties while the separation maintained during the event is being verified.

NOTE-
Minimize the operational disruptions for any investigations of Proximity Events.

e. If the preliminary review indicates that wake turbulence separation did not apply to an airborne loss of separation and less than 90% of the required vertical or lateral separation was maintained, the investigation must proceed in accordance with section 5-1-3 of Order 7210.56C.

NOTE-
1. *Involved employees participating in suspected OE/OD investigations may need to remain in the facility beyond their scheduled shifts to complete their statements, be interviewed, and participate in the initial investigations.*

2. *Removal from operational duties, pending determination that an OE/OD has occurred, does not constitute decertification and may be warranted in order for the management team to determine the proper actions to take.*

10. INVESTIGATING AN AIRBORNE LOSS OF SEPARATION. If at any time the investigation of a loss of separation reveals that an operational error/deviation actually occurred, process that incident in accordance with Chapter 5 of FAA Order 7210.56C and the following changes. Ensure that investigations are conducted in accordance with any negotiated agreements between the FAA and pertinent labor organizations.

a. If the review of radar data cannot occur immediately following a suspected OE/OD, record the incident, and report the incident using estimated separation distance, (FAA Form 7210-2, block 7) until such time a review of radar data can occur.

b. Review available radar data (see Appendix 1, Radar Data Processing, FAA Order 7210.56C), flight strips, and appropriate computer data. Many new systems retain data on their individual hard drives. These data are generally deleted from the hard drives after 15 days or 45 days. The Manager or designee is responsible for advising Technical Operations, Field Automation Support, or the Operational Support Facility, as appropriate, in a timely manner so that they can extract these data onto a storable/retainable electronic medium.

NOTE-
1. *For Controller-Pilot Data Link Communications (CPDLC) systems, data reduction and analysis tool printouts will indicate a chronological sequence of textual CPDLC transactions. Individual CPDLC messages are stored in the Data Link Applications Processor temporary file as a binary encoded message and can be printed out in a text format for review.*

2. *Requests for User Request Evaluation Tool (URET) and Display System Replacement (DSR) data should be made through the DSR/URET Helpdesk at 800-377-0308.*

c. Facilities must compare the accuracy of the Automated Radar Terminal System (ARTS) clock with its time source and also compare the voice recorder equipment clock with the ARTS clock. These findings must be noted on FAA Form 7230-4. Facilities using both Digital Voice Recorder System (DVRS) and Standard Terminal Automation Replacement System (STARS) do not need to make a comparison; instead, they must enter "DVRS/STARS Facility" on FAA Form 7230-4 along with the incident entry.

d. Review voice recordings as soon as feasible.

(1) Two certified re-recordings, one marked "Original" and the other marked "Copy," must be made from the original voice recording and must include the audible time channel. Facilities must retain both recordings in the OE file. These recordings must be certified and labeled in accordance with FAA Order 8020.16. Cassette tapes, digital file (e.g. WAV), and computer diskette are suitable media. Include all communications for a period of five minutes before initial contact to five minutes after the last contact with each position involved in the OE.

(2) If the above period exceeds 30 minutes, the Director of Operations at the Service Area may approve, with Safety Services Investigations & Evaluations concurrence, limiting the recording to that period pertinent to the specific OE incident.

e. Conduct an interview with the employee(s) to obtain insight they may have into the event for all category A, B, or C events. Employee interviews following a Proximity Event are at the discretion of the facility. To provide the most complete report, complete interviews prior to Safety Services Investigations & Evaluations notification, if possible.

f. Notify the Air Traffic Manager of the OE.

g. When the preliminary OE investigation indicates that another facility is involved in the occurrence, confer with the other Manager(s) as soon as feasible to determine the scope of the other facility's investigative effort and how long it will take.

h. The Manager of any other involved facility must provide the reporting facility with information and assistance as required. This may require an investigation on the same scale as that performed by the reporting facility, in which case the Manager must have the same responsibilities, as defined in paragraph 9 of this Notice, Initial Investigations. The Manager of any other involved facility must also retain all pertinent original data.

i. If the event involves multiple facilities and they cannot agree on which facility has the primary responsibility, all involved facilities must complete FAA Form 7210-2 within the required notification period, and request relief from an official above them in the organization (e.g. hub, Service Area, Service Unit, and/or Safety Services).

j. Ensure that FAA Form 7210-2, Preliminary Operational Error/Deviation Investigation, is completed.

