DISPOSITION OF PUBLIC COMMENTS

AC 25-31, *Takeoff Performance Data for Operations on Contaminated Runways*

Prepared by Paul Giesman, ANM-111

No.	Comment	Requested Change	Disposition
	Commenter: National Business Aviation Association (NBAA)		
1.	Para 5.3 The AC's definition of a contaminated runway that is covered by "any depth" represents a change from the previous accepted definition of contamination depth of at least 0.125". Existing advisory data for many aircraft is based on the 0.125" depth definition, as well as the runway condition reporting criteria for the descriptor "Thin" when describing contamination depth contained in the FAA Order JO 7930.2P Notice to Airman.	Does FAA intend to alter the definition of a contaminated runway? If so, then the AC should furnish guidance on the application of advisory data based on the previous definition that a considered contaminated at depths of 0.125" or greater.	We concur with the intent of this comment, and we changed the AC. Wet runway performance is assumed when water or loose contaminant depth is 1/8″ (3 mm) or less; the wheel braking performance due to the loose contaminant is assumed when the depth of the loose contaminant is greater than 1/8″ (3 mm).

No.	Comment	Requested Change	Disposition
	Commenter: JetBlue Airways		
1.	Change all the categorical mention of contamination depths from {[**less than 1/8"**] and [**1/8" and greater**]}, to {[**1/8" and less**] and [**greater than 1/8"**]}.	This requested change is in accordance with the original recommendation of the TALPA ARC in categorizing differences in wheel braking coefficients to contaminate depths.	We concur with this comment, and we changed the AC. Wet runway performance is assumed when water or loose contaminant depth is 1/8″ (3 mm) or less; the wheel braking performance due to the loose contaminant is assumed when the depth of the loose contaminant is greater than 1/8″ (3 mm).

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No.	Comment	Requested Change	Disposition
	Commenter: The Boeing Company		
1.	Page 3, Paragraph 5.3 The paragraph defines that a runway should be considered contaminated "…when more than 25 percent of the runway surface area (within the reported length and width being used) is covered by any depth of frost, snow, slush, ice, **or water**."	Change the highlighted text to read as follows: "or water" to **"or water with a depth of 1/8 inch (3 mm) or greater"** Paragraph 6.2 states that, if the runway surface is covered by water with a depth of that is less than 1/8th inch (3 mm), it can be considered a wet runway. Change is needed for consistency.	We concur with the comment and the intent of the requested change. We added the following clarifying note to paragraph 5.3: "The definition of water in the context of condition reporting and airplane performance is the definition in paragraph 5.3.6 of this AC, which is a depth of greater than 1/8 inch (3 mm). This terminology is consistent with the definitions used in NOTAMs as published in AC 150/5200-28E and Order JO 7930.2Q (or later revisions)."
2.	Page 4, Paragraph 5.5 The proposed text states: "… Takeoff performance data based on runway surface condition **may** include the effects of contaminant depth on drag and braking friction for loose contaminants."	We recommend changing the text as follows: "… Takeoff performance data based on runway surface condition ~~may~~ **should** include the ~~effects of contaminant depth on drag and braking friction for~~ **drag effects of** loose contaminants." Clarification is needed to indicate that the drag effects of loose contaminants should be considered, since they adversely affect acceleration.	We concur with this comment. We have revised the AC by replacing the definition of Runway Surface Condition with one that can be used in both the takeoff and landing AC. "The runway surface condition is a description of the contaminants (if any) on the surface of a runway. Takeoff and landing performance data based on runway surface condition may include the effects of the contaminant on braking friction and the effects of contaminant depth on drag as appropriate."

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No.	Comment	Requested Change	Disposition
	Commenter: The Boeing Company		
3.	Page 4, Paragraph 5.6 The proposed text states: "Solid contaminants are those that an airplane's tire will remain on top of and not break through. …"	We recommend revising the text as follows: "Solid contaminants are those that an ~~airplane's tire will remain on top of and not break through~~ **contaminants that will not be penetrated by an airplane tire**. Clarification of definition is needed.	We do not concur with this recommendation and did not change the AC. The TALPA ARC recommended definitions were finalized and modified as determined by a cross-function team of FAA representatives from Flight Standards (AFS-200), Transport Airplane Directorate (ANM-100), and Airports (AAS-300). Therefore, we did not implement the requested change since the current definition meets the needs of the majority of the interested parties. The requested change does not improve upon the definition, which was a product of the TALPA ARC and concurred with by the FAA.
4.	Page 6, Table 2 Table 2 provides recommended "Wheel Braking Coefficients for each Runway Surface Condition Description."	Table 2 should add the "Runway Condition Code" and "Pilot-Reported Braking Action" columns to be consistent with the information in (proposed) AC 25-XX, "Landing Performance Data for Time-of-Arrival Landing Performance Assessments." The rationale, besides consistency with the proposed AC 25-XX on landing performance, is that, from the pilot and operational perspective, departure pilots will be aware of runway codes and pilot-reported braking action from other arrival pilots. This information may then also be used for takeoff planning.	We do not concur with this comment and did not revise the AC. During the TALPA ARC process, the necessity of supplying data based on runway condition was discussed extensively: "Runway description vs. braking action for takeoff performance: It is proposed that performance data not be based on braking action reports (good/medium/poor) for takeoff but rather runway description. This is due to concerns over braking action reports being generated over a different portion of the runway than would actually be required for the stopping

No.	Comment	Requested Change	Disposition
	Commenter: The Boeing Company		
			portion of an accelerate-stop and the exposure to longer continued acceleration following an engine failure from speed closer to minimum V_1. It is recognized that there is no perfect method of relating the real operational world of runway description and PIREPS with takeoff performance due to the various effects of different surfaces on the airplanes performance capability. However, in contrast to landings, there is a mitigating aspect in takeoff performance provided by the rarity of an engine failure coupled with the rarity of an abort near V_1 speed. Another issue is that a report of braking action does not provide information on the effect of contaminant drag on the acceleration portion of the takeoff which is very significant for loose contaminants." The FAA concurs with the rationale and conclusion of the TALPA ARC on this item. Regarding the request to add the specific notations to table 2 of the takeoff AC, we believe adding the braking action and notation to may imply the need to provide takeoff data based on braking action/runway condition code (RCC) and, therefore, raise significant questions due to the ambiguity created. An example of the type of question could be:

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	Commenter: The Boeing Company		
			Should I calculate takeoff data for snow based on the acceleration effect of snow with five different braking assumptions, or just the braking action/RCC associated with snow? The same question could be raised for slush and standing water.
5.	Page 6, Table 2 Table 2 provides recommended "Wheel Braking Coefficients for each Runway Surface Condition Description."	Table 2 should add a footnote explaining that "Runway Surface Condition Description" can span across "Wheel Braking Coefficients," and is not limited to those items in the same table row as the Description' itself. The qualifying footnote could be added to explain the possible variation wheel braking coefficients for any runway surface condition. The rationale is that "Ice" can produce a wheel braking coefficient better than 0.08. Alternatively, "Snow" can produce a wheel braking coefficients worse than 0.16. Rigid adherence to a particular row in the table based on a 'description' could lead to an inappropriate braking action or braking coefficient.	We do not concur with this comment and did not revise the AC. The FAA has found that the wheel braking coefficients provided in the table are the agreed upon values and methods for computing performance data. We feel adding a note as proposed would only add confusion to the intent of the table. We understand the thought, and data providers can certainly provide qualifications on the data they provide if they choose. Data providers can also supply information based on more conservative assumed wheel braking coefficients if they so choose.
6.	Page 6, Table 2, Footnote 1 Proposed footnote 1 states: "… Airplanes without anti-skid system will need to be addressed separately on a case-by-case basis."	We recommend that airplanes without anti-skid systems be considered equivalent to an anti-skid on-off system. Our recommendation is a reasonable approach that will avoid review and assessment of possibly multiple airplane models.	We do not concur with this comment and did not revise the AC. The FAA has found that the current guidance is consistent with the TALPA ARC recommendations. This change should be submitted for inclusion in a future revision to AC 25-7C.

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No.	Comment	Requested Change	Disposition
	Commenter: The Boeing Company		
7.	Page 6, Paragraph 8.1.1 The proposed text states: "Contaminant depths are reported in field condition reports using specific depth increments: 1/8 inch, ¼ inch, ½ inch, 1 inch, etc. Depths between 1/8 inch and ¼ inch are reported as ¼ inch; depths between ¼ inch and ½ inch are reported as ½ inch; and so on."	We recommend that the paragraph be expanded either to summarize all the depth reporting information from JO 7939,2P rather than "and so on," or, alternatively, change the text to read as follows: "Contaminant depths are reported in field condition reports using depth increments **as specified in FAA Order JO 7930.2P (or later revision).** Our recommended change would improve the content of paragraph. A similar reference to JO 7930.2P is also made in Paragraph 6.3.	We concur with this comment. We revised the document as suggested.
8.	Page 7, Paragraph 8.2 The proposed text states: "… It is assumed that these effects will offset each other; however the FAA recommends that data providers consider using 50 percent of the reported contaminant depth for determining the accelerate-stop distance."	We recommend that this text be changed to clarify that 50 percent of the reported contaminant depth be used for **both** the acceleration **and** stopping portion of the RTO **or only the stopping portion**. Clarification is needed for accuracy.	We concur with this comment. We revised the text to clearly specify the "50% of depth" applies to both the accelerate and stop portion of the accelerate-stop computation.

