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FLIGHT OPS ENGINEERING

Alaska Airlines

Agenda

- Runway Condition Assessment Matrix (RCAM) – TALPA ARC Back Ground
 - Fido ICE
 - Wet Runway Reporting
 - RCAM / Vertical and Horizontal
 - SRM – On the risks of landing on short runways in Moderate or Heavy Rain
 - TAKEOFF RCAM
 - Questions
- 



Alaska Airlines operates into some of the most challenging airports in the world.

Alaska Airlines has been using the TALPA ARC Matrix for the Pilot in flight analysis since 2006 – 2007 winter season.

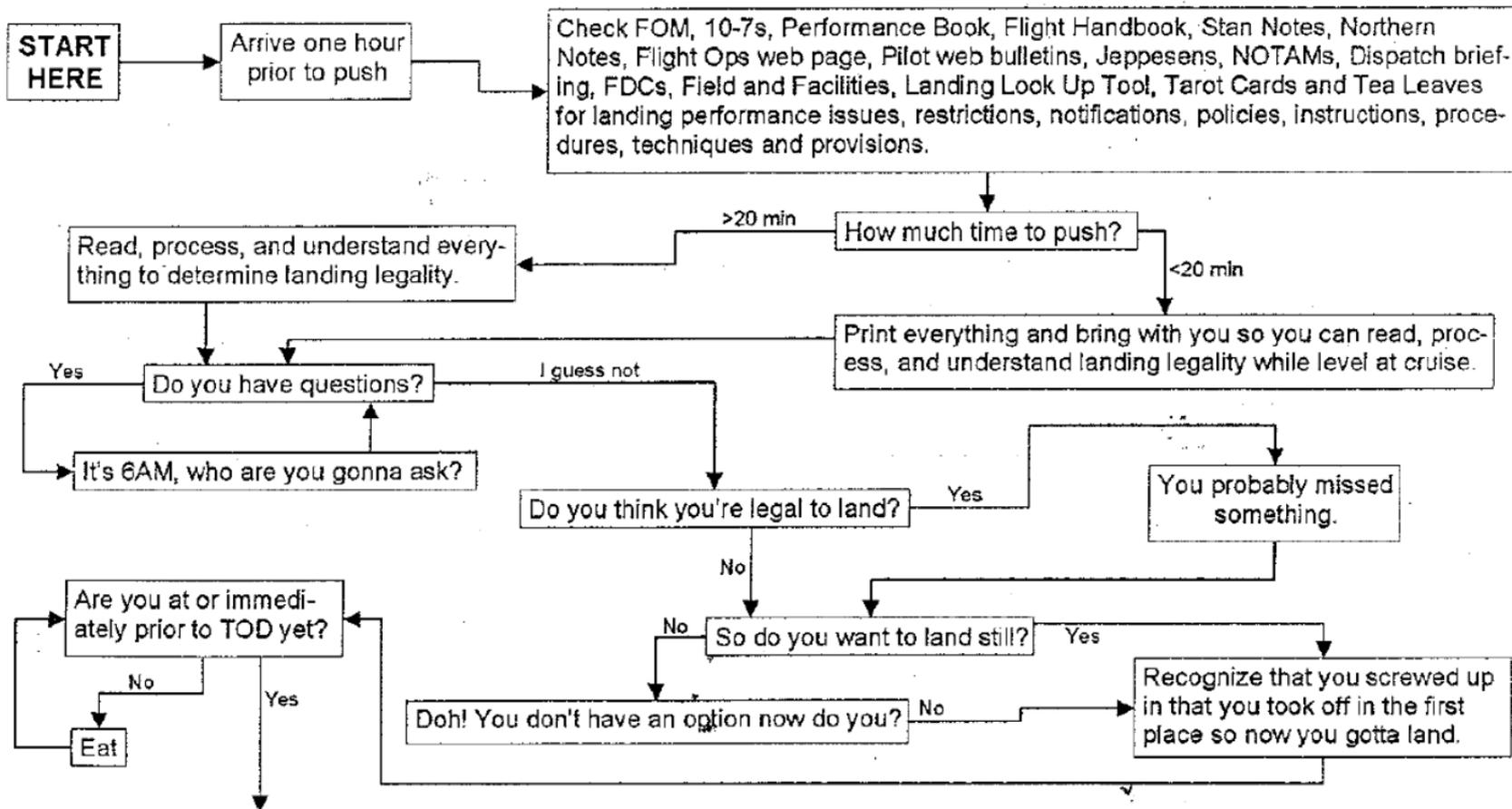
In fact, the very first RCAM was written on a cocktail napkin in the summer of 2006 in Washington DC.

The Original RCAM – Published by Alaska Airlines in Jan 2007

| BRAKING ACTION | | APPROXIMATE CORRELATIONS | | |
|--|--|---|------|------------|
| TERM | DEFINITION | RUNWAY SURFACE CONDITION | ICAO | |
| | | | CODE | MU |
| GOOD | Braking deceleration is normal for the wheel braking effort applied. Directional control is normal. | <ul style="list-style-type: none"> • Water depth of 1/8" or less • Dry snow less than 3/4" depth • Compacted snow with OAT at or below -15°C | 5 | 40 & ABOVE |
| GOOD TO MEDIUM | | | 4 | 39 - 36 |
| MEDIUM (FAIR) | Braking deceleration is noticeably reduced for the wheel braking effort applied. Directional control may be slightly reduced. | <ul style="list-style-type: none"> • Dry snow 3/4" or greater in depth • Sanded snow • Sanded ice • Compacted snow with OAT above -15°C | 3 | 35 - 30 |
| MEDIUM TO POOR | | | 2 | 29 - 26 |
| POOR | Braking deceleration is significantly reduced for the wheel braking effort applied. Potential for hydroplaning exists. Directional control may be significantly reduced. | <ul style="list-style-type: none"> • Wet snow • Slush • Water depth more than 1/8" • Ice (not melting) | 1 | 25 - 21 |
| NIL | Braking deceleration is minimal to non-existent for the wheel braking effort applied. Directional control may be uncertain. | <ul style="list-style-type: none"> • Ice (melting) • Wet ice | | 20 & BELOW |
| Note: Taxi, takeoff, and landing operations are prohibited in Nil conditions. | | | | |

CUD (Can U land?)

The decision process to land Alaska Airlines jets can be very confusing. This landing flowchart is presented for the benefit of Anchorage line pilots and is to be provided for each pilot. If ever there is a doubt about landing, sit back, ruminate, and chew your CUD.



