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NBAA

AIRPORT RUNWAY OBSTACLE ANALYSIS & FAA INFO 23009 COMPLIANCE

A GUIDE FOR PART 135 OPERATORS

Compiled by the NBAA Domestic Operations Committee

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PART 135 OPERATOR USE OF AIRPORT RUNWAY OBSTACLE ANALYSIS PRODUCTS – FAA INFO 23009

CONSIDERATIONS FOR THE PART 135 OPERATOR

Do you truly understand your third-party airport runway obstacle analysis software and how this must be approved in your OpSpec, incorporated into company manuals, standard operating procedures, annual training events, and most importantly, into every single takeoff and landing your pilots conduct?

This includes dedicated pre-flight briefings, aircraft-specific avionic setup procedures and how these alternate "engine failure escape procedures," also known in some software as "departure procedures" (DPs), should be flown precisely as described, including the ever-changing engine failure level-off altitudes, speeds and headings.

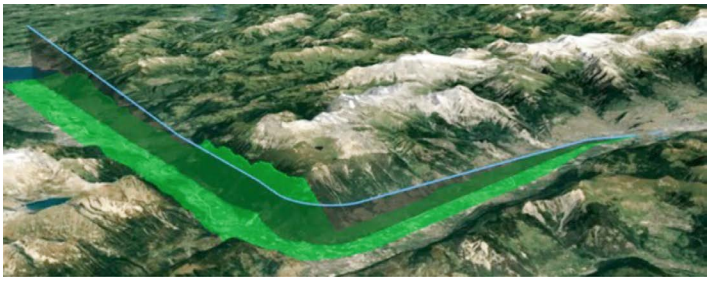
If the answer is no to any one of the above, the safety of the aircraft and passengers might be at risk, and you run the risk of an incident – and worse – a possible controlled flight into terrain (CFIT) event.

While runway obstacle analysis products are mostly used by pilots for everyday calculation of takeoff and landing distances, these programs are primarily concerned with takeoff performance after losing an engine and what protections, if any, are provided for that aircraft under the ambient conditions that exist at that time. Using Original Equipment Manufacturer (OEM) built-in performance software in aircraft flight management systems (FMS) presents the danger that these might not use One Engine Inoperative (OEI) performance figures and may not be AC120-91 compliant. Under these circumstances, there may be an inherent risk when relying on such performance figures.

The Federal Aviation Administration (FAA) InFO 23009 that was published in October 2023 reminds Part 135 operators of large turbine engine powered, transport category airplanes and commuter category airplanes about the need to comply with 14 CFR Part 135, Subpart I, Airplane Performance Operating Limitations with respect to net takeoff flight path obstacle clearance following an engine failure on takeoff. This is further highlighted under FAR 135.367, 135.379, 135.381, 135.398, AIM 5-4-21, and other associated Part 135 OEI requirements. Acceptable means to meet this approval is described in AC 120-91(A), Airport Obstacle Analysis specifically relating to OEI emergencies.

Advisory Circular (AC) 120-91(A), provides acceptable criteria for use in determining the safe vertical and lateral clearance from obstacles, when developing takeoff and initial climb out airport obstacle analyses and engine out obstacle avoidance procedures to comply with the intent of these regulatory requirements. Pilots departing an airport under IFR and operating under Part 135 are required by 14 CFR 91.175(f)(4) to use an engine-inoperative takeoff obstacle clearance or avoidance procedure that assures compliance with the obstacle clearance requirements (Subpart I) of these rules.

InFO 23009 continues by stating that the runway airport obstacle analysis products are not an alternate means of compliance with climb gradients published in instrument flight procedures, e.g., Standard Instrument Departures (SIDs) or Obstacle Departure Procedures (ODPs), instrument approach procedures, etc., which are all based on Terminal Instrument Procedures (TERPS) criteria for normal, ALL-engines-operating airplane performance. It is imperative for the operator, their dispatchers and pilots to clearly understand:



An example of a single engine escape procedure flight path (Courtesy APG).