No.	Comment	Requested Change	Disposition
	Commenter: The Boeing Company		
9.	Page 7, Paragraph 8.4 The proposed text states" "The effect of contaminant drag between rotation and liftoff can be addressed using one of two methods, as described below. There are advantages and disadvantages with each method, but either may be used if supported by an analysis that includes the assumptions used and rationale."	We recommend revising the text as follows: "The effect of contaminant drag between rotation and liftoff can be addressed using one of two methods, as described below. There are advantages and disadvantages with each method, but either may be used if supported by an analysis that includes the assumptions used and rationale. **Data providers may also use a method that was previously accepted by EASA or has been validated by suitable analysis or test data.**" Alternative methods have been accepted by the JAA or EASA for many certifications.	We do not concur with this comment and did not revise the AC. The FAA understands that, in the past, EASA/JAA have accepted methods that did not explicitly account for the expected drag between the time rotation was initiated at the normal dry runway rotation speed and the time the airplane would reach 15 feet. However, the TALPA ARC found, and the FAA concurs, that the use of this method on new applications does not reflect current best practices. However, Boeing does bring up the possibility of testing the effect of contaminant drag on a specific airplane. There is nothing in the AC that would preclude the use of validated test data on the specific model in establishing the effect of contaminant drag either before or after rotation.
10.	Page 8, Paragraph 9.7 The proposed text states: "If the data provider, in using the process described in this AC, applies credit for less than all thrust reversers, then controllability should be accounted for in that configuration. …"	We recommend revising the text as follows: "If the data provider, in using the process described in this AC, applies credit for ~~less than all thrust reversers~~ **asymmetric reverse thrust**, then controllability should be accounted for in that configuration. …" Our recommended change clarifies the intent of "less than all thrust reversers" for controllability.	We concur with this comment. We revised the document as suggested.

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No.	Comment	Requested Change	Disposition
	Commenter: Embraer S.A.		
1.	Item 6 - Definitions This item should be modified in the AC, in order to add the definition of "wheel braking coefficient".	Add the definition of "wheel braking coefficient".	We concur with this comment. We revised the AC by including the following definition in section 5 of the AC: "**Wheel Braking Coefficient.** Wheel braking coefficient is the ratio of the deceleration force from a braked wheel/tire relative to the normal force acting on the wheel/tire. The wheel braking coefficient is an all-inclusive term that incorporates effects related to the tire-to-ground interaction from braked wheels only, such as runway surface and airplane braking system (e.g., anti-skid efficiency, brake wear, tire condition, etc.). For the purposes of this AC, the wheel braking coefficient is based on a fully modulating anti-skid controlled braked wheel/tire. The definition of fully modulating anti-skid system is found in AC 25-7C."

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No.	Comment	Requested Change	Disposition
	Commenter: Airbus		
1.	5.1 Dry Runway The criterion of 25% coverage is consistent with JO7930.2P, that advises the use of the term PATCHY to describe contamination below 25% of the entire runway surface, and with the IR-OPS definition of a contaminated runway. However, it has been demonstrated that a dry runway computation including applicable margins is insufficient to predict landing performance on a runway where icy patches are concentrated in a single location. Example (Based on A320 CFM simplified simulation): Approach speed 130kt, Autobrake med (0.3g), SL, ISA, no wind, full reverse reduced to Rev Idle at 60kt, landing compliant with TALPA/ARC OLD model, the A/C will overrun the runway at around 35kt (with last quarter fully covered with ice). It has been found that neglecting up to 25% of contamination on the runway is acceptable only if this contamination is distributed evenly between the three thirds of the runway. The ICAO Friction Task Force has thus proposed a coverage criterion that considers a runway contaminated if the coverage exceeds 25% in one of the runway thirds. This applies also to §5.2 and 5.3.		We do not concur with this comment and did not change the AC. The TALPA ARC recommended definitions were finalized and modified as determined by a cross-function team of FAA representatives from Flight Standards (AFS-200), Transport Airplane Directorate (ANM-100), and Airports (AAS-300). Therefore, we did not implement the requested change since the current definition meets the needs of the majority of the interested parties. The 25 percent criterion was discussed extensively by the TALPA ARC. Changing the definition as requested would require a change to all FAA products and would potentially have a significant negative impact on aircraft operators. We are unaware of any aircraft overruns based on the specific scenario presented.

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	Commenter: Airbus		
2.	5.1 Dry Runway It is suggested to not refer to frost, slush, snow or ice that are defined later, but to stick to the ICAO Friction Task Force proposed definition of a dry runway, i.e.: "**Dry runway.** A runway is considered dry if its surface is not wet or contaminated and free of visible moisture within the area intended to be used."	Airbus suggests to change the definition of dry run as followed: "5.1 **Dry runway.** A runway is considered dry if its surface is not wet or contaminated and free of visible moisture within the area intended to be used."	We do not concur with this comment and did not revise the AC. Same justification as Boeing comment #3 on page 3.
3.	5.2 Wet Runway The first sentence of this definition is a circular definition with DRY and is unnecessary.	Airbus proposes to delete that sentence.	We do not concur with this comment and did not revise the AC. Same justification as Boeing comment #3 on page 3.
4.	5.2 Wet Runway Regarding the 1/8 inch (3mm) threshold, Airbus would like to highlight that it does not represent today's practice that is more "less than or equal to 3mm", and that harmonization with ICAO Friction Task Force conclusions should be considered.		We concur with this comment and changed the wet runway definition to "…any visible dampness or water that is 1/8″ or less in depth, which is consistent with historical standards and the TALPA ARC recommendation.

No.	Comment	Requested Change	Disposition
	Commenter: Airbus		
5.	5.3.8 Wet Ice The thickness of the layer of water on ICE has no impact on its slipperiness. It is not clear whether this definition implies that above 3mm a runway in this state would have to be considered as flooded only, which would seem non-conservative.	Airbus suggests using the definition of ICAO Friction Task Force for wet ice, i.e.: "**Wet ice.** Ice with a layer of water on top of it or ice that is melting. Note: Freezing precipitation can lead to runway conditions associated with wet ice from an aeroplane performance point of view."	We concur with the comment. We revised the definition to read: "Ice that is melting or ice with any depth of water on top."
6.	6 CONTAMINATED RUNWAY TAKEOFF PERFORMANCE DATA. Winter contaminants occur only at relatively low temperatures and performance has thus historically been provided for a more limited operational domain than that approved for dry runway operations. It is suggested that the valid temperature range for which performance data is provided may be restricted by the data provider in case of winter contaminants		We concur with this comment but did not revise the AC. We agree that winter contaminants only occur at lower temperatures (40 °F/4 °C and below typically). If data providers decide to provide takeoff data based on contaminant type and depth, it would be expected that they would use good judgment in deciding the temperature range to be covered. If they choose to not provide specific performance data for winter contaminants above 40 °F/4 °C because it environmentally cannot occur, this would still be considered coverage over the operational envelope.

<table>
<tr><th>No.</th><th>Comment</th><th>Requested Change</th><th>Disposition</th></tr>
<tr><td></td><td colspan="3">Commenter: Airbus</td></tr>
<tr><td>7.</td><td>6.2 Table 1

As the intent of this table is to differentiate solid from loose contaminants, then dry and wet should be removed from the table (not contaminant types).

§10.2.1 states that for existing type designs data should be provided for the list of runway surface condition description given in Table 2. Airbus recommends that this AC should explicitly state that new type designs data should be provided for the list of runway surface condition description given in Table 2.

Airbus also recommends including in Table 1 the loose contaminant specific gravities and depth ranges according to information contained in the TALPA-ARC transmission files for landing (ARC 25.125 Rule proposal Document rev(13)3-25.doc p2.12)</td><td>Airbus suggests to remove dry and wet from the table.</td><td>We partially concur with this comment and revised the document where applicable.

As to the first comment, we do not concur that the intent of table 1 is to differentiate between solid and loose contaminants. Rather, the intent is to provide the runway surface condition descriptions for which data should be provided. Therefore, we did not revise the AC regarding this comment.

As to the second comment about paragraph 10.2.1, we do not concur that it would be beneficial to add an additional sentence explicitly targeting new type designs.

As to the third comment on specific gravities, we concur with this comment. Instead of adding it to table 1, we added a new paragraph 8.1.3 and table 3 as follows:

8.1.3 Data should be provided for the specific gravities in the table 3 below:

Table 3. Loose Contaminant Specific Gravity
<table>
<tr><th>Runway Description</th><th>Specific Gravity</th></tr>
<tr><td>Dry Snow</td><td>0.2</td></tr>
<tr><td>Wet Snow</td><td>0.5</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>No.</th><th>Comment</th><th>Requested Change</th><th>Disposition</th></tr>
<tr><td></td><td colspan="3">Commenter: Airbus</td></tr>
<tr><td></td><td></td><td></td><td><table><tr><td>Slush</td><td>0.85</td></tr><tr><td>Standing Water</td><td>1.0</td></tr></table></td></tr>
<tr><td>8.</td><td>6.3

In EASA AMC25.1591, the maximum recommended depth is 0.59’’ (15mm) for standing water and slush if water-trough tests, performed in the frame of aircraft certification, allow demonstrating engine and structure integrity for operations up to these maximum depths.