NOTE-
Appendix 2 of Order 7210.56C contains instructions for completing FAA Form 7210-2. FAA Form 7210-2 must include pertinent actions of the pilot(s) and air traffic services leading up to the event and any subsequent action. When writing the summary, be as clear and concise as possible using who, what, when, where, *and* how *to describe the entire event.* ***For Proximity Events, items E and F in Block 13 are <u>not</u> required.***

k. Notify Safety Services Investigations & Evaluations and the Service Area through the ROC/WOC within four hours of the time the OE/OD occurrence is first reported or suspected. The management official or CIC must notify the ROC via telephone for Category A, B, and C OE events, and fax the following information and data to the ROC for transmittal to Safety Services Investigations & Evaluations for Proximity Events and ODs:

(1) A completed FAA Form 7210-2

(2) (En Route <u>only</u>) A reduced copy of the ESAT and NTAP plots with LST 5 text data

(3) (Terminal <u>only</u>) A copy of the CDR plot with the associated separation data

NOTE-
1. *Verification that the fax transmission has been received by the ROC constitutes the required notification for Proximity Events. A call-in may be required for Proximity Events where the loss of separation constitutes a significant event, i.e., involves a member of the Congress or the media, involves Presidential Aircraft, may generate significant media interest, or is requested by Safety Services Investigations & Evaluations.*

2. *The time limit should not prevent the preliminary investigation from continuing. Instead, it ensures that Safety Services Investigations & Evaluations are aware of reported or suspected events within a reasonable time. If unable to meet the four-hour requirement, the management official or CIC must request an extension from Safety Services Investigations & Evaluations prior to the requested reporting time-limit.*

l. Suspected equipment or automation anomalies that may be contributory must be immediately reported to Technical Operations, Field Automation Support, or the Operational Support Facility, as appropriate, and investigated thoroughly. If an equipment or automation anomaly from another facility is suspected, advise a management official at the other facility immediately. Document the notification on FAA Form 7230-4.

m. If the preliminary investigation reveals that certain employees first believed to be involved in the OE/OD were not involved, no further action is required. If these employees have knowledge of the events, obtain their views and recommendations.

NOTE-
Areas for improvement or performance deficiencies must be addressed even though the event is classified as a Proximity Event.

n. Continuous Data Recording (CDR) is the most common event record used to determine proximity. Safety Services expects CDR and audio records as soon as feasible after every OE other than Proximity Events. In addition, En Route facilities will prepare a SATORI, with voice, and capable Terminal facilities will prepare a RAPTOR and digital voice recording with the time channel as soon as feasible after every OE. CDR, SATORI, RAPTOR, and digital voice recordings may be required for Proximity Events where the loss of separation constitutes a significant event, i.e., involves a member of the Congress or the media, involves Presidential Aircraft, may generate significant media interest, or is requested by Safety Services Investigations & Evaluations.

o. When the initial investigation results in a determination of a non-occurrence, retain all data used in the investigation process (e.g., pilot/specialist statements, records of conversations, ESAT plots, and CDR plots in an approved electronic format), as well as any other pertinent data not otherwise required to be retained, for 45 days after the date of the determination. Facilities that determine the event was a non-occurrence based on a printed ESAT, NTAP, or CDR plot must retain both the original paper printout and an electronic copy.

11. FOLLOW-UP ACTIONS.

a. If the reporting Manager and the other Manager(s) cannot concur in any phase of their respective investigations, the Managers must report their differences to the Service Area for a resolution within 5 business days. If 5 business days have passed since the issue was elevated to the Service Area(s) and a decision cannot be reached with the other Service Area(s), forward all investigative data to the Service Unit(s) for review and resolution. If 5 business days have passed since the incident was elevated to the Service Unit(s) and the Service Unit(s) can not reach a decision forward all data to Safety Services for resolution.

b. Equipment or automation anomalies that are listed as contributory require Technical Operations, Field Automation Support, or Operational Support Facility analysis. For each such anomaly, they must provide a description of the normal functionality and a description of the degraded condition/state associated with the anomaly.

c. Based on the information gathered during the investigation, the following actions may be taken in response to any OE/OD or Proximity Event:

(1) If technical performance areas requiring enhancement are identified, develop and implement a skill enhancement training plan in accordance with FAA Order 3120.4, and include appropriate performance information in the Technical Training Discussion (TTD).