1. Manufacturers FAR 23, FAR 25 airworthiness requirements are purely certification standards, which are not operationally relevant: (https://www.faa.gov/aircraft/air_cert/airworthiness_certification/std_awcert/std_awcert_regs/regs); and

2. TERPS, as i.e. displayed on our instrument approach charts, are not aircraft specific, and ONLY apply when all engines are operating. (https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/1042118; and

3. OEI airport obstacle analysis as described in AC120-91, and the subject of this guide, contain operational considerations for Part 135 operators operating aircraft with more than one engine to avoid CFIT after losing an engine: (https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1037135)

These three subjects are wholly independent topics and should be studied individually to be better understood by all operators and pilots, as confusion and misunderstandings are rife.

This InFO further alerts operators of the need to have appropriate authorization in their OpSpec to use third party airport runway obstacle analysis products furnished by contractors or developed in house by the operator.

Operators are required to describe these analysis and OEI procedures in their General Operations Manual (GOM), operator training manuals, training curricula and Standard Operating Procedures (SOP). Their approved ground, flight and/or simulator training programs must also incorporate the use of these procedures.

As part of the authorization, operators must establish checklists and procedures for addressing an engine failure on takeoff, including the use of an airport runway obstacle analysis along with the use of one-engine-inoperative (OEI) special procedures for the takeoff runway and upon which limiting takeoff weights are based.

Lastly, and perhaps most importantly, operators must ensure that flight crews understand their runway obstacle analysis products, any limitations these might have and how the pilot's pre-takeoff briefing and flight deck should be set up for such single engine escape procedures.

This guide was created to assist operators and pilots to abide by InFO 23009 and the relevant regulations referenced therein, as well as to assist Part 135 operators in their preparation in obtaining A009 OpSpec authorization for runway airport obstacle analysis products. Listed herein are items for consideration for inclusion in the operator's GOM, training programs and SOPs.

This guide should also assist the operator in understanding the limitations their approved training provider might have regarding the operator's approved Part 135 training program, and what may be necessary to meet the requirements of InFO 23009 and FAA Notice 8900.664.

It should also provide you with the information you need to be able to understand, implement and guide your operations to compliance.

The considerations herein are specific and limited to the requirements identified in InFO 23009 and Notice 8900.664. Additional items related to other CFRs, aircraft operating requirements or the operator's SOPs specific to other areas of the operation may be added/included, as appropriate.

STEP 1 – OPSPEC A009 AUTHORIZATION

FAA order 8900.1 Volume 3, Chapter 18, Section 3 (OpSpec guidance) states that aeronautical data is required to determine aircraft performance capability at each airport, and continues by stating that airport aeronautical data includes, but is not limited to:

- Aeronautical charts (including navigational enroute, terminal area and instrument approach procedure charts).
- Airport and runway analysis.
- Chart supplement information.
- Aeronautical Information Publication (AIP) for foreign airports; and
- Notices to Air Missions (NOTAM).

This section continues by stating: "Part 135 does not require the data to be FAA approved. However, certificate holders (CHs) use, and system of distribution of airport aeronautical data, including the name of the contractor(s) providing the airport and runway analysis, must be authorized in OpSpec A009."

Operators are therefore required to have their aeronautical data, including airport runway obstacle analysis products, added to OpSpec A009.

The contractor-provided airport and runway analysis software market has grown significantly in recent years, and it is important for operators to be reminded of the importance of selecting software that meets AC120-91A. Airport and runway analysis may be provided directly, or through their flight plan service providers, however it is suggested that operators obtain a statement of compliance with AC 120-91A from the contractor or seek alternative approval from the FAA AFS headquarters for the use of the contract's product.

If an operator develops these procedures "in-house," the product must meet the above criteria and be acceptable to the FAA.

The operator also must ensure that other methods for completing the airport runway obstacle analysis not approved by the operator's A009 authorization are either excluded from the contractor's provided training, or that the contractor ensures that the operator's pilots attending training are informed that those methods are not applicable to their operation and training.

Refer to AC 120-91A for detailed guidance and contact your Principal Operations Inspectors (POIs) with any questions.

Once you have the operational approval to use this software, updating all your written procedures is an important next step.

References:

FAA 8900.1 VOLUME 3, CHAPTER 18, SECTION 3

AC120-91A

STEP 2 – UPDATE COMPANY DOCUMENTATION INCLUDING GOM, TRAINING CURRICULA AND SOPS

The size and complexity of the operation will dictate which of the below guidance you include in your company documentation. CFR 14 Section 135.23, "Manual contents," does not specifically require that you must address any of the below therein, however, 135.23(m) does state the GOM needs to contain procedures for ensuring compliance with emergency procedures. This is an overly broad statement that can be interpreted in many different ways by POIs.