Fill out an ASAP because you obviously don't understand the gravity of your decision to land.

Determine contamination level of the runway using secret decoder table published in FOM bulletin, sent by First Class, or available through word of mouth.

Land with confidence knowing that you are legal...probably. Better fill out another ASAP to find out for sure.

Is runway contaminated with snow and ice or just ice or just snow or patchy ice and patchy snow or just patchy snow or just patchy ice and is the ice or snow or snow and ice thin and/or is it compacted or loose but not more than 3/4" but less than 1/4" for thin and is there more than 1/4" of slush or standing water or is it less and is the temperature less than negative 3 but greater than negative 10 or less than or greater than negative 10 and is it raining on ice, thin ice, patchy thin ice or patchy ice and is the ice melting or was UREA applied and was it mitigated or was it applied with sand in which case you can mitigate the mitigation and is the MU 40+ which allows patchy to become not patchy or is the MU less than the reported runway condition in which case Good becomes Medium and Medium becomes Poor and Poor becomes Nil but not if the MU is better than the reported runway condition?

Burn gas in a hold to recheck landing performance, quick turn weight, climb limit, DBALD charts, decipher runway condition, negotiate for plowing and then request updated landing data from Dispatch.

CUSP?

Burn more gas in a hold thoroughly briefing the landing with other crew member (to include ABs, SBs, TRs, turn offs, yada yada yada).

Call Dispatch and change destination to Anchorage or Fairbanks.

Liar. Fill out another ASAP and report to Chief Pilot for counseling

Do you understand anything by this point?

(Sigh)

Then it's wet (duh).

Is the landing to occur at an airport in the state of Alaska?

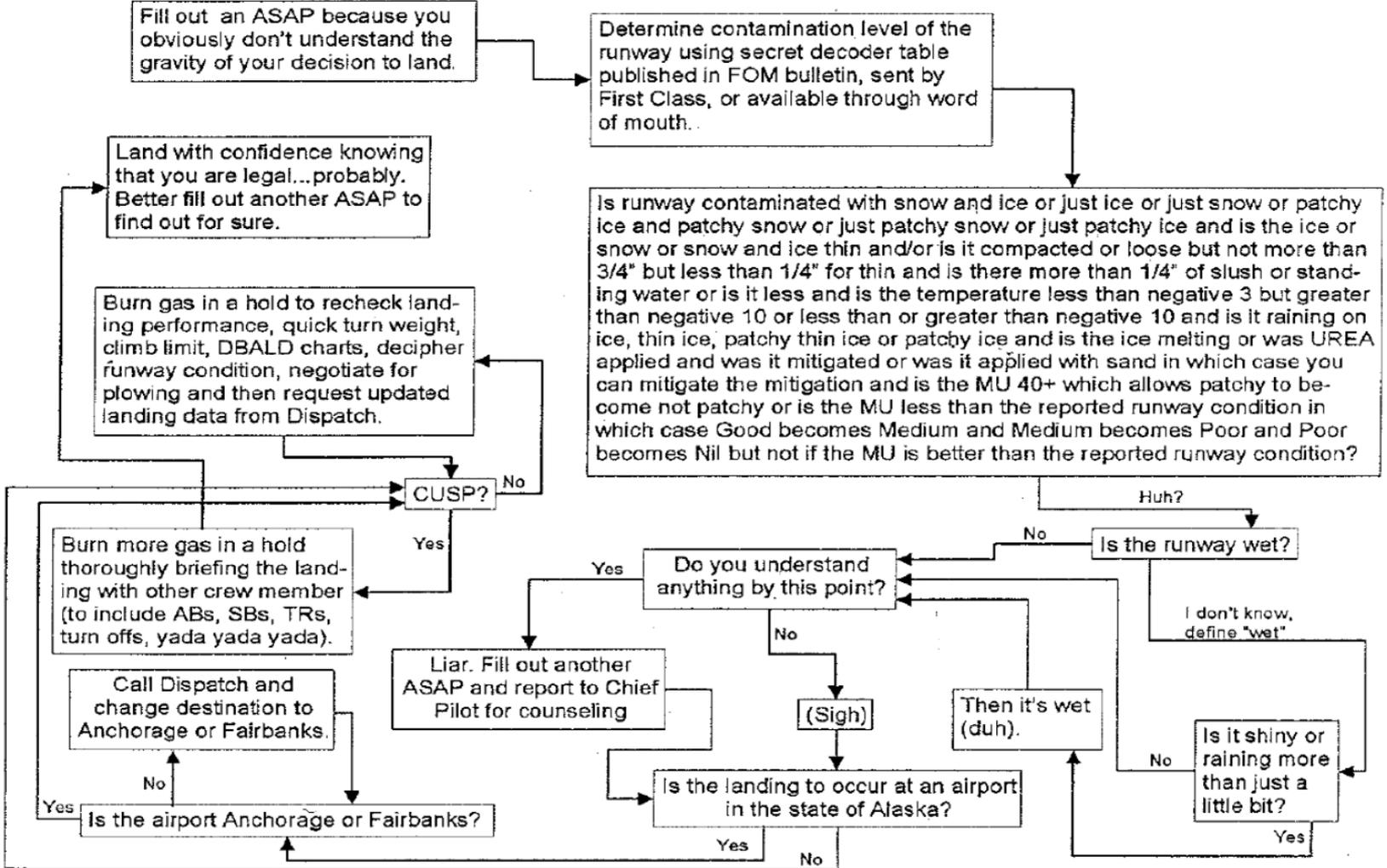
Is the runway wet?

Huh?

I don't know, define "wet"

Is it shiny or raining more than just a little bit?

Is the airport Anchorage or Fairbanks?