As suggested in above comment to §6.2, it is proposed to add in table 1 loose contaminant specific gravities and depth ranges information.</td><td>Accordingly, it is proposed to modify §6.3 as follows:

“For loose contaminants, data should be supplied for the reportable contaminant depths identified in FAA Order JO 7930.2P (or later revision) up to the maximum contaminant depth for each of these contaminants. Due to issues of potential structural damage from spray impingement, engine ingestion, and significant effects on one-engine-inoperative acceleration capability, the recommended maximum depths for takeoff operations for loose contaminants are those provided in Table 1.”</td><td>We partially concur with this comment and revised the AC. We concur with the statement on including specific gravities and included them in a new paragraph 8.1.3 as noted in comment #7 above.

We do not concur with adding the additional information proposed on depth and did not revise the AC regarding this item.

Paragraph 6.3 states: “…Due to issues of potential structural damage from spray impingement, engine ingestion, and significant effects on one-engine-inoperative acceleration capability, the recommended maximum depth for takeoff operations for slush and water is ½ inch.”

As the TALPA ARC reported depths are ½″ and ¾″, it is not necessary to change this to 0.59″ because this value will not be reported. According to FAA Order JO 7930.2Q, anything deeper than 0.5″ will only be reported as 0.75″ and, therefore, above the recommended threshold of EASA.</td></tr>
</table>

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No.	Comment	Requested Change	Disposition
	Commenter: Airbus		
9.	7.5 Table 2 Wheel Braking Coefficients as a Function of Runway Surface Condition For consistency reason with ICAO Friction Task Force conclusions, it is suggested to replace in the runway surface condition description "Ice" by "Ice (dry and cold)".	In the last row of Table 2, Airbus suggests to replace in the runway surface condition description "Ice" by "Ice (dry and cold)"	We do not concur with this comment and did not revise the AC. The current FAA definitions of Ice and Wet Ice are adequately descriptive.
10.	8.2 Historical JAR25 or CS25 compliant Airbus takeoff data for contaminated runways has always considered full depth accountability for the contaminant drag computation throughout the rejected takeoff.	In accordance with TALPA-ARC, it is strongly recommended to protect acceleration and therefore to be conservative for the acceleration phase (capability to reach V1 and VR).	We concur with this comment and revised the AC. Due to other comments, we revised paragraph 8.2 to explicitly state that 50 percent of the reported contaminant depth (drag) should be applied to both the acceleration and stop portion of the accelerate-stop calculations. This revision to paragraph 8.2 clarifies that the concept of one half the depth is solely for the accelerate-stop calculation and does not affect the acceleration for continued takeoff between V_1 and V_R following an engine failure, which should be done considering the full depth of the reported contaminant.

No.	Comment	Requested Change	Disposition
	Commenter: Airbus		
11.	10.2.1 For existing type designs, data developed in compliance with JAA or EASA requirements is typically incomplete compared with the contaminants listed in Table 2. The AC should allow the data provider restricting operations to a subset of the runway conditions for which he publishes data.		We concur with this comment but did not revise the AC. The FAA agrees the data provider and operator are free to restrict operations to a subset of the runway conditions for which they do not have data, or not provide data at all. The existing parenthetical in paragraph 10.2.1 covers this scenario.
12.	10.2.1	Airbus suggests replacing "You should develop data…" by: "The data provider should develop data…"	We concur with this comment. We revised the AC as requested.
13.	10.3	Airbus suggests replacing "However, you should not use reverse thrust credit..." by: "However, reverse thrust credit should not be used…"	We concur with this comment. We revised the AC as requested.
14.	11.2 Data Label If the data was originally developed in compliance with JAA or EASA certification requirements, this data labelling is unnecessary.		We concur with the comment and changed that paragraph as follows: "If the data provided is not certified or approved by a certification agency, it should be labeled as "Advisory Data Only" or similar wording."

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No.	Comment	Requested Change	Disposition
	Commenter: Textron Aviation		
1.	Multiple AC 25-7D has not yet been released, yet is referenced multiple times in this document.	If AC 25-7D is not released before the release of this AC 25-X, consider referencing AC 25-7C instead.	We concur and changed the AC to reference "AC 25-7C." Issuance of AC 25-7D has been delayed and will not likely be issued before this AC is issued.
2.	Page 3, Para 5.3 Taken literally, the definition for contaminated runway contradicts the definition for wet runway. Wet runway is neither dry nor contaminated, and consists of less than 1/8 inch (3mm) of visible dampness or water. Here contaminated is specifically defined as having any depth of water.	"For purposes of condition reporting and airplane performance, a runway is considered contaminated when more than 25% of the runway (within the reported length and the width being used) is covered by any depth of frost, snow, slush, or ice, or by 1/8 inch (3 mm) or more of water."	We concur with the comment and the intent of the requested change. We added the following clarifying note to paragraph 5.3: "The definition of water in the context of condition reporting and airplane performance is the definition in paragraph 5.3.6 of this AC, which is a depth of greater than 1/8 inch (3 mm). This terminology is consistent with the definitions used in NOTAMs as published in AC 150/5200-28E and Order JO 7930.2Q (or later revisions)."

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	Commenter: Textron Aviation		
3.	Page 4, Para 5.5 The last sentence is not worded clearly, as one possible interpretation might be that braking friction is only affected for loose contaminants. Suggest rearranging.	Change the second sentence to read: "Takeoff performance data based on runway surface condition may include the effects of the contaminant on braking friction, and the effects of contaminant depth on drag."	We concur with this comment. We revised the document to replace the definition of Runway Surface Condition with one that can be used in both the takeoff and landing AC. It now states: "The runway surface condition is a description of the contaminants (if any) on the surface of a runway. Takeoff and landing performance data based on runway surface condition may include the effects of the contaminant on braking friction and the effects of contaminant depth on drag as appropriate."
4.	Page 5, Table 1 The Runway Surface Condition Description column includes "Standing water", which is referred to as simply "water" in the rest of the AC. If no distinction is intended, perhaps standardize the text and just use "Water" in this table.	Table 1, Change "Standing water" to "Water".	We concur with this comment. We revised the AC as requested.
5.	Page 5, Para 6.3 The last sentence implies that loose contaminants significantly affect only the airplane's one-engine-inoperative acceleration capability. Loose contaminants may significantly affect the airplane's acceleration capability throughout.	Replace "and significant effects on one-engine-inoperative acceleration capability" with "and significant effects on an airplane's acceleration capability".	We concur with this comment. We revised the AC as requested.

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	Commenter: Textron Aviation		
6.	Page 5, Para 7.2 The second sentence implies that there is no clearway credit allowed at all when determining the takeoff run for a wet runway, but § 25.113(c)(2)(ii) does allow clearway credit for the determination of horizontal distance with all engines operating to a height of 35 feet. Suggest clarifying the statement in this draft AC to specifically reference no clearway credit for the wet engine-out calculation.	"This includes the definitions of takeoff distance (§ 25.113(a) (2) and (b)) and takeoff run (§ 25.113(c) (2)) in terms of the height at the end of the takeoff distance and lack of credit for clearway in the wet takeoff distance determined in accordance with § 25.111."	We do not concur with this comment and did not revise the AC. We disagree that paragraph 7.2 implies there is no clearway credit in every instance. Please note: • The wet runway provisions of § 25.113 apply. • The AC specifically calls out the definition of All Engine Takeoff Distance. (Section 25.113(a)(2) applies.) • The AC specifically calls out the definition of Takeoff Run on a wet runway. (Section 25.113(c)(2) applies.) This combination means that the all-engines-operating wet runway requirement in § 25.113(c)(2)(ii) applies. The result of this combination is that clearway credit is allowed for all engine distance calculation on a contaminated runway as it is for a wet runway.

No.	Comment	Requested Change	Disposition
	Commenter: Textron Aviation		
7.	Page 6, Table 2 In the Wheel Braking Coefficient column for 1/8" or greater of Water and Slush, there are several instances where footnote 3 is referenced regarding the hydroplaning speed. There is no footnote 3 below the table. These references should be to footnote 2. The wheel braking coefficient value of 0.16 in (1) should have a reference to footnote 1. Also, the reference to § 25.109(c) is missing a period.	(1) For speeds below 85% of the hydroplaning speed[2]: 50% of the wheel braking coefficient determined in accordance with § 25.109(c), but no greater than 0.161; and (2) For speeds at 85% of the hydroplaning speed[2] and above: 0.051.	We concur with this comment. We revised the AC as requested.
8.	Page 7, Para 8.2 Is the FAA recommending that data providers consider using 50% of the reported contaminant depth for determining the accelerate-stop distance? Or is the FAA recommending that data providers consider using 50% of the reported contaminant depth for determining the stopping portion of the accelerate-stop distance? This was not part of the TALPA ARC recommendations, because the effects were expected to offset each other, as stated. Discussion of the implications this recommendation might have to decision speed may be warranted.	Clarify the intent of the recommendation, or consider striking.	We concur with this comment. We have revised the text to specify that 50 percent of reported contaminant depth applies to both the accelerate and stop portion of the accelerate-stop computation.

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	Commenter: Textron Aviation		
9.	Page 10, Para 11.2 As many manufacturers have been providing contaminated runway performance in an advisory capacity for a number of years, there have likely been numerous ways of labeling or identifying this data as advisory. Suggest a minor wording change to this paragraph to convey the intent without identifying a specific label.	"Wherever the data is provided, label the data as "Advisory Data Only" or use similar wording."	We concur with this comment. We revised the AC as requested.