The GOM could be a relevant place to include the below (although not required), therefore actively working with your POI as well as the type of operation you conduct will prescribe where to address the below suggestions.

For the sake of this guide and to ensure ease of use, we use the GOM as the relevant document.

General Operations Manual

Operators should identify the provider of their runway airport obstacle analysis products as described in OpSpec A009 and describe the means for compliance with the CFR requirements in Subpart I, Part 135 as explained previously.

Operators should subsequently provide a general overview of the requirements of the program/software to comply with the regulatory requirements. It is also important for operators to note that some OEI DPs might NOT be useable, i.e., flyover fixes if the aircraft FMS cannot execute such a maneuver or might be operator specific. Other OEI DPs might have speed restrictions that certain aircraft types are unable to meet, and this should be addressed by the operator.

Training Documentation

InFO 23009 makes it noticeably clear: Operators are responsible for training and to provide staff with adequate checklists and procedures for addressing an engine failure in multiengine aircraft, including a failure during takeoff. These procedures should include any avionic setup required prior to takeoff that is necessary to comply with the OEI routing. Additionally, this should include an item in the takeoff briefing assigning the responsibility for avionics reconfiguring and how these procedures will be executed. All the aforementioned items should be incorporated into your documentation, training programs and aircraft SOPs, with specific reference to each aircraft type, and each avionic package that could differ even within the same aircraft types.

Firstly, crew should understand the basic concepts of Far 23, FAR 25, TERPS and OEI obstacles analysis as explained in AC120-91(A), as well as the OEI climb segments as this forms a core understanding of what follows.

InFO 18004 explains compliance with 14 CFR Part 97 IFR DPs and Missed Approach Climb Gradients for additional guidance on complying with these all-engine performance requirements. Suffice to say it is necessary when planning normal operations that aircraft be able to meet the climb gradients on all engines operating, expressed in ft/nm, when accepting these normal, all-engine operating departure procedures – which is beyond the scope of this guide.

Crew should also be familiar with the normal categories of departure procedures (ODPs and SIDs (FAA-H-8083-16B p. 1-23), and that it differs from OEI departure procedures (engine failure escape procedures). It is important to keep in mind that normal departure procedures are also categorized by equipment requirements (pages 1-30), and might affect your ability to accept these procedures, especially smaller aircraft under hot ambient temperatures. (https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/instrument_procedures_handbook)

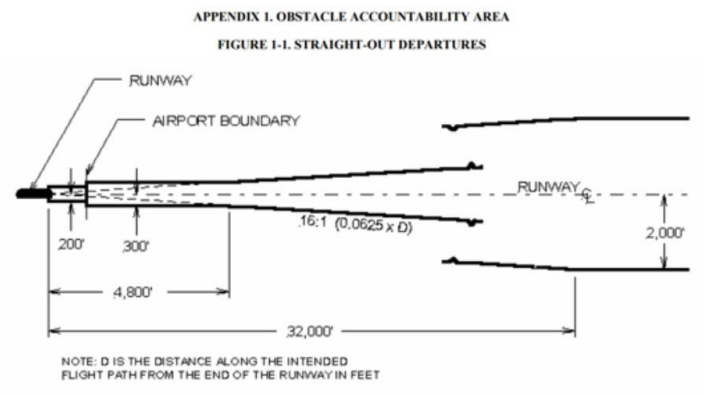
Now that your aircrew know what to do under normal, AEO conditions, it is time to plan for engine failure departure procedures.

It is very important for relevant personnel to fully understand this often-misunderstood concept, and it is therefore suggested that you clearly explain that an engine failure is an emergency that takes precedence over any noise abatement, air traffic considerations, Standard Instrument Departures (SIDs), Obstacle Departure Procedures (ODPs), Departure Procedures (DPs) and other normal operating considerations depicted in the aircrew's every day aeronautical charts.

Compliance with the OEI special procedures upon which runway airport obstacle analysis limiting weights are based, including exact, specified routes, speed restrictions, strict level-off heights, equipment limitations etc., is mandatory unless use of the pilot-in-command authority to deviate is necessary for safety of flight. You could consider these emergency OEI instructions best described as "engine failure escape procedures."