Runway Surface Condition Reporting

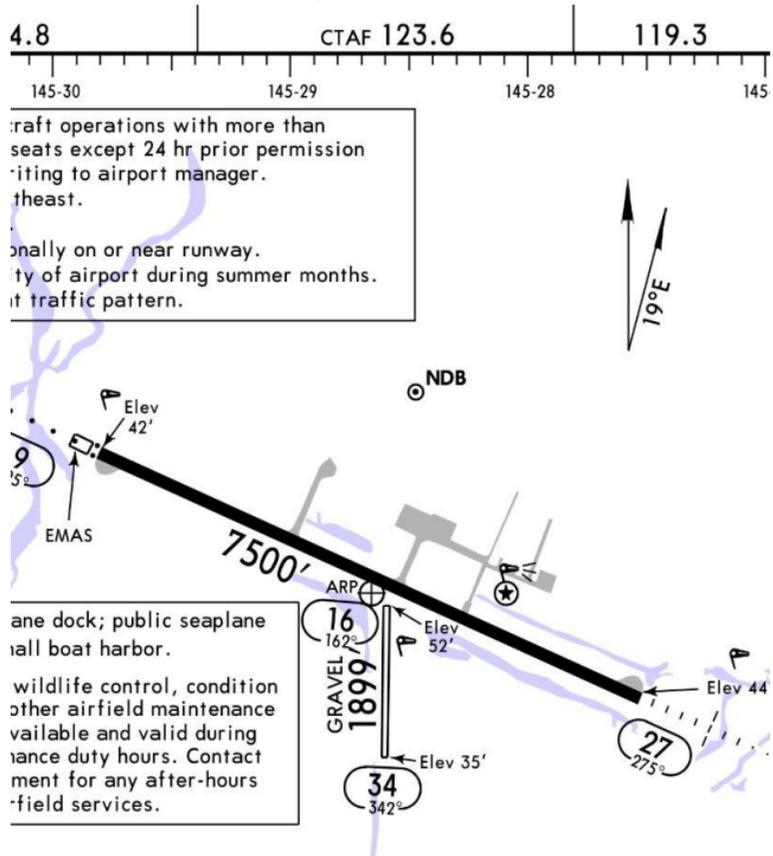
TALPA ARC Recommendation:

- Use Runway Surface Condition Matrix Report and Pilot BA to best describe the conditions.
- Improvements to address known deficiencies
- Beta test proposed method
 - First Winter 2009 - 10
 - Completed – Winter 2010-11
- Changes to the Final TALPA ARC Matrix completed – Summer 2011

RWYCC for ICE

- Alaska Airlines was one of the lone voices on the TALPA ARC for ICE
 - How do you upgrade a Poor or NIL (RWYCC 1 or 0) without Mu?
 - If upgraded, what can it be upgraded to?
 - ICE upgrade (after validation testing) was a compromise
 - Mu Values 40 or greater
 - Continuous monitoring
 - Highest Upgrade possible was RWYCC 3
- 

An Example of our Experience



An Example of our Experience

UTC

CDV 01/265 Aerodrome 01/14/2019 2346 01/15/2019 2346 RWY 09 FICON 3/3/3 30 PCT ICE SANDED 80FT WID AND DEICED SOLID 80FT WID OBS AT 1901142346. (1546 PST)

CDV 01/266 Aerodrome 01/14/2019 2348 01/15/2019 2348 APRON ALL FICON PATCHY ICE OBS AT 1901142348. 1901142348-1901152348

CDV 01/260 Aerodrome 01/14/2019 2037 01/15/2019 2037 RWY 09 FICON 3/3/3 100 PCT ICE SANDED 80FT WID AND DEICED SOLID 80FT WID OBS AT 1901142037. (1237 PST)

CDV 01/255 Aerodrome 01/14/2019 1842 01/15/2019 1842 RWY 09 FICON 3/3/3 100 PCT ICE SANDED 80FT WID AND DEICED SOLID 80FT WID OBS AT 1901141842. (1042 PST)

CDV 01/256 Aerodrome 01/14/2019 1842 01/15/2019 1842 TWY B, D FICON ICE OBS AT 1901141842. 1901141842-1901151842

| | |
|-------------------------------------|-----------------------------------|
| AS62 | |
| N618AS / 700 | |
| MERLE K .. (CDV/PACV) | |
| 27 | + |
| FULL / 7500 ft | |
| 3 MED | Ice (Dry) |
| 190°M / 5 kts | -2 °C |
| 29.30 InHg | |
| SEL LW 129000 lbs | FLAPS 30 |
| AUTO BRAKE AB MAX | REV THRUST Detent 2 |
| V _{REF} ADJ None | TOUCHDOWN POINT 1000 FT |
| ICING No | |
| MEL/CDL | |
| QRH Non Normal | |

| Ad-Hoc | | | |
|------------|--------------------|------------------------|-----------------|
| GENERAL | | SPEEDS | |
| LW | 129,000 lbs | V _{REF} +5 | 138 KIAS |
| LD | 5,834 ft | V _{TouchDown} | 133 KIAS |
| Max Weight | | LD at SEL LW | LTP at SEL LW |

Wind 190°M / 5 kts

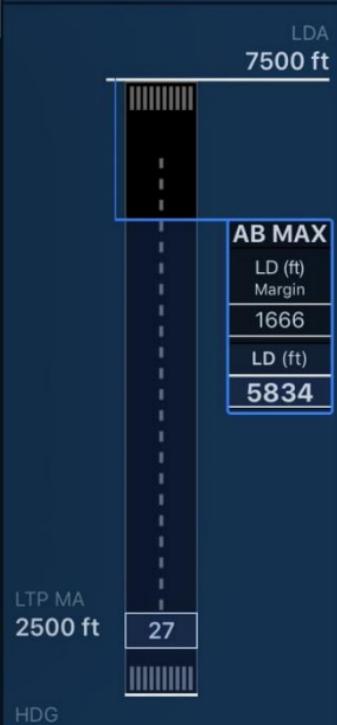


Tail: 0 kts Left: 5 kts

LD at SEL LW

| | AB MAX | | |
|---------|--------|--------------|-----------------|
| | FLP 40 | FLP 30 | FLP 15 (NO ADJ) |
| 5 GOOD | 4,463 | 4,521 | 4,692 |
| 4 GD/MD | 4,951 | 5,029 | 5,240 |
| 3 MED | 5,725 | 5,834 | 6,112 |
| 2 MD/PR | 6,363 | 6,491 | 6,832 |
| 1 POOR | 7,344 | 7,516 | 7,957 |

SHOW ADDITIONAL INFO



NOT F

An Example of our Experience

Pilot Report:

PST

| | | | | | | |
|----|------|-------|------------|------------------------|----------------|---|
| AS | 61 | 622AS | 01/14/2019 | 01/14/2019 13:16:55 | FLT SUMMARY | QU SEADLAS .DDLXCXA 142116 A80 FI AS61/AN N622AS DT DDL CDV 142116 M17A - 3501 SUMMARY 0061/14 PAJN/PACV .N622AS /OUT 1949/FOB 0178 /OFF 2008/FOB 0174 /ON 2108/FOB 0126 /IN 2113/FOB 0124 /TKO F.O. /CRW 25475 /LND F.O. /CRW 25475 /CPT 23961 /FO 25475 /CHK /HGST 3/RNPD Y N /AIII 3/RNPA Y N /ELEC N/BA 5/RWY 27 |
| AS | 7098 | 625AS | 01/14/2019 | 01/14/2019 15:59:05 | FLT SUMMARY | QU SEADLAS .DDLXCXA 142359 A80 FI AS7098/AN N625AS DT DDL CDV 142359 M65A - 3501 SUMMARY 7098/14 PANC/PACV .N625AS /OUT 2311/FOB 0220 /OFF 2322/FOB 0220 /ON 2353/FOB 0188 /IN 2357/FOB 0184 /TKO F.O. /CRW 20917 /LND F.O. /CRW 20917 /CPT 91822 /FO 20917 /CHK /HGST 3/RNPD N 3 /AIII 3/RNPA Y N /ELEC N/BA 5/RWY 27 |
| AS | 66 | 622AS | 01/14/2019 | 01/14/2019 17:03:15 | FLT SUMMARY | QU SEADLAS .DDLXCXA 150103 A80 FI AS66/AN N622AS DT DDL CDV 150103 M55A - 3501 SUMMARY 0066/15 PANC/PACV .N622AS /OUT 0003/FOB 0261 /OFF 0021/FOB 0263 /ON 0057/FOB 0231 /IN 0102/FOB 0226 /TKO CAPT /CRW 31762 /LND CAPT /CRW 31762 /CPT 31762 /FO 82935 /CHK /HGST N/RNPD N 3 /AIII N/RNPA Y N /ELEC Y/BA /RWY 27 |

Aviation Safety Technology (AST)

SafeCenter 2.0 National Alert Recent Landings Search Hist. Search Alerts 0 Hello Chat

National Alert Page



Aviation Safety Technology (AST)

