NOTICE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

N 8900.19

National Policy

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9/20/07

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9/20/08

SUBJ: Guidance and Procedures for Dispatching During Ice Pellet and in Heavy Snow Conditions and Evaluating Pilot Assessment of Precipitation Intensity

1. Purpose of This Notice. This notice provides guidance to aviation safety inspectors (ASI) regarding allowance times in ice pellet conditions, procedures and limitations for pilot assessment of precipitation intensity, and procedures for dispatch in heavy snow conditions.

2. Audience. The primary audience for this notice is the Flight Standards District Office (FSDO) ASIs and Aircraft Evaluation Group (AEG) inspectors. The secondary audience includes Flight Standards braches and divisions in the regions and in headquarters.

3. Where You Can Find This Notice. Inspectors can access this notice through the Flight Standards Information Management System (FSIMS) at http://fsims.avr.faa.gov. Operators may find this information on the Federal Aviation Administration's (FAA) Web site at: http://www.faa.gov/library/manuals/examiners_inspectors/8900.

4. Background.

a. During the winter of 2006-2007, operations in ice pellets were approved for "light ice pellets" with an allowance time of 25 minutes. That time was based on limited research conducted late in the winter of 2005-2006 at the request of various industry groups. More comprehensive ice pellet research was conducted jointly by the research teams of the FAA and Transport Canada this past winter season. This research consisted of extensive climatic chamber, wind tunnel, and live aircraft testing with ice pellets (light and moderate) and light ice pellets mixed with other forms of precipitation. Additionally, Type IV anti-icing fluid with ice pellets embedded was evaluated for its aging qualities over periods of time beyond the allowance times, when the active precipitation time was limited to the allowance times. Results of this research provided the basis for extended allowance times for operations in light ice pellets, moderate ice pellets, and light ice pellets mixed with other forms of precipitation. This research also provides the basis for guidance for Type IV anti-icing fluid with embedded ice pellets "aged" beyond its allowance time when the precipitation stops at or prior to the expiration of the allowance time. Although the FAA supplies the following allowance times under the stated precipitation condition, the general requirement that takeoffs not be attempted with any contaminant adhering to the critical surfaces of the aircraft still applies.

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b. This notice additionally provides standardized procedures and limitations for Pilot Assessment of Precipitation Intensities. Previously, the FAA had authorized some operators to allow their flightcrews to make their own assessment of precipitation intensity when the officially reported intensity differed from what was observed by the flightcrew. Under some precipitation conditions, current methods used by weather observers to determine precipitation intensities could lead to over-stating the actual intensity rate. This national policy will level the playing field for all operators to choose to incorporate appropriate procedures and training into their winter operation practices. This national policy also provides standardization, establishes appropriate limitations for the use of pilot assessments, and implements accountability requirements.

5. Discussion.

a. Operations in Light and Moderate Ice Pellets and Light Ice Pellets mixed with other forms of precipitation.

(1) Tests have shown that ice pellets generally remain frozen when embedded in Type IV anti-icing fluid and are not absorbed by the fluid in the same manner as other forms of precipitation. Using current guidelines for determining anti-icing fluid failure, the presence of a contaminant not absorbed by the fluid (remaining embedded) would be an indication that the fluid has failed. These embedded ice pellets are generally not readily detectable by the human eye during pre-takeoff contamination check procedures. Therefore, a visual pre-takeoff contamination check in ice pellet conditions may not be of value.

(2) Research data have also shown that after proper deicing and anti-icing, the accumulation of light ice pellets, moderate ice pellets, and ice pellets mixed with other forms of precipitation in Type IV fluid will allow the fluid to flow off the aerodynamic surfaces during takeoff. This flow, due to shearing, occurs with rotation speeds consistent with Type IV anti-icing fluid recommended applications for up to the applicable allowance time listed in Table 1, Ice Pellet Allowance Times Winter 2007-2008. These allowance times are from the start of the Type IV anti-icing fluid application. Additionally, if the ice pellet condition stops, the allowance time is not exceeded, and the outside air temperature (OAT) has remained constant or increased from the temperature on which the allowance time was based, the operator is permitted to consider the Type IV anti-icing fluid effective without any further action up to *90 minutes* after the start of the application time of the Type IV anti-icing fluid. Examples:

(a) Type IV anti-icing fluid is applied with a application start time of 10:00, OAT is 0^0C, light ice pellets fall until 10:20 and stop and do not restart. The allowance time stops at 10:50; however, provided that the OAT remains constant or increases, and that no precipitation restarts after the allowance time of 10:50 the aircraft may takeoff without any further action up to 11:30.