The operator should provide guidance to relevant staff and pilots on the following:

Explain what a straight out "engine failure escape procedure" means, using AC120-91A referencing Appendix 1, showing the obstacle accountability area for how OEI straight out departures and turning departures are calculated, and what protections they provide vertically, laterally and along the intended engine failure escape flight path.



Obstacle accountability area as per AC120-91(A)

Operators should explain how compliance with the limiting weights shown on the analysis are mandatory, regardless of the flight rules being conducted under (e.g., IFR or VFR) or for the flight or weather conditions present at the time of departure (e.g., IMC, VMC, day, night, "good VFR" where obstacles can be seen). The best analogy here is that the aircraft does not know whether it is flying in IMC or not. Relevant personnel should understand, and be knowledgeable of the definitions of field length, obstacle, brake energy and approach climb limits, for their aircraft, and what this means for their intended takeoff, approach and landing calculations.

It should be clearly stated that "visually avoiding" obstacles in the takeoff path following an engine failure may only be used if it meets the requirements of AC 120-91A, and it does not extend permission to pilots to take off and "see and avoid" obstacles.

If there is a specific visual avoidance procedure provided in the runway airport obstacle analysis software, the limiting weights shown on the analysis for that procedure must be used for that takeoff.

It needs to be understood that the engine failure level-off height changes for each departure, and unlike the i.e. constant 1000' AGL level-off you might have been trained to comply with during certifications takeoff performance at your Part 142 training provider, these engine failure level-off heights regularly change, sometimes dramatically, from one departure to the next. Airport runway obstacle analysis products might require you to level off early (i.e. 800' AGL) to use your enroute climb to get you over an obstacle or allow you to depart with a greater weight, or opt to extend your second segment climb (i.e. 2000' AGL level off) to account for a secondary object. These level-off heights should therefore be clearly noted and briefed on every single departure. An especially crucial point to remember is that during OEI landings, AC120-91(A) states that Part 135 does not specifically require OEI obstacle analysis for missed approaches or rejected/balked landings.

It remains important that operators train their aircrews on which procedures to follow during OEI landings to best equip them to make the right decisions on what to do in case of an OEI missed approach, and requirements for alternate airports in case of an engine failure. Pilots should always know what options are available to them, as technically obstacle clearance is on the pilot.

Differentiation should be made between OEI go-arounds from before, or at the missed approach point (MAP), and what protections, if any, are provided when going missed after this point, i.e., a rejected or balked landing. Protection for the missed approach procedure and associated missed approach climb gradients only provide protection up to the MAP, and operators are encouraged to ensure pilots can meet the missed approach climb gradients associated with a specific approach with OEI.

Crew should be trained on what options are available to them in the case of an OEI landing with a possible missed approach or rejected landing. This is explained in AC120-91(A) paragraph 20.

Using a third-party supplier's engine failure departure procedure for the landing runway in the case of a balked or rejected landing should be considered. Operators should incorporate procedures for converting required climb gradients to required climb rates in pilot and dispatcher airplane performance sections for their approved training programs. Pilots need to understand how to use their company-specific OpSpec A009-approved runway analysis software, and how the requirements of AC120-91(A) are incorporated to assist them in the event of an engine failure, and what vertical and lateral protections these procedures provide. Lastly, crew should understand the limiting factors of their aircraft performance and the environment, and how this relates to their use of the software.

This includes selection of limiting takeoff or landing weights for the airport under the specific operational requirements and current atmospheric conditions:

For the phases of flight, these might include:

- Maximum takeoff weight (MTOW)
- Runway length limit (TODA/TODA/ASDA)
- Takeoff brake energy limit
- Climb limit (AEO - TERPS)
- Climb limit (OEI)
- Maximum landing weight (MLW)
- Runway length limit (LDA)
- Landing brake energy limit
- Go around climb limit (AOE – TERPS)
- Approach-climb (OEI) limit

Your training program should describe to flight crew the use of the runway analysis product, including any OEI special departure procedure upon which the limiting takeoff weights shown in the analysis are based. This must be based on the guidance provided by the runway airport obstacle analysis provider on the use of their products. Operators should furnish guidance, procedures and any other relevant information for use in interpretation of the runway airport obstacle analysis.