PST

PACV 01/14/2019 15:57:29 27

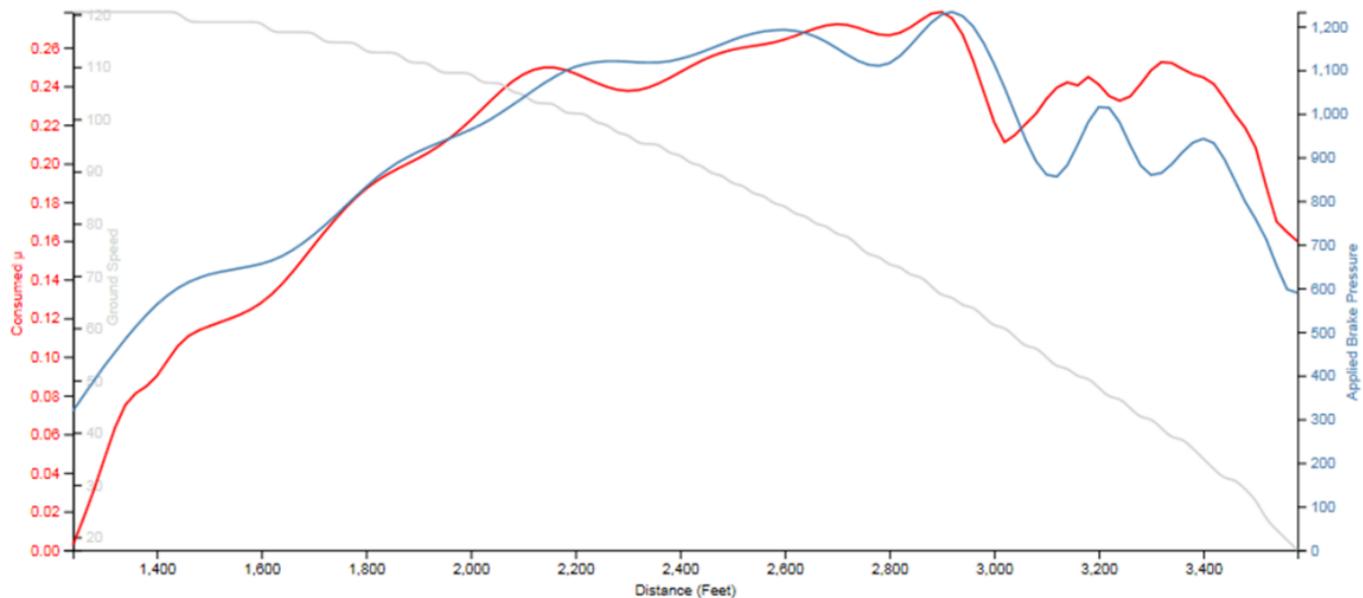
View

Airport Landing Detail Data

Summary

Chart

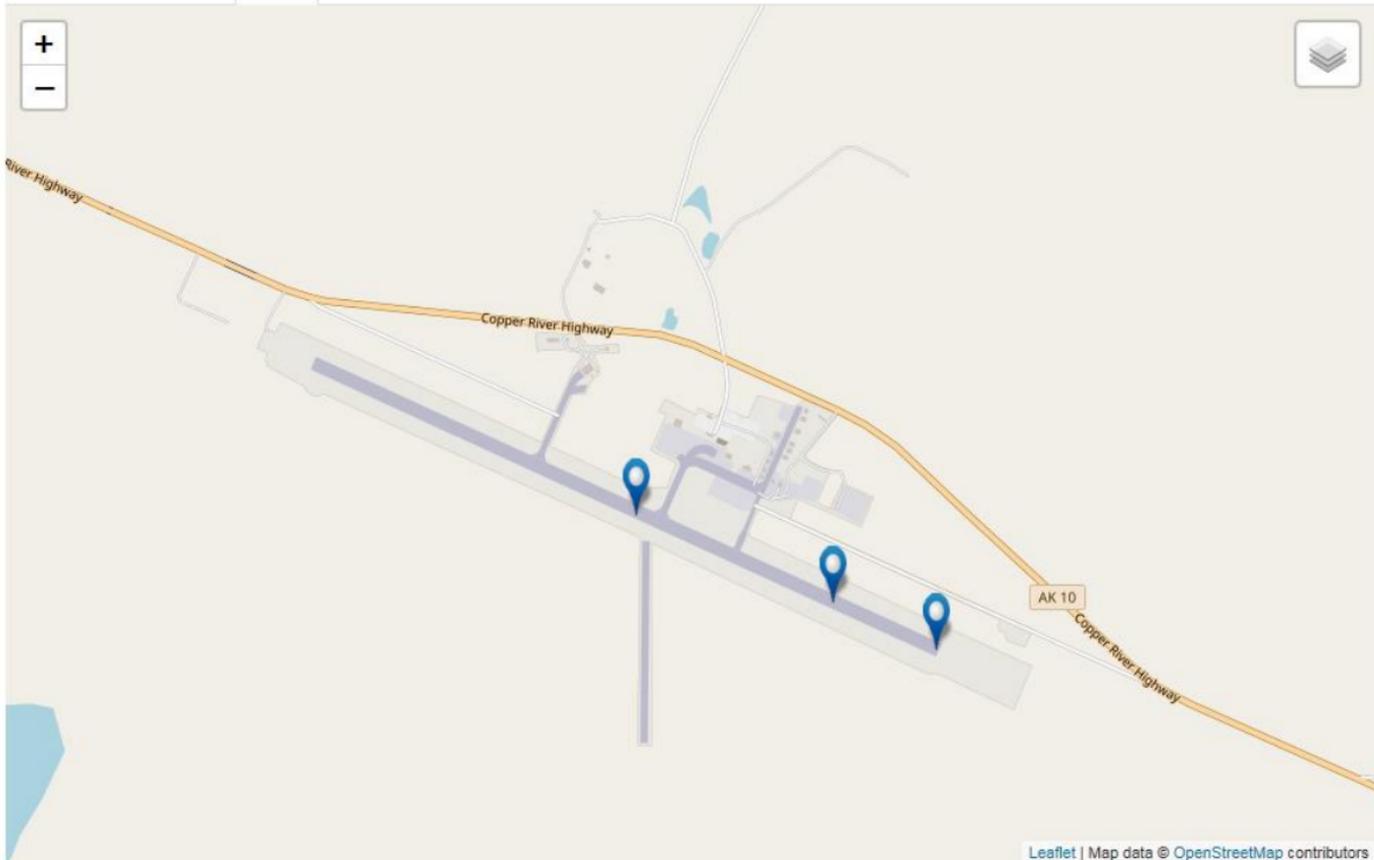
Map



Summary

Chart

Map



TALPA RCAM after Validation

| Airport Runway Condition Assessment | | | Pilot Reports (PIREPs) Provided To ATC And Flight Dispatch | |
|-------------------------------------|---|-------------------------------|---|----------------|
| Assessment Criteria | | Downgrade Assessment Criteria | | PIREP |
| Code | Runway Condition Description | Mu (μ) | Deceleration And Directional Control Observation | |
| 6 | <ul style="list-style-type: none"> Dry | 40 or Higher | - | Dry |
| 5 | <ul style="list-style-type: none"> Wet (Includes water 1/8" or less and Damp) Frost 1/8" or less depth of: <ul style="list-style-type: none"> Slush Dry Snow Wet Snow | | Braking deceleration is normal for the wheel braking effort applied. Directional control is normal. | Good |
| 4 | <ul style="list-style-type: none"> -15°C and Colder outside air temperature: Compacted Snow | 39 | Brake deceleration and controllability is between Good and Medium. | Good to Medium |
| 3 | <ul style="list-style-type: none"> Wet ("Slippery when wet" runway) Dry Snow or Wet Snow (Any Depth) over Compacted Snow Greater than 1/8" depth of: <ul style="list-style-type: none"> Dry Snow Wet Snow Warmer than -15°C outside air temperature: <ul style="list-style-type: none"> Compacted Snow | 30 to 39 | Braking deceleration is noticeably reduced for the wheel braking effort applied. Directional control may be noticeably reduced. | Medium |
| 2 | <ul style="list-style-type: none"> Greater than 1/8" depth of: <ul style="list-style-type: none"> Water Slush | 29 to 30 | Brake deceleration and controllability is between Medium and Poor. Potential for hydroplaning exists. | Medium to Poor |
| 1 | <ul style="list-style-type: none"> Ice ² | 21 to 29 | Braking deceleration is significantly reduced for the wheel braking effort applied. Directional control may be significantly reduced. | Poor |
| 0 | <ul style="list-style-type: none"> Wet Ice ² Water on top of Compacted Snow ² Dry Snow or Wet Snow over Ice ² | 20 or Lower | Braking deceleration is minimal to non-existent for the wheel braking effort applied. Directional control may be uncertain. | Nil |

Contaminants not on the RCAM



RCAM – Vertical

Table 5-2. Runway Condition Assessment Matrix (RCAM) *(for Airport Operators' Use Only)*

| Assessment Criteria | | Downgrade Assessment Criteria | | |
|--|------|-------------------------------|---|-------------------------------|
| Runway Condition Description | Code | Mu (μ) ¹ | Vehicle Deceleration or Directional Control Observation | Pilot Reported Braking Action |
| <ul style="list-style-type: none"> Dry | 6 | 40 or Higher | --- | --- |
| <ul style="list-style-type: none"> Frost Wet (Includes Damp and 1/8 inch depth or less of water) <p>1/8 inch (3mm) depth or less of:</p> <ul style="list-style-type: none"> Slush Dry Snow Wet Snow | 5 | | Braking deceleration is normal for the wheel braking effort applied AND directional control is normal. | Good |
| <p>5° F (-15°C) and Colder outside air temperature:</p> <ul style="list-style-type: none"> Compacted Snow | 4 | 39 | Braking deceleration OR directional control is between Good and Medium. | Good to Medium |
| <ul style="list-style-type: none"> Slippery When Wet (wet runway) Dry Snow or Wet Snow (Any depth) over Compacted Snow <p>Greater than 1/8 inch (3mm) depth of:</p> <ul style="list-style-type: none"> Dry Snow Wet Snow <p>Warmer than 5° F (-15°C) outside air temperature:</p> <ul style="list-style-type: none"> Compacted Snow | 3 | 10 | Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced. | Medium |
| <p>Greater than 1/8 (3mm) inch depth of:</p> <ul style="list-style-type: none"> Water Slush | 2 | 30 | Braking deceleration OR directional control is between Medium and Poor. | Medium to Poor |
| <ul style="list-style-type: none"> Ice² | 1 | 20 to 21 | Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced. | Poor |
| <ul style="list-style-type: none"> Wet Ice² Slush over Ice Water over Compacted Snow² Dry Snow or Wet Snow over Ice² | 0 | 20 or Lower | Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain. | Nil |