(2) If technical performance areas indicate deficiencies, develop and implement a remedial training plan in accordance with FAA Order 3120.4, and include appropriate performance information in the Technical Training Discussion (TTD).

d. Based on the information gathered during the investigation, the employee may continue operational duties with no follow-up actions in response to a Proximity Event.

NOTE-
As mentioned in this Notice, there is not a requirement to place any Proximity Event information in the employee's Training and Proficiency Record, FAA Form 3120-1.

e. Service Units and Service Area offices will establish follow-up mechanisms to determine if corrective actions contained in FAA Forms 7210-3 are effective and are accomplished in a timely manner. All corrective actions shall specify a completion deadline.

12. RECLASSIFICATION.

a. After preliminary notification procedures are completed, a review of the data may indicate a reclassification of the incident to one of the following:

(1) A pilot deviation.

(2) Military facility deviation.

(3) An OD (from an OE).

(4) An OE (from an OD).

(5) A non-occurrence.

b. If a reclassification is determined to be appropriate, the Manager must:

(1) Complete FAA Form 7210-5, Operational Error/Deviation Reclassification Report.

NOTE-
If an incident is reclassified from an OE to an OD, or an OD to an OE, reclassify the original incident to a "Non-occurrence," and indicate the new report number in the supporting documentation.

(2) Forward FAA Form 7210-5, along with the rationale and all necessary supporting documentation, including voice tapes and radar data, to the Service Area for review no later than 45 days from the date of the initial report.

c. The Service Area must thoroughly review all requests for reclassification for completeness of data and validity. They must forward the requests they believe have merit to the Service Unit no later than 60 days from the date of the initial report.

d. The Service Unit must thoroughly review all forwarded requests for reclassification. They must forward the requests they believe have merit to Safety Services Investigations & Evaluations no later than 75 days from the date of the initial report.

e. Safety Services Investigations & Evaluations must review the forwarded requests for reclassification and determine whether the requests should be granted. Safety Services Investigations & Evaluations must advise the Service Unit via memorandum of the disposition of the FAA Form 7210-5 no later than 90 days from the date of the initial report.

f. Facilities must retain all original forms and all supporting investigative data for 2 ½ years.

13. MULTIPLE LOSSES OF SEPARATION OR MULTIPLE DEVIATIONS DURING A SINGLE EVENT.

a. During a single event in which multiple OE/ODs reported and/or discovered and are determined to be the result of employee actions or inaction, each OE/OD must be reported individually by completing a separate FAA Form 7210-2. Each form should describe the individual OE/OD, including a reference, if necessary for clarity, to the other related incidents.

b. When an OE/OD occurs, and the reaction to that event creates a chain reaction of additional OEs or ODs, the multiple OEs or multiple ODs will be considered as a single event only for return to operational duty purposes, performance skill checks, and training actions or plans, and entries in FAA Order 3120-1.

14. FINAL REPORTS.

a. For Proximity Events, the information contained on FAA Form 7210-2 constitutes the final report. If the investigation has revealed information that differs from that which was initially reported, an amended FAA Form 7210-2 must be prepared.

b. When an employee of another facility is involved in an OE, ensure that the employee's first level supervisor, through that facility's Manager, is given sufficient documentation to determine the appropriate corrective action.

c. Retain the original report in the facility files.

d. Establish a follow-up method to evaluate the effectiveness of the local recommendations and actions that result from the investigation.

e. Send copies of the completed FAA Form 7210-2 to Technical Operations, Field Automation Support, or the Operational Support Facility for any Proximity Event where equipment or automation is found to be contributory.

f. Service Areas must work closely with other Service Areas when an OE involves facilities in different Service Areas and the respective Managers cannot concur in any phase of their investigations. If 5 business days have passed since the incident and a decision cannot be reached with the other Service Areas, forward all investigative data to the Service Unit for review and resolution. If 5 business days have passed since the incident was elevated and the Service Units can not reach a decision forward all data to Safety Services for resolution. Retain all recordings, data, and documentation pertaining to the incident until Safety Services reaches a decision.