(b) Type IV anti-icing fluid is applied with a application start time of 10:00, OAT is 0^0C, light ice pellets mixed with freezing drizzle falls until 10:10 and stops and restarts at 10:15 and stops at 10:20. The allowance time stops at 10:25, however provided that the OAT remains constant or increases and that no precipitation restarts after the allowance time of 10:25, the aircraft may takeoff without any further action up to 11:30.

(c) Type IV anti-icing fluid is applied with a application start time of 10:00, OAT is 0^0C, light ice pellets mixed with freezing drizzle falls until 10:10 and stops and restarts at 10:30 with the allowance time stopping at 10:25, the aircraft *may not takeoff*, no matter how short the time or type of precipitation after 10:25, without being deiced, and anti-iced if precipitation is present.

(3) Operators with a deicing program approved in accordance with Title 14 of the Code of Federal Regulations (14 CFR) part 121, § 121.629, will be allowed, in the specified ice pellet conditions and corresponding outside air temperatures (OAT) listed in Table 1, up to the specific allowance time listed in this table after the start of the anti-icing fluid application to commence the takeoff with the following restrictions:

(a) The aircraft critical surfaces must be free of contaminants before applying Type IV anti-icing fluid. If not, the aircraft must be properly deiced and checked to be free of contaminants before the application of Type IV anti-icing fluid.

(b) The allowance time is valid only if the aircraft is anti-iced with undiluted Type IV fluid.

(c) Due to the shearing qualities of Type IV fluids with embedded ice pellets, this allowance is limited to aircraft with a rotation speed of 100 knots or greater.

(d) If the takeoff is not accomplished within the applicable allowance time in Table 1, the aircraft must be completely deiced, and if precipitation is still present, anti-iced again prior to a subsequent takeoff. If the precipitation stops at or before the time limits of the applicable allowance time in Table 1 and does not restart, the aircraft may takeoff up to 90 minutes after the start of the application of the Type IV anti-icing fluid provided the temperature on which the allowance time was based remains constant or increases.

(e) A pre-takeoff contamination check is not required. The allowance time cannot be extended by an internal or external check of the aircraft critical surfaces.

(f) If ice pellet precipitation becomes heavier than moderate or if the light ice pellets mixed with other forms of allowable precipitation exceeds the listed intensities or temperature range, the allowance time cannot be used.

(g) If the temperature decreases below the temperature on which the allowance time was based:

1. And the new lower temperature has an associated allowance time for the precipitation condition and the present time is within the new allowance time, then that new time must be used as the allowance time limit.

2. And the allowance time has expired (within the 90 minute post anti-icing window if the precipitation has stopped within the allowance time), the aircraft may not takeoff and must be completely deiced and, if applicable, anti-iced before a subsequent takeoff.

Table 1. Ice Pellet Allowance Times Winter 2007-2008

	OAT -5^0 C or Warmer	**OAT Colder Than -5^0 C**
Light Ice Pellets	50 Minutes	30 Minutes
Moderate Ice Pellets	25 Minutes	10 Minutes
Light Ice Pellets Mixed with Light or Moderate Snow	25 Minutes	Operations Not Authorized
Light Ice Pellets Mixed with Light or Moderate Freezing Drizzle, or Light Freezing Rain (Operations Not Authorized below -10C OAT)	25 Minutes	10 Minutes (Operations Not Authorized below -10C OAT)
Light Ice Pellets Mixed with Light Rain (Operations Not Authorized below 0C OAT)	25 Minutes (Operations Not Authorized below 0C OAT)	(Operations Not Authorized below 0C OAT