RCAM – Horizontal

| Type | Wet (Includes water 1/8" or less and Damp) | | Contaminant | | | | | | | | | | |
|-------|---|-----|---|-------|---|-------------------|----------------------|-------------------|---|-----------------------|-------------------------------------|------------------|---|
| | Dry | Any | Slippery When Wet | Frost | Standing Water or Slush | | Wet Snow or Dry Snow | | Compacted Snow (May include imbedded Ice) | | Dry or Wet Snow over Compacted Snow | Ice ¹ | Wet Ice ¹ Water Over Compacted Snow ¹ Dry or Wet Snow Over Ice ¹ |
| Depth | N/A | N/A | | N/A | 1/8" or less | Greater than 1/8" | 1/8" or less | Greater than 1/8" | Any | Any | Any | Any | Any |
| NOTES | | | Slippery When Wet used to indicate excess rubber deposits in touchdown zones. | | For Standing Water 1/8" or less report as WET | | | | OAT -15°C or Colder | OAT Warmer than -15°C | | | Taxi, takeoff, and landing operations in Nil conditions are prohibited. |
| RWYCC | 6 | 5 | 3 | 5 | 5 | 2 | 5 | 3 | 4 | 3 | 3 | 1 | 0 |

¹In some circumstances, these runway surface conditions may not be as slippery as the runway condition code assigned by the Matrix. The airport operator may issue a higher runway condition code (but no higher than code 3) if Mu values 40 or greater are obtained on all three thirds of the runway by a properly operated and calibrated friction measuring device and all other observations, judgment, and vehicle braking action support the higher runway condition code. The decision to issue a higher runway condition code than would be called for by the Matrix cannot be based on Mu values alone; all available means of assessing runway slipperiness must be used and must support the higher runway condition code. This ability to raise the reported runway condition code to a code 3 can only be applied to those runway conditions listed under code 0 and 1 in the Matrix.

The airport operator must also continually monitor the runway surface as long as the higher code is in effect to ensure that the runway surface condition does not deteriorate below the assigned code. The extent of monitoring must consider all variables that may affect the runway surface condition, including any precipitation conditions, changing temperatures, effects of wind, frequency of runway use, and type of aircraft using the runway. If sand or other approved runway treatments are used to satisfy the requirements for issuing this higher runway condition code, the continued monitoring program must confirm continued effectiveness of the treatment.

Caution: Temperatures near and above freezing (e.g., at -3°C and warmer) may cause contaminants to behave more slippery than indicated by the runway condition code given in the Matrix. At these temperatures, airport operators should exercise a heightened level of runway assessment, and should downgrade the runway condition code if appropriate.

| Downgrade Assessment Criteria (Mu), Pilot Braking Action Descriptors | | | | | | | |
|--|--------------|---|--|---|---|---|---|
| RWYCC from ABOVE | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Mu (μ) ² | 40 or higher | | | | 20 | | 21 |
| | 39 | | | - | 30 | | 20 or lower |
| Deceleration & Directional Control Observation | | Braking deceleration is normal for the wheel braking effort applied. Directional control is normal. | Brake deceleration and controllability is between Good and Medium. | Braking deceleration is noticeably reduced for the wheel braking effort applied. Directional control may be slightly reduced. | Brake deceleration is between Medium and Poor. Potential for hydroplaning exists. | Braking deceleration is significantly reduced for the wheel braking effort applied. Directional control may be significantly reduced. | Braking deceleration is minimal to non-existent for the wheel braking effort applied. Directional control may be uncertain. |
| PIREP | Dry | Good | Good to Medium | Medium | Medium to Poor | Poor | Nil |

²The correlation of the Mu (μ) values with runway conditions and condition codes in the Matrix are only approximate ranges for a generic friction measuring device and are intended to be used only to downgrade a runway condition code. Airport operators should use their best judgment when using friction measuring devices for downgrade assessments, including their experience with the specific measuring devices used.

AC 150-5200-30D Errata

- Required WET Runway Reporting
 - October 1, 2016 was the implementation date
- 

Wet Runway Reporting

1.12.23 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 or less in depth.

Note: A significant change to condition reporting includes the requirement and ability to report '**Wet** when visible dampness, or water that is 1/8-inch (3.3 mm) or less in depth exists on any surface (runways, taxiways, aprons, holding bays). This change is largely due to the airplane performance differences that exist between wet, dry, or runways with water greater than 1/8-inch (3.3 mm) in depth.

AC 150-5200-30D Errata

Then on September 30, 2016 . . . FAA
Published CertAlert 16-06

3. Guidance Change. The FAA will change Advisory Circular 150/5200-30D, *Airport Field Condition Assessments and Winter Operations Safety*, to remove the current requirement to report runway “wet” conditions (1/8th inch or less of water) when it is the only contaminant present. Instead, because of the impact on performance of some aircraft, the FAA will **highly encourage** airports to report “wet” conditions (1/8th inch or less of water) when it is the only condition present on the runway.

Wet Runway Reporting

- 28 days after the FAA made WET runway Reporting optional
- Moderate to Heavy rain at LGA with NO FICON
- Could a 5/5/5 100% WET FICON have alerted the flight crew?



BREAKING NEWS

4vChar

PENCE'S PLANE SKIDS OFF RUNWAY

Standing Water - Depth

- 1/8" or less – Code 5 Good BA (Wet Runway)
- Greater than 1/8" – Code 2 Medium to Poor BA
 - Risk of hydroplaning

**But How Does Rainfall Intensity
Effect the Potential for Standing
Water?**



Operations in Heavy Rain

- Alaska Airlines prohibits operation in Heavy Rain (+RN) if it is in conjunction with Convective Activity
 - But there are times of Heavy Rain without Convective Activity that had us concerned.
- 

SRM – Landing on Short Runways in Heavy Rain

- Determined that the risk was a Level 3
 - If the runway actually has water greater than 1/8 Inch, the use of “Wet” runway will overestimate the braking effectiveness the aircraft will encounter. On a short runway, this could lead to a runway overrun.
- 

Grooved vs Un-Grooved

- Heavy Rain (+RN) – It doesn't matter if the runway is grooved or not. Assume 1/8" or greater unless better information is available.
 - Moderate Rain (RN)
 - If the runway is Grooved, use Code 5 Good data.
 - If the runway is Un-Grooved, assume Code 2 Medium to Poor
- 

SRM – Landing on Short Runways in Heavy Rain Mitigation

- Direct Pilots to use Degraded Braking Action Landing Data (15% additional safety margin) when Rainfall intensity is Moderate (RN) or Heavy (+RN)
- 

Definition of Standing Water

Water depths sufficient to rise above the micro texture depth of the runway grooving or PFC overlay. In conditions of steady rain, the depth of standing 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 standing water depths of more than 1/8 inch when rainfall intensity is moderate on an ungrooved runway, or if the rainfall intensity is heavy.