DISPOSITION OF PUBLIC COMMENTS

AC 25-31, *Takeoff Performance Data for Operations on Contaminated Runways*

Prepared by Paul Giesman, ANM-111

No.	Comment	Requested Change	Disposition
	Commenter: Delta Air Lines, Inc. (DAL)		
1.	DAL agrees with the conclusions of the TALPA ARC regarding the reporting of ranges of contaminant depths rather than an exact value. Exact reporting of depth is not feasible nor can one expect the reporting authority to distinguish between 1/8" and slightly less than 1/8". DAL is of the opinion that all depth reporting should be in ranges given the inability to measure a value or presume that the entire piece concrete is at a constant depth. Furthermore, DAL has implemented the TALPA ARC recommendations in SOPs and training programs based on the overwhelming industry wide acceptance of those recommendations. Realigning DAL business processes to the 'slightly revised' RCAM would be costly and time consuming. Based on the TALPA ARC conclusions, which entailed 2 to 3 years of reporting observances and corresponding performance assessments, the findings do not provide an increased margin of safety benefit by introducing a depth of exactly 1/8". DAL currently operate aircraft that do not provide 1/8" depth contaminant performance. Including an exact depth of 1/8" would require using the more conservative ¼" performance data provided by the mfgs for those aircraft.	Change: Depth reporting should be in ranges given the inability to measure a value or presume that the entire piece concrete is at a constant depth.	We do not concur with this comment and did not revise the AC as the reporting methods are outside the scope of this AC. The TALPA ARC project includes implementation of multiple products by different parts of the FAA that are on schedules specific to the product. We passed your comment on and suggested change to the appropriate FAA organization for consideration as they continue working on their AC, Order, or Operations Specification (Ops Spec) or other product. The Takeoff and Landing Performance ACs on takeoff and landing performance data are leading the project to provide manufacturers and data providers time to create performance data consistent with the airport/NOTAM reporting methods and the Ops Spec revision. The specific comment is appropriate for the Airport ACs and has been forwarded to the appropriate group. Parts of the discussion in this comment does touch on the 1/8″ issue of whether it is contaminated or not for performance purposes. Please note that we changed the AC such that wet runway performance is assumed when water or loose contaminant depth is 1/8″ (3 mm) or less; the wheel braking performance due to the loose contaminant is assumed when the depth of the loose contaminant is greater than 1/8″ (3 mm).

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1.	The following comments pertain to the entire AC, with "Requested Changes" allied with the topic in my comments. The original recommendation from the TALPA ARC part 25 working group was in line with the reporting criteria developed by the Part 121 and part 139 working groups (and agreed to by the entire TALPA ARC in the form of the "MATIX") as follows: • Report "1/8 inch" when 1/8 inch or less is observed • Report "1/4 inch" when 1/4 inch or less and greater than 1/8 inch is observed • Report "1/2 inch" when 1/2 inch or less and greater than 1/4 inch is observed • Etc. **The term "THIN" was never intended to be included in the final reporting criteria.** Unfortunately, the current version of FAA Order JO 7930.2P retained "Thin" as an interim step to get to the reporting criteria describe in this AC in section 8.1.1 I believe that the guidance in 6.3 is incomplete, and needs to clarify the one time that the 1/8 inch penalty needs to be applied.	6.3 For loose contaminants, data should be supplied for the reportable contaminant depths identified in FAA Order JO 7930.2P (or later revision) up to the maximum contaminant depth for each of these contaminants. Due to issues of potential structural damage from spray impingement, engine ingestion, and significant effects on one-engine-inoperative acceleration capability, the recommended maximum depth for takeoff operations for slush and standing water is ½ inch. 6.3.1 Loose Contaminants 1/8 inch or less do not require an impingement drag penalty, but creation of the 1/8 inch equivalent penalty would be required for Dry Snow greater than 1/8 inch up to and including 1 inch. 6.3.2 Loose Contaminants that are reported as 1/8 inch or less should use data per method defined in § 25.109(c).	We do not concur with this comment and did not revise the AC as the reporting methods are outside the scope of this AC. The TALPA ARC project includes implementation of multiple products by different parts of the FAA that are on schedules specific to the product. We passed on your comment and suggested change to the appropriate FAA organization for consideration as they continue working on their AC, Order, or Operations Specification (Ops Spec) or other product. The Takeoff and Landing Performance ACs on takeoff and landing performance data are leading the project to provide manufacturers and data providers time to create performance data consistent with the airport/NOTAM reporting methods and the Ops Spec revision. Parts of the discussion in this comment does touch on the 1/8″ issue of whether it is contaminated or not for performance purposes. Please note that we changed the AC such that wet runway performance is assumed when water or loose contaminant depth is 1/8″ (3 mm) or less; the wheel braking performance due to the loose contaminant is assumed when the depth of the loose contaminant is greater than 1/8″ (3 mm).

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2.	2.2 states that "this AC in neither mandatory nor regulatory in nature" however AC are and will be regulatory in nature to Airports in the form of AC 150/5200-30D. If that AC comes out with the Depth descriptors that were changed by the FAA in AC-91-79A and in AC 25-X Takeoff and AC-25-X landing, it will force the airports to report an 1/8 inch (which will be the lowest level of depth they can report) of Dry or Wet Snow as a Code 3, and an 1/8 inch of Slush and Water as a Code 2 even though the data from the two years of validation showed those runways to be Good Braking Action		We concur with this comment, and we changed the AC. Wet runway performance is assumed when water or loose contaminant depth is 1/8″ (3 mm) or less; the wheel braking performance due to the loose contaminant is assumed when the depth of the loose contaminant is greater than 1/8″ (3 mm).
3.	Based on the TALPA ARC Recommendations, a runway should be reported WET if there is no visible standing water, and should be reported contaminated if the runway has standing water. This is the only place that the "less than 1/8 inch (3 mm) in depth" works. The Note below the Wet runway definition should probably be clarified with the added text in red.	5.2 Wet Runway. A runway is wet when it is neither dry nor contaminated. For purposes of condition reporting and airplane performance, a runway can be considered wet when more than 25 percent of the runway surface area (within the reported length and the width being used) is covered by any visible dampness or water that is less than ⅛ inch (3 mm) in depth. Note: A damp runway that meets this definition is considered wet, regardless of whether or not the surface appears	We do not concur with this comment and did not change the AC. The TALPA ARC recommended definitions were finalized and modified as determined by a cross-function team of FAA representatives from Flight Standards (AFS-200), Transport Airplane Directorate (ANM-100), and Airports (AAS-300). Therefore, we did not implement the requested change since the current definition meets the needs of the majority of the interested parties. The specific additional sentence in the note recommends a change in the reporting methods, which are outside the scope of the AC. Reporting standards are worked by FAA

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		reflective. A reflective runway should be reported as 1/8 inch of standing water, as opposed to "Wet".	Airports (AAS-300). Please note that paragraph 5.2 was modified to change the depth at which the runway will be considered wet to 1/8″ or less in response to other comments. Paragraph 5.2 now reads as follows: "Wet Runway. A runway is wet when it is neither dry, nor contaminated. For purposes of condition reporting and airplane performance, a runway can be considered wet when more than 25 percent of the runway surface area (within the reported length and the width being used) is covered by any visible dampness or water that is 1/8 inch (3 mm) or less in depth."

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<tr><th>No.</th><th>Comment</th><th>Requested Change</th><th>Disposition</th></tr>
<tr><td></td><td colspan="3">Commenter: Alaska Airlines</td></tr>
<tr><td>4.</td><td>Again, Water is the one area where if it is less than 1/8 inch, all the way to just damp, then the runway would be reported as Wet vs “Water”. If the runway is reflective, it is a good indication that it is more than just Wet. That information may not belong in AC 25-X takeoff, but it might belong in the Airport and 121 AC.

I believe the following guidance would also be appropriate.

This all assumes that the FAA is going to “Fix” the depth criteria in the RCAM back to what was tested and validated during the 2009-2011 validation.

The question then becomes, if the FAA wants us to treat a runway that has 1/8 inch reported contaminant as a contaminated runway instead of Wet, would that preclude the use of ATM Reduced Thrust?

NOTE: This rainfall intensity depth criteria has been used by Alaska Airlines since July 2014, but it applies more to landing then to takeoff. See my note in the Landing comments.</td><td>5.3.6 Water.

Water in a liquid state. For purposes of condition reporting and airplane performance, water is ⅛ inch (3 mm) or greater in depth. In conditions of steady rain, the depth of water on a runway may be a function of the rainfall intensity. In the absence of a current FICON Report/PIREP or the ability to visually assess the runway condition (takeoff), assume water depths as follows:

<table><tr><td>Light Rain</td><td>-R</td><td>Runway is Wet</td></tr><tr><td>Moderate Rain – Grooved Runway</td><td>RN</td><td>Water depth is 1/8 inch or less</td></tr><tr><td>Moderate Rain – Un-grooved Runway</td><td>RN</td><td>Water depths of more than 1/8 inch</td></tr><tr><td>Heavy Rain</td><td>+RN</td><td>Water depths of more than 1/8 inch</td></tr></table></td><td>This comment is beyond the scope of the TALPA ARC recommendations and this AC; therefore, we did not revise the AC.

The FAA recognizes that over the last five years there have been instances where reduced wheel braking was experienced during moderate to heavy rain. This was addressed by Flight Standards in SAFO 05012. However, there is not universal acceptance on the physics or the runway characteristics, which may cause the reduced braking that has been observed.