The training should further provide clear instructions on the selection of an appropriate OEI procedure, which should be based on, but not limited to:

- Airport, and runway of departure
- IFR clearance, including assigned SID or use of the ODP for the IFR takeoff
- Aircraft avionics, to include the availability and use of ground-based NAVAIDs, availability, suitability and use of FMS, GPS or RNAV guidance.
- Whether the fixes are flyOVER fixes (RNAV) or whether they can only use the non-RNAV procedures (with smart turns. It is important to note that some avionics cannot select an overfly function and this has significant bearing on which procedure you can use).

Furthermore, operators should explain OEI procedures that are NOT APPROVED for use by the operator due to the operation, OpSpec limitations, airport or a specific aircraft type:

- Approval or no-approval to use "visual obstacle avoidance" procedures provided by the runway airport obstacle analysis contractor's product.
- OEI procedures that have speed limits that cannot be met by the aircraft type.
- OEI procedures that cannot be used due to avionics limitations.
- OEI procedures that may require special avionics performance capabilities, e.g., Required Navigation Performance Authorization Required Departure (RNP AR DP).
- Flyby versus flyover fixes, i.e., area navigation (RNAV) or non-RNAV procedures.

The operators training should also describe any differences between formats for the runway airport obstacle analysis such as electronic flight planning, tablet or PC-based products that may provide a point calculation based on specific set of conditions, or pre-composed (i.e., "paper") analysis that may cover a range of takeoff conditions and assumptions.

Built-in aircraft FMS performance software is only an approved substitute for the AFM section 5, FAA-approved performance data, however, this does not include any obstacle data and therefore does not provide AC 120-91A obstacle clearance. Any considerations for a turning procedure also need to be addressed, and FMS technology is, at the time of this writing, not adequate to the task of complying with AC 120-91A.

Part 142 Contract Training Providers

An operator must provide detailed training to contract training providers to qualify them on the operator's specific, A009-approved airport analysis program if this training is contracted.

If an operator utilizes a contract training provider without providing detailed training on the operator's specific A009-approved airport analysis program, expect aircraft-specific training to be conducted using courseware representative of manufacturer certification requirements, or airport obstacle analysis products, but without operator-specific GOM procedures and OpSpec A009-specified airport obstacle analysis products. If guidance from the operator is inadequate, it could lead to situations where crew are trained to i.e. ALWAYS level off at i.e. 1000' AGL, which might be contrary to actual procedures required in the operator's runway analysis software, and might cause unwanted confusion and incorrect procedures post training during flight.

It is therefore best to ensure operator example courseware provides adequate examples of aircraft-specific company procedures for contract training providers to meet aircraft-specific training objectives.
The operator-specific topics will be trained by the operator and the contract training provider aircraft-specific training will generally cover these N8900.664 topics:

- AFM source performance data
- Departure planning and briefing
- Avionics use for navigation and performance
- Alternate DP for OEI versus OEI following SID/ODP
- ATC communication applicable to each flight scenario

Contract training providers may not be familiar with a particular vendor's product or its application. The burden, therefore, falls upon operators to either train their contractor-provided instructors/check airmen accordingly as they would with any other company-specific procedures or provide applicable aircraft-specific example courseware information for training and checking. If a contract training provider offers a training product on the specific airport runway analysis product that they are approved to use, the operator may seek approval from their POI to use this training to meet the requirements outlined in InFO 23009.

It is important to reiterate that it remains the operator's responsibility to ensure that their staff and any other providers are fully trained in their requirements, and it is therefore strongly suggested that an operator proactively manages their own training program needs on this particularly important subject.

Some contract training providers may not be able or otherwise unwilling to provide instruction on a particular airport runway obstacle analysis product. They may elect to opt out of providing detailed training to the operator's pilots on that product, e.g., ground training, training module, computer-based training, etc.

The operator is still responsible for training their own pilots on the use of the runway obstacle analysis product approved in their A009 authorization, however, flight and simulator instructors, and their instructors performing as FAA-designated check airman for the operator must be briefed or trained by the operator, as applicable, in the use of the operator's approved runway obstacle analysis product in order to fulfill their responsibilities as FAA-approved Part 135 instructors and designated check airman for that operator.