Landing RCAM

LANDING RUNWAY CONDITION ASSESSMENT MATRIX (RCAM)

| Type | Dry | Wet (Includes water 1/8" or less and Damp) | | Contaminant | | | | | | | | | |
|-------|-----|---|---|-------------|--|--|--------------|--|---------------------|-------------------------------------|------------------|---|--|
| | N/A | Any | Slippery When Wet | Frost | Standing Water or Slush | Wet Snow or Dry Snow | | Compacted Snow (May include Imbedded Ice) | | Dry or Wet Snow Over Compacted Snow | Ice ¹ | Wet Ice ¹ Water Over Compacted Snow ¹ Dry or Wet Snow Over Ice ¹ | |
| Depth | N/A | 1/8" or less | | N/A | 1/8" or less | Greater than 1/8" | 1/8" or less | Greater than 1/8" | Any | Any | Any | Any | Any |
| Notes | | | Slippery When Wet used to indicate excess rubber deposits in touchdown zones. | | May include moderate rainfall intensity. | Includes moderate rainfall intensity on smooth runways or heavy rainfall intensity. ² | | | OAT -15°C or Colder | OAT Warmer than -15°C | | | Takeoff and landing operations in NIL conditions are prohibited. |
| RWYCC | 6 | 5 (GOOD) | 3 (MEDIUM) | 5 (GOOD) | 5 (GOOD) | 2 (MED to POOR) | 5 (GOOD) | 3 (MEDIUM) | 4 (GOOD to MED) | 3 (MEDIUM) | 3 (MEDIUM) | 1 (POOR) | 0 (NIL) |

¹ The Runway Codes of 1 or 0 may be upgraded to Code 3 by airport operator if conditions warrant.

² A current FICON Report/PIREP can upgrade the Rwy Condition Code in Moderate or Heavy Rain.

CAUTION! Temperatures near and above freezing (e.g., at -3°C and warmer) may cause contaminants to behave more slippery than indicated by the runway condition code given in the Runway Surface Condition Report Assessment Table. At these temperatures, airport operators should exercise a heightened level of runway assessment, and should downgrade the runway condition code if appropriate.

Pilot Braking Action Descriptors and Crosswind Component Limits

| Runway Condition Codes (RWYCC) | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|--|------------------------------------|---|--|--|---|--|--|
| Deceleration & Directional Control Observation | | Braking deceleration is normal for the wheel braking effort applied. Directional control is normal. | Brake deceleration and controllability is between GOOD and MEDIUM. | Braking deceleration is noticeably reduced for the wheel braking effort applied, or directional control is slightly reduced. | Brake deceleration is between MEDIUM and POOR. Potential for hydroplaning exists. | Braking deceleration is significantly reduced for the wheel braking effort applied, or directional control is significantly reduced. | Braking deceleration is minimal to non-existent for the wheel braking effort applied, or directional control is minimal to non-existent. |
| PIREP | Dry | GOOD | GOOD to MEDIUM | MEDIUM | MEDIUM to POOR | POOR | NIL |
| Landing Max Allowable Crosswind Component (Boeing) | 40 kts (700) 37 Kts (800 & 900) | 40 kts (700) 37 Kts (800 & 900) | 35 kts | 25 kts | 17 kts | 15 kts | N/A |

WET vs Standing Water – Effects of Rainfall Intensity

Aircraft Performance differences are huge.

- DRY
- WET
- Standing Water Greater than 1/8 INCH

| Standing Water or Slush | |
|--|--|
| 1/8" or less | Greater than 1/8" |
| May include moderate rainfall intensity. | Includes moderate rainfall intensity on smooth runways or heavy rainfall intensity. ² |
| 5 (GOOD) | 2 (MED to POOR) |

¹ The Runway Codes of 1 or 0 may be upgraded to Code 3 by airport operator if conditions warrant.
² A current FICON Report/PIREP can upgrade the Rwy Condition Code in Moderate or Heavy Rain.

Less Than 7000 Rules

If the runway is less than 7000 ft.

- If it is WET (Damp or more) Request Data based on RWYCC 5 – GOOD vs WET
 - (Or) Less than Good – Calculate Latest Touchdown Point (LTP)
 - (And) Less than Good – Use Max Auto-Brakes with Max Manual Braking until stopping is assured
- 

ACARS Page for WET



AS62

N618AS / 700

MERLE K .. (CDV/PACV)

27

FULL / 7500 ft

5 GOOD Moderate Rain (Standi...)

063°M / 4 kts 14 °C

29.99 InHg

SEL LW 129000 lbs FLAPS 30

AUTO BRAKE AB MAX REV THRUST Detent 2

V_{REF} ADJ None TOUCHDOWN POINT 1000 FT

ICING No

MEL/CDL

QRH Non Normal

Ad-Hoc

GENERAL

LW **129,000** lbs

LD **4,961** ft

QTAW **180,000** lbs

SPEEDS

V_{REF} +5 **138** KIAS

V_{TouchDown} **133** KIAS

Max Weight LD at SEL LW LTP at SEL LW

LD at SEL LW

| AB MAX | FLP 40 | FLP 30 | FLP 15 (NO ADJ) |
|---------|--------|--------|-----------------|
| 5 GOOD | 4,875 | 4,961 | 5,149 |
| 4 GD/MD | 5,439 | 5,544 | 5,774 |
| 3 MED | 6,338 | 6,477 | 6,779 |
| 2 MD/PR | 7,085 | 7,245 | 7,614 |
| 1 POOR | 8,244 | 8,450 | 8,927 |

SHOW ADDITIONAL INFO

Wind 063°M / 4 kts

Tail: 4 kts Right: 3 kts

LDA 7500 ft

AB MAX

LD (ft) Margin 2539

LD (ft) **4961**

LTP MA 2500 ft 27

HDG 275°M Not to scale

AS62

N618AS / 700

MERLE K .. (CDV/PACV)