The effect of rain intensity will be included in the upcoming Flight Test Harmonization Working Group activity that will look into wet runway issues. This comment will be included for consideration in that activity.</td></tr>
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5.	Table 2 is the sources of the problems in this AC. Redefining the Depth from "1/8 inch or less" to "Less than 1/8 inch" is an extremely significant change that needs to be corrected. Here are the reasons that this must be changed: Depths of "Less than 1/8 inch" will simply not be reported. As a result of the FAA's change to the RCAM in AC91-79A and AC 25-X, this would force the airports to Code the runway as a 2/2/2 for ***any*** reported depth of slush or standing water, and a 3/3/3 for ***any*** reported depth of Dry or Wet Snow, when full implementation occurs. The validation that Alaska Airlines, Pinnacle Airlines, 29 airports and the FAA did over two winter seasons validated that the reporting of an 1/8 inch contaminant resulted in a Good Pilot Braking action Report 1045 times vs only 25 times that condition was rated either Medium or Medium to Poor. The airports were trained not to use the term "Thin" in the data collection, and report depths in accordance with the TALPA ARC Depth criteria. Early adopter airlines include: Alaska, Pinnacle, United, Delta, American/US Airways, UPS, FedEx (recently started programming and training based on original Matrix), Southwest, West Jet, and JetBlue.	**Runway Surface Condition Description** • Frost • Wet (includes damp and water less than 1/8″ deep) 1/8″ (3 mm) or less depth of: • Water • Slush • Dry snow • Wet snow -15 °C and colder outside air temperature: • Compacted snow • Wet ("slippery when wet" runway) • Dry snow or wet snow (any depth) over compacted snow Greater than 1/8″ (3 mm) depth of: • Dry snow • Wet snow Warmer than -15 °C outside air temperature: • Compacted snow Greater than 1/8″ (3 mm) depth of: • Water • Slush • Ice	We concur with this comment, and we changed the AC. Wet runway performance is assumed when water or loose contaminant depth is 1/8″ (3 mm) or less; the wheel braking performance due to the loose contaminant is assumed when the depth of the loose contaminant is greater than 1/8″ (3 mm).

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	This would include extensive programmatic changes to our ACARS System, and our Dispatch and pilot performance software, extensive re-training of our pilots that would actually turn into negative training since our pilots already know that 1/8 inch of contaminant is going to be Good Braking Action Detrimental effect on operational reliability Takeoff data for 1/8 inch Slush would have to be based on Slippery (Poor) data even though the validation data shows that runway to be 5/5/5 Good. This would prohibit Takeoff Operations in these conditions on runways shorter than: 8500 737-700 9800 737-800SFP 10200 737-800W 11000 737-900W 11400 737-400 Every station in the state of Alaska (except ANC and FAI) would be unavailable for takeoff with this new depth criteria. This would prohibit Landing Operations in these conditions on runways shorter than: 6700 737-700 6800 737-400 7300 737-800SFP		

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	7700 737-900ER and 737-800W 7800 900W NOTE: This data assumes the special training to use the 1000 ft. air run.		
6.	Reporting "Thin" contaminants will go away with AC 150/5200-30D and the new FAA Order replacing JO 7930.2P this AC in should reflect the TALPA ARC Recommended reporting criteria. Keep in mind section 8.1.1. I would suggest adding the additional clarification to 8.1.1.	8.1.1 Contaminant depths are reported in field condition reports using specific depth increments: ⅛ inch, ¼ inch, ½ inch, 1 inch, etc. Depths up to and including ⅛ inch would be reported as ⅛ inch, between ⅛ inch and ¼ inch are reported as ¼ inch; depths between ¼ inch and ½ inch are reported as ½ inch; and so on.	We do not concur with this comment and did not revise the AC. In response to Boeing comment #7 on page 6, we replaced the depth increments with a reference to FAA Order JO 7930.2Q.
7.	Sections 10.2.1, 10.3, and 11.1 all use the term "you". Who is you? Is that the airplane manufacturer? The operator? The Flightcrew?		We replaced "you" with "data provider" in the AC.

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8.	The application of the appropriate performance penalties were also accounted for by the original TALPA ARC work. Here is a summary of those penalties, and how they were intended to be applied: ***Dry runway.*** For airplane performance purposes and use of this Matrix, a runway can be considered dry when no more than 25 percent of the runway surface area within the reported length and the width being used is covered by: 1. Visible moisture or dampness, or 2. Frost, slush, snow (dry or wet), ice, or compacted snow. Then: • For Landing, use DRY Advisory Landing Data. This data does not need to be "factored" with the additional 15% safety margin since it is predicated on advisory autobrake data to a complete stop on the runway with no pilot intervention. Factoring this data could lead a pilot to use significantly more autobrakes than required and could lead to stopping short on the runway and causing go-around of subsequent aircraft as a result.		Much of this comment goes beyond the subject of this AC, which is takeoff performance data. Parts of the comment touch on the definition of whether the runway is to be considered contaminated. In response to this comment and others, we changed the AC. Wet runway performance is assumed when water or loose contaminant depth is 1/8″ (3 mm) or less; the wheel braking performance due to the loose contaminant is assumed when the depth of the loose contaminant is greater than 1/8″ (3 mm). This will also be done in the RCAM and AC 91-79A. Many of the items in this list appear to be the application of the TALPA ARC concepts during operation, which are not the subject of this AC. The other requested change is to remove the term "THIN" from the FICON terminology and replace it with the recommended TALPA ARC guidance. FICONs and reporting terminology are beyond the scope of this AC. We forwarded this comment to FAA Airports (AAS-300) for consideration.

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	• For Takeoff, use DRY takeoff performance data. ***Wet runway.*** For airplane performance purposes and use of this Matrix, a runway is considered wet when more than 25 percent of the runway surface area within the reported length and the width being used is covered by any visible dampness or any water up to 1/8-inch (3 mm) deep. Then: • For Landing, use WET Advisory Landing Data based on Code 5/Good BA. This data does not need to be "factored" with the additional 15% safety margin since it is predicated on advisory autobrake data to a complete stop on the runway with no pilot intervention. Factoring this data could lead a pilot to use significantly more autobrakes than required and could lead to stopping short on the runway and causing go-around of subsequent aircraft as a result. • For Takeoff, use WET takeoff performance data. If the runway has **1/8 inch or less** of Wet or Dry Snow, Slush or Water:		

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	• For Landing, use Degraded Braking Action Landing Data based on Code 5/Good BA **with the additional 15% safety margin.** • For Takeoff, use data based on Code 5/Good (equivalent to WET) takeoff performance data. No impingement drag penalty needs to be applied. NOTE: The primary distinction between using WET data vs Code 5/Good data for takeoff would be the use of ATM Reduced Trust for takeoff. If the runway is reported as having 1/4 inch (**Greater than 1/8 inch** up to and including 1/4 inch) of Wet Snow, Slush , or Water: • For Landing, use Degraded Braking Action Landing Data based on Code 3/Medium BA with the additional 15% safety margin for Wet Snow and Code 2 Medium to Poor for Slush and Water (because of the risk of hydroplaning) • For Takeoff, use data based on 1/4 inch loose contaminant takeoff performance data. If the runway is reported as having **DRY SNOW** Greater than 1/8 inch up to and including 1 inch (Dry snow has a lower		

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	specific gravity than wet snow, slush or water, so its takeoff penalty is handed differently): • For Landing, use Degraded Braking Action Landing Data based on Code 3/Medium BA with the additional 15% safety margin • For Takeoff, use data based on **1/8 inch** loose contaminant takeoff performance data. **This would be the only time the current 1/8 inch penalty would need to be applied.** If the runway is reported as having 1/2 inch (Greater than 1/4 inch up to and including 1/2 inch) of Wet Snow, Slush , or Water: • For Landing, use Degraded Braking Action Landing Data based on Code 3/Medium BA with the additional 15% safety margin for Wet Snow and Code 2 Medium to Poor for Slush and Water (because of the risk of hydroplaning) • For Takeoff, use data based on 1/2 inch loose contaminant takeoff performance data. If the runway is reported as having **DRY SNOW** Greater than 1 inch up to and including 2 inches (Dry snow has a lower specific gravity than wet snow, slush or water, so its takeoff		

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	penalty is handed differently): • For Landing, use Degraded Braking Action Landing Data based on Code 3/Medium BA with the additional 15% safety margin • For Takeoff, use data based on 1/4 inch loose contaminant takeoff performance data. If the runway is reported as having **DRY SNOW** Greater than 2 inches up to and including 4 inches (Dry snow has a lower specific gravity than wet snow, slush or water, so its takeoff penalty is handed differently): • For Landing, use Degraded Braking Action Landing Data based on Code 3/Medium BA with the additional 15% safety margin • For Takeoff, use data based on 1/2 inch loose contaminant takeoff performance data. There are no takeoff performance data available for wet contaminant types (wet snow, slush, or water) for depths greater than ½ inch nor DRY SNOW Greater than 4 inches. Takeoff operations in these conditions would be suspended until the runway is cleared.		

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	If the contaminant is "Slippery" rather than loose (i.e. Compact Snow, Ice, Frost) then the takeoff and landing penalties are predicated on the Runway Condition Code assigned to that contaminant type and depth from the MATRIX. • For Landing, use Degraded Braking Action Landing Data based on the assigned Runway Condition Code with the additional 15% safety margin • For Takeoff, use the manufacturer's slippery data for the Runway Condition Code assigned. • NOTE: Boeing does not provided slippery takeoff data for the intermediate values, so it would be necessary to use Code 3/Medium for Compact Snow OAT -15 or colder (normally a Code 4/Good to Medium). **It is critical for the FAA to understand** that the work the TALPA ARC was done as a team. Even though there were many different working groups that addressed their specific parts of the regulations, we worked very hard to ensure our individual working groups recommendations were in concert with all of the other working groups within the ARC.		