b. Pilot Assessment of Precipitation Intensity. Some operators have in their approved de-icing programs procedures for their flightcrews to do assessments of precipitation intensities (including the presence of precipitation), if the officially reported precipitation intensity differs from what is observed by the flightcrew. Other operators have not been authorized to allow their flightcrews to make the same assessments. In some cases this disparity has placed an operator at an unfair disadvantage. Often weather observers determine precipitation intensities levels by the size and coverage of the precipitation on the ground or by its effects on the prevailing visibility. When precipitation is present with other obstructions to visibility such as fog or mist, the intensity level of the precipitation may be overstated. This is particularly common for ice pellet conditions where no accurate method of electronically measuring intensity levels is currently in use. Only operators that chose to develop Pilot Assessment of Precipitation Intensity procedures in accordance with the following guidelines and have incorporated and conduct the applicable training may be authorized to use those precipitation intensity assessments for determining applicable holdover and allowance times. Pilot Assessment of Precipitation Intensity procedures are to be used only for the purpose of determining appropriate holdover/allowance times. These procedures are for use by flightcrew (pilots) only and should not be used by other ground support personnel to adjust holdover/allowance times.

(1) Guidelines for Pilot Assessment of Precipitation Intensity Procedures.

(a) Pilots may act based on their own assessment of precipitation intensity only in those cases where the officially reported meteorological precipitation intensity is grossly

different from that which is occurring. (For example: precipitation is reported when there is no actual precipitation occurring.) As always, if, in the pilot's judgment, the intensity is greater, or a different form of precipitation exists than that being reported, then the appropriate course of action and applicable holdover/allowance times for the higher intensity or different form of precipitation must be applied. (For example: precipitation is being reported as light ice pellets and the pilot assessment is that it is moderate ice pellets, than the pilot must apply the allowance time for moderate ice pellets.)

(b) Before a pilot takes action on his/her own precipitation intensity assessment, he/she shall request that a new observation be taken. A pilot must not take action based on his/her own precipitation intensity assessment unless either a new observation is not taken and reported, or the new precipitation intensity officially reported remains grossly different from that which is occurring.

(c) The company's approved deicing program in accordance with § 121.629 must contain the required company coordination procedures for a pilot when he chooses to take actions that are based on his/her precipitation intensity assessment that is less than the precipitation intensity that is being officially reported. (Example: The official weather report is moderate freezing rain, and the pilot's assessment is that there is no liquid precipitation, or the reported weather is moderate snow and light ice pellets and by the pilot's assessment there is light snow and no ice pellets.) These procedures must require coordination with the company before the pilot takes such action, or a report of action taken after the pilot has opted to exercise this option.

(d) When a pilot acts based on his/her own assessment that precipitation intensity levels are lower than the official reported intensity level, a check at least as comprehensive as the operator's pre-takeoff contamination check (when holdover times have been exceeded) as per the approved procedure for the applicable aircraft is required within five minutes of takeoff.

> **Note:** Unlike other forms of precipitation, individual ice pellets may be seen, if viewed close up, or felt embedded in the fluid since they are not readily absorbed into the anti-icing fluid like other forms of precipitation. Under ice pellet conditions and within the appropriate allowance times, if ice pellets are visible they should appear as individual pellets and not form a slushy consistency indicating fluid failure. This distinction is very difficult to make from inside the aircraft. If through an internal or external visual check or a tactile check (as appropriate for the aircraft), the ice pellets mixed with the anti-icing fluid forms a slushy consistency or are adhering to the aircraft surface, then the intensity level that the pilot based the allowance time on was not accurate and the takeoff should not be conducted.

(e) Under the following conditions a pilot may act based on his/her own assessment of precipitation intensity levels that are less than that being officially reported. Pilot assessment of precipitation intensity levels may only be used when there is enough natural sunlight or artificial lighting available to provide adequate exterior visibility. The snowfall rate chart provided in Table 2, Snowfall Intensities as a Function of Prevailing Visibility, is based on prevailing visibility and allowances are made in the chart for the effects of night light conditions.