27

FULL / 7500 ft

5 GOOD Moderate Rain (Standi...)

063°M / 4 kts 14 °C

29.99 InHg

SEL LW FLAPS

129000 lbs 30

AUTO BRAKE REV THRUST

AB MAX Detent 2

V_{REF} ADJ TOUCHDOWN POINT

None 1000 FT

ICING

No

MEL/CDL

QRH Non Normal

Ad-Hoc

GENERAL SPEEDS

LW 129,000 lbs V_{REF} +5 138 KIAS

LD 4,961 ft V_{TouchDown} 133 KIAS

QTAW 180,000 lbs

Tail: 4 kts Right: 3 kts

Max Weight LD at SEL LW LTP at SEL LW

LDA
7500 ft

LTP at SEL LW

AB MAX

| | FLP 40 | FLP 30 | FLP 15 (NO ADJ) | AB MAX |
|---------|--------|--------|-----------------|----------------|
| 5 GOOD | 2,500 | 2,500 | 2,500 | LD (ft) Margin |
| 4 GD/MD | 2,500 | 2,500 | 2,500 | 2539 |
| 3 MED | 2,162 | 2,023 | 1,721 | LD (ft) |
| 2 MD/PR | 1,415 | 1,255 | -- | 4961 |
| 1 POOR | -- | -- | -- | |

NOT FOR

SHOW ADDITIONAL INFO

HDG
275°M Not to scale

Takeoff RCAM

TAKEOFF RUNWAY CONDITION ASSESSMENT MATRIX (RCAM) – (BOEING ONLY – AIRBUS SEE QRH OR AQRG)

| Type | Dry | | Wet (5/5/5) | | Loose Contaminants | | | | | | Hard Packed Contaminants | | | | | | | | |
|---------------------------------------|--|--|----------------------------------|--|-----------------------------|--|------------------------------------|------------------|---|------------------|---|----------------|-----------------------------|--------------|--------|--------------------------------------|--|--------------------------------------|----------------------------|
| Contaminant | | | Water, Wet Snow, Dry Snow, Slush | | Frost | | Wet Snow, Standing Water, or Slush | | | Dry Snow | | | Compacted Snow | | Ice | | | | |
| Depth | | | 1/8" or less | | N/A | | > 1/8" to ≤ 1/4" | > 1/4" to ≤ 1/2" | > 1/2" | > 1/8" to ≤ 1" | > 1" to ≤ 2" | > 2" to ≤ 4" | > 4" | Any | | Any | | | |
| Notes | | | Slippery When Wet | | | | | | | | | | See Note Below ² | | | | | | |
| Takeoff Performance Level | DRY | | WET | | Medium (or PIREP value) | | WET | | > 1/8" to ≤ 1/4" | > 1/4" to ≤ 1/2" | No Ops | > 1/8" to ≤ 1" | > 1" to ≤ 2" | > 2" to ≤ 4" | No Ops | Medium ² (or PIREP value) | | Medium ² (or PIREP value) | Poor |
| Crosswind Limit ¹ (Boeing) | 40 kts (400 & 700) 33 Kts (800 & 900) | | 25 kts | | 15 kts (400) 20 kts (NG) | | 25 kts | | Wet Snow 15 kts (400) 20 kts (NG) | | Water/Slush 7 kts (400) 15 kts (NG) | | 15 kts (400) 20 kts (NG) | | | 15 kts (400) 20 kts (NG) | | 15 kts (400) 20 kts (NG) | 7 kts (400) 13 kts (NG) |

| Type | Layered Contaminants | | | | | | | | | | | | | | | | | | |
|---------------------------------------|--------------------------------------|-------------------------|-----------------------|-----------------------|--------|--------------------------------------|---------------------------|---------------------------|--------|---------------------|--|---------------------|---------------------|---------------------|--------------------------------|---------------------|---------------------|---------------------|---------------------|
| Contaminant | Dry Snow Over Compacted Snow | | | | | Wet Snow Over Compacted Snow | | | | | Wet Ice or Water Over Ice ³ Wet Snow Over Ice ³ Slush Over Ice ³ Water or Slush Over Compacted Snow ³ | | | | Dry Snow Over Ice ³ | | | | |
| Depth | ≤ 1/8" | > 1/8" to ≤ 1" | > 1" to ≤ 2" | > 2" to ≤ 4" | > 4" | ≤ 1/8" | > 1/8" to ≤ 1/4" | > 1/4" to ≤ 1/2" | > 1/2" | ≤ 1/8" | > 1/8" to ≤ 1/4" | > 1/4" to ≤ 1/2" | > 1/2" | ≤ 1/8" | > 1/8" to ≤ 1" | > 1" to ≤ 2" | > 2" to ≤ 4" | > 4" | |
| Notes | See Notes Below | | | | | | | | | | | | | | | | | | |
| Takeoff Performance Level | Medium ² (or PIREP value) | Dry Snow > 1/8" to ≤ 1" | Dry Snow > 1" to ≤ 2" | Dry Snow > 2" to ≤ 4" | No Ops | Medium ² (or PIREP value) | Wet Snow > 1/8" to ≤ 1/4" | Wet Snow > 1/4" to ≤ 1/2" | No Ops | No Ops ³ | No Ops ³ | No Ops ³ | No Ops ³ | No Ops ³ | No Ops ³ | No Ops ³ | No Ops ³ | No Ops ³ | No Ops ³ |
| Crosswind Limit ¹ (Boeing) | 15 kts (400) 20 kts (NG) | | | | | 15 kts (400) 20 kts (NG) | | | | | See Note 1 Below | | | | See Note 1 Below | | | | |

¹ Crosswind Limits are not enforced by Takeoff Performance Tools. If available, use PIREP values to determine actual crosswind limits. See applicable flight manual. Limitations, for crosswind limits.

² If RWYCC allow operations, use the code provided (Code 3 = Medium, Code 2 or 1 = Poor).

³ PIREPs can be used to override No Ops conditions (allowing operations). Any PIREP that allows operation and contaminant depths greater than 1/8 inch, use the depth value to determine takeoff performance.

IN CONCLUSION

- The TALPA RCAM is a fantastic tool that can be used by all concerned parties (Airports, Pilots, Dispatchers, ATC, Airplane Manufacturers etc.)
- The key to the success of the program is TRAINING. Unfortunately, the FAA failed to mandate Airport Training – choosing to rely on the Digital NOTAM System to control erroneous inputs.
- ICE upgrades should be allowed up to RWYCC 4 or 5. Our experience and data supports this.
- 1000 ft Air Run should be authorized provided the Airline has Training and a mitigation plan in place (like LTP)
- Factored Data is (and should be) required for Degraded Braking Action only! Non-Normal and Dry/Wet data should be allowed to be displayed UNFACTORED.

Any Questions?