Operator SOPs

- Develop and describe pilot SOPs to follow, for every avionics package, the use of runway airport obstacle analysis products, which may include:
  - Setup of ground based NAVIDs for the OEI procedure
  - Setup of the FMS to fly both the normal IFR departure procedure and the OEI departure procedure (engine failure escape procedures), if necessary.
- Differences in takeoff and landing performance data and limiting weights calculated using FMS performance data functions, including supremacy of calculations, i.e., runway airport obstacle analysis product limiting weights always supersede FMS calculated limit weights.
- Describe briefings on how these SOPs will be executed and should be performed prior to every departure requiring nonstandard crew interaction and/or complex avionics manipulation (e.g., split FMS operations, loading secondary or standby flight plans, sequencing active waypoint on the LEGS page to follow the OEI procedure in the event of an engine failure on takeoff).

Aircraft-specific training should also emphasize the need to declare an emergency with air traffic control (ATC). Controllers are trained to immediately ask "state intentions" or "say request" as soon as an emergency is declared, and crews should be ready to immediately advise ATC of their intentions to fly the OEI routing developed during planning, as this should have been discussed in the pre-departure briefing.

References:

AC120-91A

INFO18014

NOTICE 8900.664

INFO23009

FAA Instrument Procedures Handbook -

https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/instrument_procedures_handbook

FAA AIM 5-4-21

STEP 3 – GROUND TRAINING, FLIGHT TRAINING AND IMPLEMENTATION ON THE LINE

Ground training programs should include all the of the aforementioned information, expanded to include all relevant practical information that pilots should know to execute these requirements effectively and safely.

During simulator and/or flight training programs, training and checking on the use of runway airport obstacle analysis products should be conducted. Flight crews, before going to the Part 142 training provider, should be competent in the interpretation and application of these products, including limiting weights, operating restrictions, OEI procedures, avionics setup and the execution of SOPs related to these products and procedures.

Engine failure on takeoff training in the actual aircraft is extremely hazardous. To prevent a hazardous loss-of-control situation, the instructor/check airman providing this training and evaluation in the actual aircraft, in flight must themselves be trained and highly competent on common pilot mistakes that occur when flying the aircraft following a simulated engine failure above V1 speed. It is strongly recommended that an FAA-certificated full flight simulator be used to conduct this training and checking.

UNDER NO CIRCUMSTANCES (if training is conducted in an aircraft) SHOULD TRAINING AND CHECKING INVOLVE AN ACTUAL ENGINE SHUTDOWN DURING THE TAKEOFF MANEUVER!

Lastly, an example of an actual flight should be provided to crew either during training, and/or during Initial Operating Experience (IOE), and should walk pilots through the process of safely planning for and executing such a flight.

This could include:

- TERPS analysis and whether the aircraft can comply with the SID/ODP etc.
- Runway analysis, and whether a single engine escape procedure will need to be flown, i.e., will we maintain runway heading, level off at 800' AGL, clean up and continue the climb at enroute climb (Venr).
- Are weights/ambient conditions limiting to such an extent that a single engine escape procedure needs to be flown, should we lose an engine after V1?
- Can the aircraft climb above the MSA for the area on one engine, i.e. what is the ceiling for the aircraft with OEI at those ambient conditions?

- Avionics setup and crew briefings and actions in the case of an engine failure.
- Climbing at i.e., V2+10 for the engine maximum limits or until above MSA should be considered.
- What options are available to you after losing an engine, i.e., grid minimum off-route altitudes (MORAs) and diversion to an alternate airport?
- Can the aircraft fly into this alternate airport with OEI and ambient conditions?
- What to do if you need to go missed on OEI before the MAP?
- What options are available if you have a rejected or balked landing on OEI after the MAP?

Conclusion

Ensuring compliance with FAA InFo 23009 involves a systematic approach encompassing three steps: understanding the regulatory requirements and obtaining the required authorization, implementing robust documentation to support the operation, and finally using these procedures to train the crew and implement these critical procedures during daily pre-departure crew briefings and flight operations.

By adhering to these guidelines, operators can enhance safety, improve operational efficiency, and remain compliant with federal regulations, thereby further fostering a culture of responsibility and excellence within their flight departments.

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