1. Ice Pellets – When ice pellets are being reported, the following chart information extracted from the Federal Meteorological Handbook shall be used to assess their actual intensity rate:

A. Light - Scattered pellets that do not completely cover an exposed surface regardless of duration.

B. Moderate - Slow accumulation on ground.

C. Heavy - Rapid accumulation on ground.

2. Drizzle/Freezing Drizzle and Rain/Freezing Rain - The differentiations between these various conditions are based on drop size and require careful observation. Therefore, when drizzle/freezing drizzle or rain/freezing rain is being reported a pilot must use both visual and physical (feel) cues in determining the presence of precipitation. If precipitation is present to any degree by visual or physical cues, the official reported precipitation type and intensity must be used for determining the appropriate course of action and applicable holdover times. If the pilot determines no precipitation is present, the aircraft should be deiced if necessary and consideration given to treating the aircraft with anti-icing fluid as a precaution for encountering the reported precipitation on taxi out. As always, if, in the pilot's judgment, the intensity is greater, or a different form of precipitation exists, than that being reported, then the appropriate course of action and applicable holdover/allowance times for the higher intensity or different form of precipitation must be applied.

3. Snow – The snowfall visibility table attached in Table 2 has previously been published with the annual FAA holdover time tables for use in determining snow intensity rates based on prevailing visibility and can be used in place of official reported intensities. Thus the table should be used for pilot assessment of snowfall intensity rates when the actual snowfall intensity is obviously different from that being officially reported or at any other time.

Table 2. Snowfall Intensities as a Function of Prevailing Visibility

Time of Day	Temp.		Visibility (Statute Mile)							
	Degrees Celsius	Degrees Fahrenheit	≥ 2 1/2	2	1 1/2	1	3/4	1/2	≤ 1/4	Snowfall Intensity
Day	colder/equal -1	colder/equal 30	Very Light	Very Light	Light	Light	Moderate	Moderate	**Heavy**	
	warmer than -1	warmer than 30	Very Light	Light	Light	Moderate	Moderate	**Heavy**	**Heavy**	
Night	colder/equal -1	colder/equal 30	Very Light	Light	Moderate	Moderate	**Heavy**	**Heavy**	**Heavy**	
	warmer than -1	warmer than 30	Very Light	Light	Moderate	**Heavy**	**Heavy**	**Heavy**	**Heavy**	

NOTE: Based upon technical report, "The Estimation of Snowfall Rate Using Visibility," Rasmussen, et al., Journal of Applied Meteorology, October 1999 and additional in situ data.

NOTE: This table is to be used with Type I fluid guidelines. It may also be used with Type II, III, or IV fluid.

HEAVY = Caution–No Holdover Time Guidelines Exist

Note: During snow conditions alone the use of Table 2 in determining snowfall intensities does not require pilot company coordination or company reporting procedures since this table is more conservative than the visibility table used by official weather observers in determining snowfall intensities, the correct use of this table will result in a snowfall intensity greater than that being officially reported.

(2) Training Requirements.

(a) Pilots that are limited in their precipitation intensity assessments to whether or not precipitation is falling will only be required to have instruction on how that assessment should be made. (Example: How and where to perform the physical feel cues to determine if precipitation is present.)

(b) All other pilots will require training on their company's pilot precipitation intensity assessment procedures. Pilots will need training on the methods used by weather observers to determine precipitation types and intensities and on how to conduct their own assessment under the different precipitation conditions. (The Federal Metrological Handbook FMH-1 and Snowfall Intensities as a Function of Prevailing Visibility, Table 2, should be used as the source documents for this training.)

Note: Additionally, § 121.629 requires anti-icing fluid failure recognition training under the various precipitation conditions for pilots and all other persons responsible for conducting pre-takeoff contamination checks if anti-icing fluids are used.

c. Operations in Heavy Snow.