15. ENTRIES IN TRAINING AND PROFICIENCY RECORD (FAA Form 3120-1).

a. When an employees' performance has been determined to contribute to an OE/OD other than a Proximity Event, the following shall be entered into the employees' FAA Form 3120-1:

(1) The causal factors as determined by the ATM shall be fully transcribed and endorsed by the employees' first-line supervisor on a separate page in Section VI. This page shall be used for any further reference to the OE/OD and shall indicate the facility's name, the OE/OD report number, and the removal date for the page.

(2) Any associated training, remedial and/or skill enhancement shall be logged, in accordance with FAA Order 3120.4, without reference to the OE/OD.

(3) Any associated position performance skill checks, including all follow-up performance skill checks (e.g., 30-day) shall be logged in accordance with FAA Order 3120.4, without reference to the OE.

(4) Any associated recertification shall be logged, in accordance with FAA Order 3120.4, without reference to the OE.

b. When an employee has been determined to be primary or contributory to a Proximity Event, Section 5-1-14 of Order 7210.56C does not apply, and the first level supervisor must enter the following onto the employee's FAA Form 3120-1:

(1) Any associated training, remediation, and/or skill enhancement, in accordance with FAA Order 3120.4, without reference to the Proximity Event.

(2) Any associated position performance skill checks, including all follow-up performance skill checks (e.g., 30-day), in accordance with FAA Order 3120.4, without reference to the Proximity Event.

(3) Any associated recertification, in accordance with FAA Order 3120.4, without reference to the Proximity Event.

16. DOCUMENTATION RETENTION.

The reporting facility must:

a. Retain the OE/OD investigation file for 2 ½ years from the date of the occurrence.

b. Ensure that the OE investigation file (for A, B, and C categories) is identified by a label (maximum size three × five inches) clearly marked with "OPERATIONAL ERROR," the report number, the incident local date and time, and the local date to be destroyed for all OEs that are not Proximity Events.

c. Ensure that the Proximity Event investigation file is identified by a label (maximum size three × five inches) clearly marked with "PROXIMITY EVENT," the report number, the incident local date and time, and the local date to be destroyed.

d. Ensure that the OD investigation file is identified by a label (maximum size three × five inches) clearly marked with "OPERATIONAL DEVIATION," the report number, the incident local date and time, and the local date to be destroyed.

e. Ensure that the investigation file contains, at a minimum, the original FAA Forms 7210-2; the original FAA Form 7210-3 (if appropriate); signed employee personnel statements and/or any similar supporting documents; the two certified re-recordings marked "Original" and "Copy" in accordance with section 5-1-4f of FAA Order 7210.56C; and all supporting documentation such as the original ESAT, NTAP, Data Analysis and Reduction Tool (DART), or CDR plot (in both printed format and an approved electronic medium).

NOTE-
A facility may elect to store the supporting data on a floppy disk or other portable electronic medium.