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	The FAA, Alaska Airlines, and Pinnacle Airlines spent a great deal of time, energy and money to train 29 airports (11 in Alaska, and 18 in the lower 48) to report and validate the contaminant types and depth relationships on the MATRIX between 2009-2011. Alaska Airlines and Pinnacle Airlines also trained every pilot to use the MATRIX, and to make accurate Braking Action Reports. (This data is available at the FAA Technical Center.) At no time during training or testing was the "Less than 1/8 inch" criteria used or even discussed. As a result of that validation testing, the Validation Team from the FAA distributed the results to the rest of the TALPA ARC in the form of the Final Matrix Vertical and Horizontal (also attached). At some point after that, we were informed by the FAA that the TALPA ARC recommendations would not go through the actual rule making process, but the FAA would implement the TALPA ARC Recommendations, to include the Final Matrix Vertical and Horizontal versions, by Advisory Circular – **without change**. AC 150/5200-28E, JO 7930.2P CHG 1, AC 91-79A, and now AC 25-X Takeoff and AC 25-X Landing all have gone against the recommendations of the TALPA ARC without explanation. This definition change for the depth of		

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	contaminants on the RCAM in AC 91-79A and AC 25-x is more than significant. It undermines the cornerstone of the work the TALPA ARC did and the two year training and validation project after the TALPA ARC had completed its work. It also challenges the safe operations of Alaska Airlines, Pinnacle Airlines, Delta, American Airlines, United Airlines, FedEx, Southwest Airlines, and all of the other airlines that have chosen to voluntarily operate under the rules and guidelines that were recommended by the TALPA ARC, and have been using the Final Matrix Vertical or Horizontal for years. Many of these airlines have put considerable expense into developing aircraft performance tools that match the Final Matrix from the 2011 validation meeting. The RCAM in AC 91-79A and AC 25-X Takeoff and Landing must be revised back to the values that were included in the original TALPA ARC Matrix, and are repeated in the Final Matrix Vertical and Horizontal values as agreed upon by the TALPA ARC validation team in the spring of 2011. Additionally, the term “THIN” must be removed from the FICON terminology and replaced with the recommended guidance from the TALPA ARC. Originally, we were told that		

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	"THIN" was only temporary, and would be replaced with the recommended language from the TALPA ARC when runway condition codes were adopted. With the changes in the current versions of AC 91-79A and the draft versions of AC 25-X Takeoff and Landing, that is now in question.		

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	Commenter: Engineering Science Data Unit (ESDU)		
1.	Noting that the draft AC endorses the EASA AMC 25.1591, we consider it important to bring to your attention that the information upon which the current EASA AMC 25.1591 is based (provided by ESDU IHS) was withdrawn some years ago because of reduced confidence in its accuracy. The ESDU Data Items referenced in EASA AMC 25.1591 have been superseded by later methods that are considered to be more reliable and of greater accuracy. EASA was advised of this some time ago, but it appears that they have not yet taken action to update their AMC; we will write to them again on this matter.		We thank ESDU for the information. The intent of the TALPA ARC part 25 working group was to not "re-invent the wheel." The participating manufacturers did not want to create more than one set of data that would meet the needs of both the FAA and EASA. Since EASA already had a standard, it was adopted as one method of compliance. Two other thoughts on this item: 1. A data provider is free to use the ESDU information if they feel it provides a more realistic answer. 2. We assume that EASA will adopt the updated ESDU recommendation during a future revision of their standards. Since the AC simply says the EASA method is acceptable, the AC will still be valid if EASA revises their methods.

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2.	General Comments Whilst the draft AC provides coefficients for wheel braking (following a decision to abandon a take-off) it does not provide information on the drag arising from surface contaminants during the acceleration phase. Also, no guidance is given on the effects that surface contaminants may have on the value of VMCG (25.149(e)) or on the determination of the appropriate value of V1. On some contaminated surfaces controllability following engine failure may be so limiting that the reduction in payload and/or fuel required to operate within the certification requirements would make the flight uneconomic.		We do not concur with this comment and did not revise the AC. The FAA has found that section 8, "Accounting for the Drag of Loose Contaminates" addresses this issue by accepting EASA AMC 25.1591 methods for computing the contaminant drag and providing recommendations for accounting for the contaminant drag between V_R and V_{LO}. FAA determination of V_{MCG} does not take into account nose wheel steering and is considered applicable to all runway surfaces, so no additional discussion on V_{MCG} is required. As for telling the data providers how to determine V_1, the philosophy is to not over prescribe how a data provider creates data and handles issues such as V_1 adjustments. There are different possible methods and philosophies that may be used to address issues of computing takeoff performance, and this is left for the data provider to determine this implementation.

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3.	Paragraph 5.1 – Definition of 'Dry Runway'. We are surprised by the statement that "a runway may be considered dry when no more than 25 percent of the runway surface area.....is covered by....slush, snow (any type) or ice." Would this apply if a continuous length (measuring 25% of the runway) that the aircraft entered just as it reached V1 were to be covered in ice or snow? We do not believe that dry runway performance data could be considered valid in such circumstances. We would suggest that this needs further clarification.		We do not concur with this comment and did not change the AC. The TALPA ARC recommended definitions were finalized and modified as determined by a cross-function team of FAA representatives from Flight Standards (AFS-200), Transport Airplane Directorate (ANM-100), and Airports (AAS-300). Therefore, we did not implement the requested change since the current definition meets the needs of the majority of the interested parties. All issues pertaining to the 25-percent threshold were explored during the TALPA ARC. It was determined that the 25-percent standard that has long been used by the industry was reasonable in practical application during airport and flight operations. The scenario mentioned in the comment was discussed by the ARC but was considered unrealistic based on the normal airport operations and methods. Also, the FAA is unaware of any accidents or incidents that match the scenario discussed in the comment.

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4.	Paragraph 5.3 – The ESDU Performance Committee believes that the methods for the determination of runway 'friction' or contaminant depth established by ESDU provide a safer route for the qualitative determination of aircraft performance on such surfaces than methods based on subjective assessment.		We do not concur with this comment and did not revise the AC. However, due to a comment to the proposed *Landing Performance Data for Time-of-Arrival Landing Performance Assessments* AC, we added the following note to this AC expressing the background for the associated wheel braking coefficients. "**Note:** The wheel braking coefficients in table 2 of this AC were determined by the TALPA ARC part 25 working group, based on their experience and accepted performance levels on different surfaces as defined by aircraft certification agencies (EASA). They were verified to the greatest degree possible by the latest industry flight testing as embodied by the Joint Winter Runway Friction Program, which was active from 1995 to 2004. This AC may be revised if future industry-level acceptance of new information becomes available."

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5.	Paragraph 7.2 - This paragraph suggests that a full determination of V1 is required, but it does not identify the relevant regulations or how they are to be applied in the presence of any runway contaminant.		We do not concur with this comment and did not revise the AC. Paragraph 7.2 recommends the standards of § 25.113 for wet runway be used when computing the accelerate and continued takeoff considerations. Paragraph 7.5 provides wheel braking coefficients for consideration during the accelerate-stop calculation. Section 8 provides recommendations for accounting for the drag of loose contaminants during the calculation of accel-go, accel-stop and the all engine calculation. Section 9 provides recommendations on use of reverse thrust. When a data provider applies this information, it must determine a V_1 that meets the other normal takeoff constraints as called out in § 25.107. The AC references in section 7 and 8 provide enough information to compute a V_1 speed.

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	Commenter: Engineering Science Data Unit (ESDU)		
6.	Paragraph 7.5 – There are ESDU items that provide specific theoretical methods for the determination of braking coefficients for all contaminants.		We do not concur with this comment and did not revise the AC. A data provider is free to use the ESDU information if they feel it provides a more realistic answer.
7.	Paragraph 7.5, Table 2 – Water and slush in excess of 3mm and the hydroplaning speed. Note 2 presents the equation for the hydroplaning speed in a very definite manner. i.e. The hydroplaning speed..... is given by... . It is recommended that this at least be amended to say that an estimate of the hydroplaning speed, VP, may be obtained using the equation. The ESDU Performance Committee believes that the answers given by this equation are not necessarily conservative; hydroplaning can occur at lower speeds and there are also hysteresis effects.		We concur with the ESDU comment and will change the note to read: "The hydroplaning speed, V_P, may be estimated by the equation ….." The notes in the wheel braking coefficient column uses 85% of the hydroplaning speed to address the hysteresis affect discussed in the comment.

No.	Comment	Requested Change	Disposition
	Commenter: Engineering Science Data Unit (ESDU)		
8.	Paragraph 8.2. The use of 50% of the reported contaminant depth for the accelerate-stop calculation may be unsafe for some conditions. Using 50% of the depth when determining the predicted performance may mean that the true acceleration distance will be significantly longer than calculated, without there being an equivalent reduction in stopping distance.		We do not concur with this comment. We clarified this issue as requested by two other commenters. We revised the text to clearly specify the "50% of depth" applies to both the accelerate and stop portion of the accelerate-stop computation. The TALPA ARC made it clear that the concept of using equal depth for both the accelerate portion and stop portion was an acceptable interpretation. When accelerate-stop performance is computed, a lower depth of contaminant results in a longer distance for the same assumed V_1 speed. Hence computing accelerate-stop distance with half the reported depth is conservative as compared to the traditional interpretation of computing the accelerate-stop distance based on the reported depth of contamination. The interpretation that ESDU recommends is a much more conservative interpretation and would have the result of significantly increasing the runway required and curtailing operations without proof that there is a need for this additional conservatism in calculation of the accelerate-stop distance.