(1) No holdover times exist for heavy snow conditions in the current holdover time tables. Review of existing data from past testing has indicated with proper tactile and/or visual checks, as appropriate for the aircraft, and a determination that the fluid has not failed, takeoffs may be safely conducted. A tactile and/or visual check in heavy snow conditions must be accomplished in a manner that provides an accurate assessment. It is imperative that the tactile and/or visual check procedures (to determine if the anti-icing fluid has failed in heavy snow conditions) be at least as comprehensive as the authorized procedures for the operators pre-takeoff contamination check (when holdover times have been exceeded) for those precipitation conditions for which holdover times exist. These inspection procedures must comply with all flight manual requirements for determining that the critical surface are free of contaminants prior to flight. Anti-icing fluids dissolve the snow and absorb the resulting moisture into the fluid. When the fluid begins to fail, it starts to change in appearance (i.e., less glossy and more opaque) and the snow starts to accumulate on and in the fluid. At this stage, the fluid has failed and takeoff is not authorized. If the operator's procedure to accomplish this check is different from the operator's approved pre-takeoff contamination check procedures for other precipitation conditions, this check procedure must be verified and approved by the operator's principal operations inspector (POI).

(2) Operators with a deicing program approved in accordance with § 121.629 may be authorized to take off in heavy snow conditions subject to the following restrictions:

(a) The aircraft must be anti-iced with undiluted Type IV fluid.

(b) The aircraft critical surfaces must be free of contaminants or the aircraft be properly deiced before the application of the anti-icing fluid.

(c) The operator must accomplish an approved tactile and/or visual check, as appropriate, of the aircraft's critical surfaces within 5 minutes of takeoff.

(d) If this check is accomplished visually from within the aircraft, the view must be such that it is not obscured by de/anti-icing fluid, dirt, or fogging. If the critical surfaces cannot be seen due to snowfall, distance from the viewing position, or inadequate lighting, or for any other reason, the check must be a visual or tactile check conducted from outside the aircraft.

(e) If a definitive fluid failure determination cannot be made using the checks prescribed, takeoff is not authorized. The aircraft must be completely deiced and, if precipitation is still present, anti-iced again before a subsequent takeoff.

Note: Current aircraft certification standards only require testing of flight instrument sensing devices and engine anti-icing systems in moderate snow levels. Ground operations in heavy snow conditions may exceed the capabilities or limitations of these systems and devices to adequately provide anti-icing.

d. Other Conditions. When no holdover times exist (heavy ice pellets, snow pellets, moderate and heavy freezing rain, and hail).

(1) No testing has been conducted in these conditions; therefore, this notice does not provide for holdover times or other forms of relief for dispatch in these conditions.

(2) Sections 121.629(b) and (c) clearly state "no person may take off an aircraft when frost, ice, or snow is adhering to the wings…" and "…no person may dispatch, release or take off an aircraft any time conditions are such that frost, ice, or snow may reasonably be expected to adhere to the aircraft…" respectively. Under some conditions the aircraft critical surfaces may be considered free of contaminants when a cold, dry aircraft has not had de-icing and/or anti-ice fluids applied, and ice/snow pellets do not adhere and are not expected to adhere to the aircraft critical surfaces. Refueling with fuel warmer than the wing skin temperature may create a condition that previously non-adhering contaminants may adhere to the wing surfaces.

6. Action. POIs should provide a copy of this notice to all certificate holders and/or fractional ownership program managers that have deicing/anti-icing programs or plans. For those certificate holders choosing to take advantage of the relief provided for dispatching in ice pellet and/or heavy snow conditions and/or implementation of a pilot assessment of precipitation intensity procedure, the POI should review the certificate holder's deicing/anti-icing program or plan to determine that it is consistent with the guidance and procedures outlined in this notice.

7. Tracking. Document the conveyance of the information contained in this notice for each air carrier or fractional ownership program affected.

a. Use Program Tracking and Reporting Subsystem (PTRS) code 1030, Convey Non-Reg.

b. Enter "N8900.19" in the "National Use" field (without the quotes).

c. Once the above information has been provided to the operator's representative, as appropriate, close out the PTRS.

8. Disposition. We will permanently incorporate the information in this notice to FSIMS before this notice expires. Direct questions concerning this notice to the Air Carrier Operations Branch, AFS-220, at (202) 493-5286.

ORIGINAL SIGNED BY
John M. Allen for

James J. Ballough
Director, Flight Standards Service