Lyle A. Mello
Acting Vice President, Safety Services
Air Traffic Organization

Figure 1: Non-Wake Separation Conformance Categorization

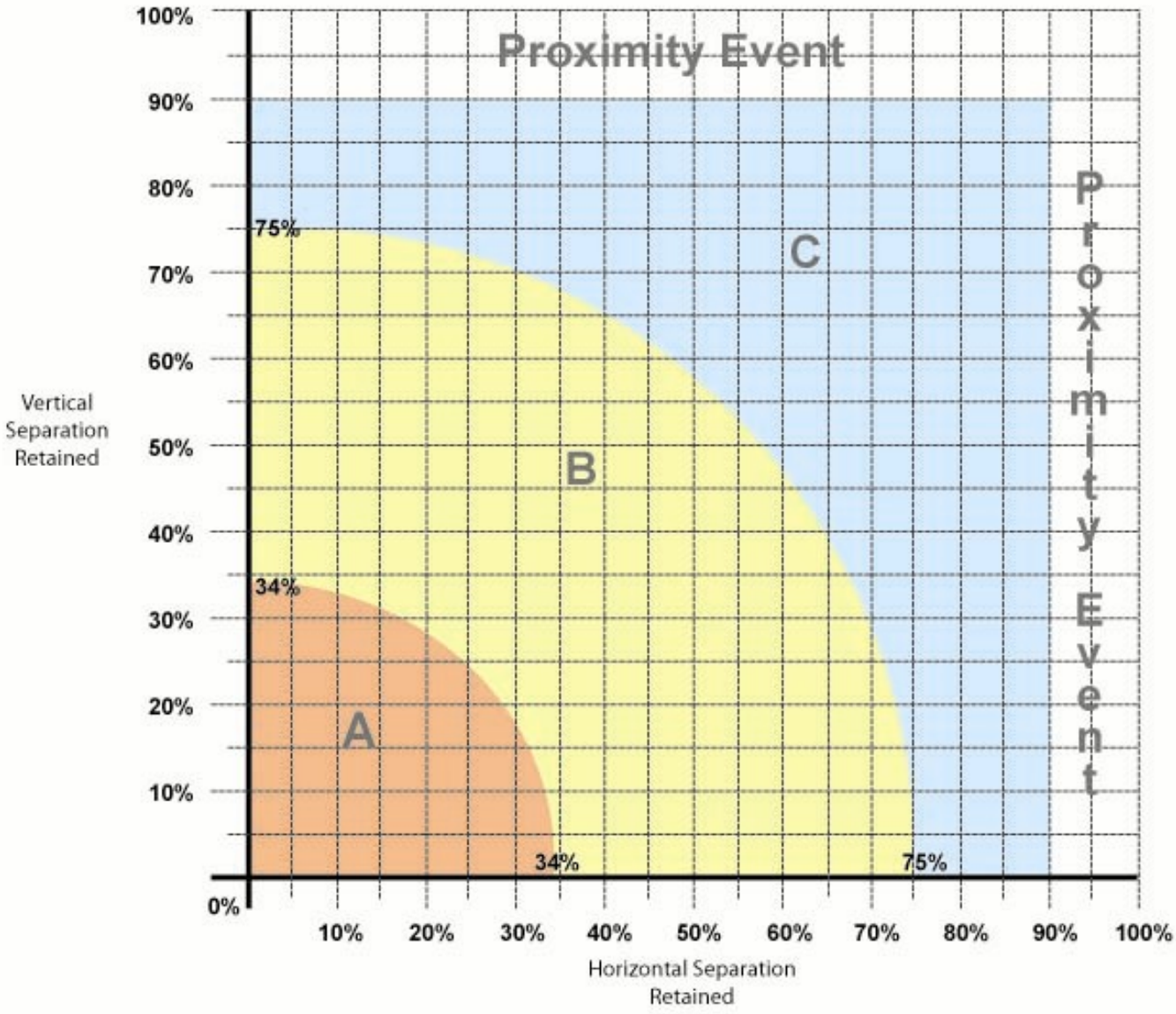
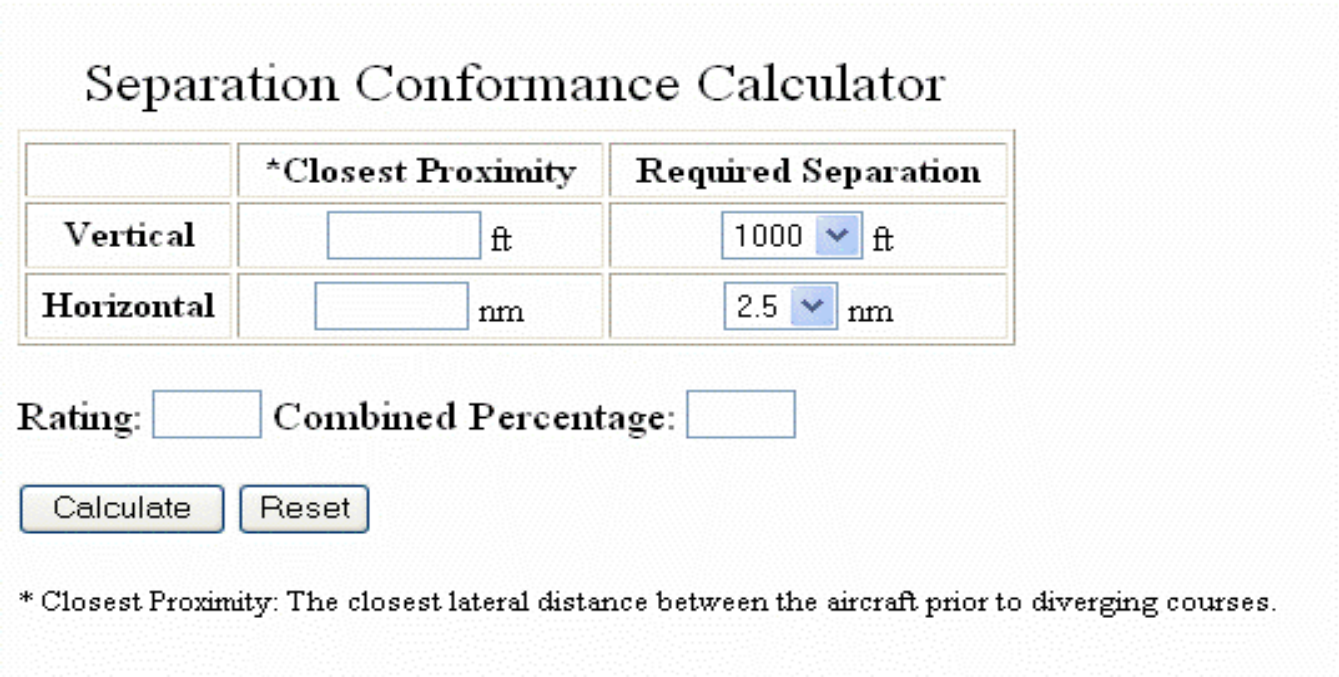