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9.	Paragraph 8.3 – EASA AMC 25.1591. The ESDU contaminant drag estimation methods referenced in EASA AMC 25.1591 are out of date and have been withdrawn. These have been replaced with later methods. We will advise EASA that AMC 25.1591 needs to be revised.		No change to the AC is needed. Same disposition as EDSU comment #1 on page 38.
10.	Paragraph 8.5 – Whilst the intent of this paragraph is understood, the ESDU Performance Committee is doubtful that meaningful information can be provided because there are too many potential permutations of runway and wind conditions and aircraft events (such as engine failure).		We do not concur with this comment and did not revise the AC. The FAA has found that airplane manufacturers have been providing guidance on airplane crosswind capability on contaminated runways for a number of years. For at least some of the manufacturers, this guidance has included the effect of engine failure on takeoff.

No.	Comment	Requested Change	Disposition
	Commenter: Engineering Science Data Unit (ESDU)		
11.	Paragraph 9 – The ESDU Performance Committee supports the principles of this section, but considers that in practice the variability of directional stability and control with runway contamination will prevent aircraft design organizations from being able to define a degree of reverse thrust that the crew will definitely be able to apply in all circumstances (or different levels depending upon the specific circumstances). If the degree of reverse thrust that will be set cannot be defined, then it will not be possible to calculate the stopping distances. If performance credit is to be given, as is proposed in the AC, then a specific level of reverse thrust must be set, as per the operational procedures. This implies that a different power/reverse lever detent level will be required for a contaminated runway. This may mean numerous detents depending upon the condition of the runway, crosswinds etc. This would be very difficult to engineer. The level of reverse thrust obtained from modern fan engines is a small percentage of stopping power when on a dry runway, but is very worthwhile on a contaminated runway with a poor level of wheel braking. Therefore the use of reverse thrust on		We do not concur with this comment and did not revise the AC. Manufacturers have been providing operational reverse thrust levels and, in some cases, certified data based on procedures for use of reverse thrust on contaminated and slippery runways for a very long time. These procedures are typically based on reducing the reverse thrust at some pre-determined speed as the airplane slows down and the use of symmetrical reverse thrust only for the contaminated runway stopping performance for four-engine airplanes. Please note the concept of reverse thrust for contaminated runway calculations of accelerate-stop distances goes back 50 years, including British CAA performance certifications where asymmetric reverse controllability issues had to be addressed.

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	contaminated runways is to be encouraged. But given variability in the degree of reverse capable that can be safely applied on a contaminated surface with inherent variability, plus possible crosswinds or other factors, it is not possible to ordain a certain level of reverse thrust, with detent, for a certain set of conditions. The current procedures, where reverse thrust is a safety bonus but without specific performance credit, works well. It allows the handling pilot to set and adjust the reverse thrust to a level that is within his ability to maintain directional control of the aircraft, but requires a runway length that assumes no reverse thrust will be applied.		

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12.	2.10 Paragraph 9 - In discussing reverse thrust there is no discussion of the use of, or credit for, nosewheel steering. Such credit is normally prohibited in the determination of VMCG, for example. But it may be reasonable to allow credit for nosewheel steering in determining contaminated runway controllability where this can be justified by the design organization.		We acknowledge the comment; however, we did not change the AC. Manufacturers have been providing operational reverse thrust levels and, in some cases, certified data based on procedures for use of reverse thrust on contaminated and slippery runways for a very long time. If the manufacturer takes into account engine failure when determining crosswind guidelines on contaminated runways, it may well have taken credit for nose wheel steering and differential braking.

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No.	Comment	Requested Change	Disposition
	Commenter: Bombardier		
1.	Recommend paragraph 5.1 on page 2 be changed as follows (to emphasize any type of water):	A runway is dry when it is neither wet nor contaminated. For purposes of condition reporting and airplane performance, a runway can be considered dry when no more than 25 percent of the runway surface area (within the reported length and the width being used) is covered by visible moisture or ~~dampness~~ water, frost, slush, snow (any type), or ice.	We do not concur with this comment and did not revise the AC. The TALPA ARC recommended definitions were finalized and modified as determined by a cross-function team of FAA representatives from Flight Standards (AFS-200), Transport Standards (ANM-100), and Airports (AAS-300). Therefore, we did not implement the requested change since the current definition meets the needs of the majority of the interested parties. The dampness term is used here to ensure commonality with the terms used in the definition of a wet runway which includes dampness.
2.	Recommend paragraph 5.3 page 4 be changed as follows (to clarify water depth):	For purposes of condition reporting and airplane performance, a runway is considered contaminated when more than 25 percent of the runway surface area (within the reported length and the width being used) is covered water that is 1/8 inch (3 mm) in depth or greater, and any depth of frost, snow, slush, or ice. Definitions for each of these runway contaminants are provided in paragraphs 5.3.1 through 5.3.8 of this AC.	We concur with the comment and the intent of the requested change. We added the following clarifying note to paragraph 5.3: "The definition of water in the context of condition reporting and airplane performance is the definition in paragraph 5.3.6 of this AC, which is a depth of greater than 1/8 inch (3 mm). This terminology is consistent with the definitions used in NOTAMs as published in AC 150/5200-28E and Order JO 7930.2Q (or later revisions)."

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	Commenter: Bombardier		
3.	Recommend paragraph 5.3.8 on page 4 be changed as follows (to remove mention of water depth):	Ice that is melting or with a layer of water on top.	We concur and revised the definition to remove the mention of a specific water depth: "Ice that is melting or ice with any depth of water on top."
4.	Recommend paragraph 8.1.1 on page 7 be changed as follows (for the situations with water less than ⅛ of an inch):	Contaminant depths are reported in field condition reports using specific depth increments: ⅛ inch, ¼ inch, ½ inch, 1 inch, etc. Depths between ⅛ inch and ¼ inch are reported as ¼ inch; depths between ¼ inch and ½ inch are reported as ½ inch; and so on. Depths of less than ⅛ inch and where braking may be worse than wet are reported as ⅛ inch.	We do not concur with this comment and did not revise the AC. In response to Boeing comment #7 on page 6, we replaced the depth increments with a reference to FAA Order JO 7930.2Q.
5.q	Recommend paragraph 9.1 on page 8 be changed as follows:	Procedures used in the determination of the accelerate-stop distance on a contaminated runway should be consistent with the normal procedures for use of reverse thrust during a rejected takeoff on a contaminated runway.	We do not concur with this comment as written and did not revise the AC. We believe the intent of this comment was to replace paragraph 9.1 with the following text where the second use of "contaminated" should actually read as "***un***contaminated": "Procedures used in the determination of the accelerate-stop distance on a contaminated runway should be consistent with the normal procedures for use of reverse thrust during a rejected takeoff on an ***un***contaminated runway." If this is the recommendation, then it very closely parrots the first sentence of paragraph

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			9.1 but leaves out the second sentence. No rationale is provided for leaving out the second sentence of paragraph 9.1; therefore, we left it in the AC.
6.	General Comment: BA's interpretation of this AC is that it provides an acceptable means for which takeoff performance data on wet and contaminated surfaces can be developed, in the absence of wet/contaminated takeoff data. However, the wet/contaminated runway takeoff performance data approved by either the Joint Aviation Authorities or EASA is also considered acceptable for use without any modification. BA request confirmation of its interpretation of this AC is correct		We agree with BA's interpretation. Section 10 provides guidance on current designs, which states that current JAA or EASA data is acceptable.

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	Commenter: Bombardier		
7.	Table 2 on Page 6: 1. There is no distinction between Wet Smooth and Wet Grooved surfaces. Consideration should be given to providing credit for the improved brake coefficient on wet grooved runway surfaces. 2. Please consider replacing Depth with Reported depth for all occurrences in Column 1 of Table 2. 3. Column 2, Table 2, replace 25109(c) to 25.109(c) 4. BA considers Take-off is prohibited on wet ice since it is not presented in Table 2.		Item 1. We do not concur with this comment and did not revise the AC. The FAA has found that grooved/PFC wet runway improved performance credit must be taken on a runway-by-runway basis. The operator is responsible for ensuring the specific runway in question is properly built and maintained according to the appropriate airport standards. Therefore, it is not appropriate to report via NOTAM an improved performance category, nor is it appropriate for operators to use the specific improved performance without the appropriate AFM substantiation and operational confirmation that the specific runway qualifies for such credit. Item 2. We do not concur with this comment and did not revise the AC. The TALPA ARC RCAM has been finalized. Table 2 in the Takeoff and Landing Performance ACs must remain consistent with the RCAM. Item 3. We concur and revised the AC as recommended.

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			Item 4. BA's interpretation is correct. No change to the AC is necessary.
8.	Paragraph 8.1.1 Page 6: Intermediate depths: At BA, we found situations where the performance penalty at the higher depth may be less than that at the lower depth. This is because of the different effects on acceleration and deceleration.	BA would like the AC to provide additional guidance to the operator when reported depth falls in between two depths for which performance is provided.	We do not concur with this comment and did not revise the AC. Method of presentation of data is strictly in the data providers purview. The philosophy is to not over prescribe how a data provider creates or presents data and to let the data provider provide instructions on items like this that is consistent with their specific methods.
9.	Paragraph 10.2 on Page 9: This is a change from TALPA ARC: it was said then that EASA-JAA data was acceptable for takeoff performance on wet and contaminated runways.	BA requests confirmation that EASA-JAA data is still valid for takeoff performance on wet and contaminated runways.	We do not understand this comment or requested change. Paragraph 10.2 is clear that current EASA-JAA data is acceptable assuming the caveats of paragraphs 10.2.1 and 10.2.2 are followed. We did not change the AC. Further, please see BA comment #6 on page 51.
10.	Paragraph 11.1 on Page 10:	BA requests that reference to Computerized Airplane Flight Manual be also included as an additional location for contaminated runway take-off performance data.	We do not concur with this comment and did not revise the AC. The FAA has found that the current verbiage does not specify a paper chart when referring to the AFM. The verbiage is flexible as written and can mean a computerized AFM as well as paper AFM.

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	Commenter: Private Citizen		
1.	Paragraph 2.2 With this not being mandatory a manufacturer can opt to provide the information, provide it based on different criteria, or not provide it at all. In essences this changes nothing from the status today. If the data is not required to be supplied by the manufacturer than the operator cannot be required to use advisory data. In order to have standardized data provided by the manufacturers and therefore operators required to use that data the processes described in this draft AC must be regulatory. Today the manufacturer is not required by the FAA to supply any takeoff or landing performance data for conditions other than dry and wet runway surfaces therefore operators are not required to base their safety critical takeoff and landing decisions on a runway surface condition worse than wet regardless of how contaminated or with the type of contamination that the operator knows is present on the runway surface, because that is the only data that the operator has available from the manufacturer. In other words the FAA is saying that there is no difference in the their eyes that requires regulation for a takeoff or landing on a wet runway, a runway covered with wet ice, slush, or any depth of snow. EASA has required the manufacturers	I recommend that in addition to this AC that the Agency begin rulemaking to implement the recommendation of the TALPA ARC. The aviation community worldwide has been waiting for rulemaking action by the FAA on the TALPA ARC recommendations.	We acknowledge the commenters recommendation that rulemaking be implemented addressing the TALPA ARC recommendations and recognize the frustration in the change in FAA priorities. Mitigating this lack of rulemaking in the foreseeable future is the widespread acceptance of TALPA ARC recommendations into the greater aviation community. The following is the current state of the FAA and industry activity as to TALPA ARC recommendations and implementations: • The TALPA ARC runway reporting provisions of TALPA ARC are being implemented by revision to the airport ACs and FAA Order JO 7930.2Q or later revision. • The TALPA ARC matrix has been published in AC 91-79A. • The recommended landing operational factor and landing factors recommended to be applied by the operator if the manufacturer does not provide appropriate data are being included in FAA Order 8900.1 and OPS SPEC 382.

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	to provide the various contaminate performance data for many years, it appears that the FAA is lagging in this critical safety area where a very large percentage of airplane accidents occur. The precedent has been set and endorsed by most aviation professionals around the world, many regulatory authorities, manufacturers and operators worldwide have been eagerly waiting for the FAA to publish regulations to implement the TALPA ARC recommendations for regulatory changes in this area, not additional advisory material. From a regulatory authority Safety Management perspective this non- regulatory approach simply does not appear logical. Has the agency completed a safety risk analysis on this non-regulatory approach and compared it to a regulatory approach? If so can the agency publish the documentation of that risk analysis in the public docket with the response to comment to this draft AC? I applaud the FAA on taking action on the work completed by the industry members of the TALPA ARC however I think that significant work is being significantly watered down by this non-regulatory approach. Other than the FAA not wanting to go through the difficult bureaucratic rulemaking process this approach is illogical.		• These Takeoff and Landing Performance ACs provide data providers with recommended methods to compute takeoff and landing time-of-arrival field length performance to be supplied to operators as advisory data. • The ICAO has released a state letter that encompasses the bulk of the TALPA ARC recommendations in revisions to standards and recommended practices of Annex 3, Annex 6, Annex 8, Annex 14, Annex 15. • EASA has chartered a rulemaking task looking at implementing TALPA ARC flight operations recommendations but may also look at airport and type certification issues as possible recommendations for action beyond its terms of reference. • Many aircraft manufacturers have either provided TALPA ARC based takeoff and landing time-of-arrival data or provided the option for the airplane operator to have said data in their manuals.

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			• Many aircraft operators have adopted principles in the takeoff and landing time-of-arrival data into their operation as a best practice and have facilitated a change in the specification for computerized airplane performance data to accommodate TALPA ARC recommended performance practices.
2.	Paragraph 5.2 Based on briefings by FAA personnel I understand that this change to the RCAM matrix and therefore carried over into this document, from the one recommended by the TALPA ARC and later evaluated by the agency and industry was based on a request by one air carrier. Although the FAA response to an air carrier request is greatly appreciated this specific change has created unintended consequences for all operators. Under the original MATRIX recommended by the TALPA ARC the lowest contaminant measurement was 1/8 inch or less, (not less than 1/8 inch), at first glance this is a small change however its effect is very significant. As FAA personnel has stated as recently as February 24, 2015 the reporting term "THIN" will eventually be eliminated. (This is		We concur with this comment. We changed the wet runway definition to "…any visible dampness or water that is 1/8″ or less in depth," which is consistent with historical standards and the TALPA ARC recommendation. We also changed this standard in multiple places in the document.

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	consistent with the TALPA ARC recommendation to eliminate these subjective measurement terms and use only actual measurements beginning with 1/8 inch, ¼, ½ and so on). With the change to the RCAM in this document and other FAA recent publications when the term "THIN" is eliminated any contaminate regardless of how thin it is (even dampness) will be reported as 1/8 inch depth, since that will be the smallest reportable measurement, with this change this will drive the RCAM code to a 2 or 3 depending on the type of contaminate. This change in the RCAM moves the RCAM code from the TALPA ARC recommendation of a code 5 to the revised FAA RCAM code 2 or 3, this change has a significant impact on the operational capability of the air carriers and is not consistent with the TALPA ARC recommendations or the results from the FAA/industry conducted evaluations of the TALPA ARC MATRIX. Unless the FAA has performance data to substantiate this major change in the RCAM it is recommended that the RCAM in this document and all FAA documents go back to the original MATRIX terms recommended and evaluated by the TALPA ARC.		

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	Commenter: Private Citizen		
3.	Paragraph 5.3.6 Same comment as previously stated for the change in the RCAM reference "less than 1/8 inch vs 1/8 inch or less.		We concur with this comment, and we changed the AC. Wet runway performance is assumed when water or loose contaminant depth is 1/8″ (3 mm) or less; the wheel braking performance due to the loose contaminant is assumed when the depth of the loose contaminant is greater than 1/8″ (3 mm).
4.	Paragraph 5.3.8 I believe this is also a change in definition of wet ice from that made in the TALPA ARC recommendations. I do not recall that there was a depth of water associated with water over ice in the recommended definitions. Unless the FAA has data to support this change logic tells me that water over ice regardless of its depth would have the same amount of surface friction (near zero). Therefore it does not seem logical to conclude that with water of less than 1/8 inch the RCAM code is "0" for water over ice, however with 1/8 inch of water or more the RCAM code is "2" for water 1/8 inch or greater, which is where one is driven with this definition. It therefore is recommended that the depth of less than 1/8 inch be dropped from the definition of wet ice in this document and all other FAA documents, unless the FAA		We concur and revised the definition to remove the mention of a specific water depth: "Ice that is melting or ice with any depth of water on top."

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	has data to support otherwise.		
5.	Table 2 "Wet (includes damp and water less than 1/8″ deep) See previous comment on the change in the RCAM to less than 1/8 inch from the recommended 1/8 inch or less.		We concur with this comment, and we changed the AC. Wet runway performance is assumed when water or loose contaminant depth is 1/8″ (3 mm) or less; the wheel braking performance due to the loose contaminant is assumed when the depth of the loose contaminant is greater than 1/8″ (3 mm).
6.	Table 2 "1/8″ (3 mm) depth, or greater, of: • Dry snow…" See previous comment on the change in the RCAM to less than 1/8 inch from the recommended 1/8 inch or less.	Suggest this be changed to "greater than 1/8 inch" to be consistent with the previous comment and the recommendations and evaluations of the TALPA ARC.	We concur with this comment, and we changed the AC. Wet runway performance is assumed when water or loose contaminant depth is 1/8″ (3 mm) or less; the wheel braking performance due to the loose contaminant is assumed when the depth of the loose contaminant is greater than 1/8″ (3 mm).
7.	Table 2 "1/8″ (3 mm) depth, or greater, of: • Water…" See previous comment on the change in the RCAM to less than 1/8 inch from the recommended 1/8 inch or less.	Suggest this be changed to "greater than 1/8 inch" to be consistent with the previous comment and the recommendations and evaluations of the TALPA ARC.	We concur with this comment, and we changed the AC. Wet runway performance is assumed when water or loose contaminant depth is 1/8″ (3 mm) or less; the wheel braking performance due to the loose contaminant is assumed when the depth of the loose contaminant is greater than 1/8″ (3 mm).

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8.	Paragraph 8.1.1 To be consistent with the other recommended changes to address the 1/8 inch contamination terminology this paragraph would need to be rewritten.	My suggested language is: "Depths of 1/8 inch or less are reported as 1/8 inch, depths greater than 1/8 inch but ¼ inch or less are reported as ¼ inch, depths greater than ¼ inch but ½ inch or less are reported as ½ inch, and so on….	We do not concur with this comment and did not revise the AC. In response to Boeing comment #7 on page 6, we replaced the depth increments with a reference to FAA Order JO 7930.2Q.