Figure 2: Non-Wake Separation Conformance Classification Tool



This tool is available at the following FAA intranet site:

http://atqa.faa.gov

Severity Categorization Tables

The Severity Category for non-wake events may be determined by reference to the measured remaining vertical and horizontal separation. The following tables provide the Severity Categories based on remaining separation for the 2.5 NM/1000 ft. , 3 NM/1000 ft., 5 NM/1000 ft., and 5 NM/2000 ft. (RVSM) separation requirements, respectively:

a. 2.5 NM separation, 1000 foot minima, non-wake:

	Vertical									
Lateral	**0 feet**	**100 ft**	**200 ft**	**300 ft**	**400 ft**	**500 ft**	**600 ft**	**700 ft**	**800 ft**	**900 ft**
2.49-2.25 NM	**PE**	**PE**	**PE**	**PE**	**PE**	**PE**	**PE**	**PE**	**PE**	**PE**
2.24-1.88 NM	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**PE**
1.87-1.86 NM	**B**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**PE**
1.85-1.81 NM	**B**	**B**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**PE**
1.80-1.72 NM	**B**	**B**	**B**	**C**	**C**	**C**	**C**	**C**	**C**	**PE**
1.71-1.59 NM	**B**	**B**	**B**	**B**	**C**	**C**	**C**	**C**	**C**	**PE**
1.58-1.40 NM	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**C**	**C**	**PE**
1.39-1.13 NM	**B**	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**C**	**PE**
1.12-0.82 NM	**A**	**B**	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**PE**
0.81-0.68 NM	**A**	**A**	**B**	**B**	**B**	**B**	**B**	**C**	**C**	**PE**
0.67-0.41 NM	**A**	**A**	**A**	**B**	**B**	**B**	**B**	**B**	**C**	**PE**
0.40-0.00 NM	**A**	**A**	**A**	**A**	**B**	**B**	**B**	**B**	**C**	**PE**

b. 3 NM separation, 1000 foot minima, non-wake:

Lateral	Vertical									
	0 feet	100 ft	200 ft	300 ft	400 ft	500 ft	600 ft	700 ft	800 ft	900 ft
2.99-2.70 NM	PE	PE	PE	PE	PE	PE	PE	PE	PE	PE
2.69-2.26 NM	C	C	C	C	C	C	C	C	C	PE
2.25-2.20 NM	B	C	C	C	C	C	C	C	C	PE
2.19-2.10 NM	B	B	C	C	C	C	C	C	C	PE
2.09-2.00 NM	B	B	B	C	C	C	C	C	C	PE
1.99-1.90 NM	B	B	B	B	C	C	C	C	C	PE
1.89-1.10 NM	B	B	B	B	B	C	C	C	C	PE
1.09-1.02 NM	B	B	B	B	B	B	B	C	C	PE
1.01-0.90 NM	A	B	B	B	B	B	B	C	C	PE
0.89-0.80 NM	A	A	B	B	B	B	B	C	C	PE
0.79-0.40 NM	A	A	A	B	B	B	B	B	C	PE
0.39-0.00 NM	A	A	A	A	B	B	B	B	C	PE

c. 5 NM separation, 1000 foot minima, non-wake:

Lateral	Vertical									
	0 feet	100 ft	200 ft	300 ft	400 ft	500 ft	600 ft	700 ft	800 ft	900 ft
4.99-4.50 NM	PE	PE	PE	PE	PE	PE	PE	PE	PE	PE
4.49-3.76 NM	C	C	C	C	C	C	C	C	C	PE
3.75-3.67 NM	B	C	C	C	C	C	C	C	C	PE
3.66-3.50 NM	B	B	C	C	C	C	C	C	C	PE
3.49-3.33 NM	B	B	B	C	C	C	C	C	C	PE
3.32-3.17 NM	B	B	B	B	C	C	C	C	C	PE
3.16-1.83 NM	B	B	B	B	B	C	C	C	C	PE
1.82-1.70 NM	B	B	B	B	B	B	C	C	C	PE
1.69-1.50 NM	A	B	B	B	B	B	B	C	C	PE
1.49-1.33 NM	A	A	B	B	B	B	B	C	C	PE
1.32-0.67 NM	A	A	A	B	B	B	B	B	C	PE
0.66-0.00 NM	A	A	A	A	B	B	B	B	C	PE

d. 5 NM separation, 2000 foot (RVSM airspace) minima, non-wake:

Lateral	Vertical 0 feet	100 ft	200 ft	300 ft	400 ft	500 ft	600 ft	700 ft	800 ft	900 ft
4.99-4.50 NM	PE	PE	PE	PE	PE	PE	PE	PE	PE	PE
4.49-3.76 NM	C	C	C	C	C	C	C	C	C	C
3.75 NM	B	C	C	C	C	C	C	C	C	C
3.74-3.71 NM	B	B	C	C	C	C	C	C	C	C
3.71-3.68 NM	B	B	B	C	C	C	C	C	C	C
3.67-3.62 NM	B	B	B	B	C	C	C	C	C	C
3.61-3.54 NM	B	B	B	B	B	C	C	C	C	C
3.53-3.44 NM	B	B	B	B	B	B	C	C	C	C
3.43-3.32 NM	B	B	B	B	B	B	B	C	C	C
3.32-3.18 NM	B	B	B	B	B	B	B	B	C	C
3.17-3.01 NM	B	B	B	B	B	B	B	B	B	C
3.00-1.70 NM	B	B	B	B	B	B	B	B	B	B
1.69-1.68 NM	A	A	B	B	B	B	B	B	B	B
1.67-1.62 NM	A	A	A	B	B	B	B	B	B	B
1.61-1.53 NM	A	A	A	A	B	B	B	B	B	B
1.52-1.37 NM	A	A	A	A	A	B	B	B	B	B
1.36-1.15 NM	A	A	A	A	A	A	B	B	B	B
1.14-0.80 NM	A	A	A	A	A	A	A	B	B	B
0.79-0.00 NM	A	A	A	A	A	A	A	B	B	B

Lateral	Vertical 1000 feet	1100 Feet	1200 feet	1300 feet	1400 feet	1500 feet	1600 feet	1700 feet	1800 feet	1900 feet
4.99-4.50 NM	PE	PE	PE	PE	PE	PE	PE	PE	PE	PE
4.49-2.80 NM	C	C	C	C	C	C	C	C	PE	PE
2.79-2.55 NM	B	C	C	C	C	C	C	C	PE	PE
2.54-2.26 NM	B	B	B	C	C	C	C	C	PE	PE
2.25-1.88 NM	B	B	B	B	C	C	C	C	PE	PE
1.87-1.35 NM	B	B	B	B	C	C	C	C	PE	PE
1.34-0.05 NM	B	B	B	B	B	C	C	C	PE	PE
0.04-0.00 NM	B	B	B	B	B	B	C	C	PE	PE

The Severity Category for wake turbulence events may be determined by reference to the measured horizontal separation only:

4 NM Horizontal

C equals	**3.99 - 3.40 NM**
B equals	**3.39 - 2.80 NM**
A equals	**≤ 2.79 NM**

5 NM Horizontal

C equals	**4.99 - 4.25 NM**
B equals	**4.24 - 3.50 NM**
A equals	**≤ 3.49 NM**

6 NM Horizontal

C equals	**5.99 - 5.10 NM**
B equals	**5.09 – 4.20 NM**
A equals	**≤ 4.19 NM**