Ministry of Blue Economy & Civil Aviation

Belize Department of Civil Aviation

ADVISORY CIRCULAR

Subject: ASSESSMENT, MEASUREMENT AND REPORTING OF RUNWAY SURFACE CONDITION

Date: 22-11-2022	AC No. BDCA AGA-13-2022
Initiated by: HWP	Revision: 0

1. PURPOSE

This circular describes the obligation of assessment and notification of the condition of the runway surface, which are necessary to provide the flight crew with the information necessary for the safe operation of the aircraft, such notification is made by means of the runway condition report (RCR), in accordance with ICAO Cir-355

2. APPLICABILITY

See point 3

3. WHAT CANCELS THIS AC.?

This Advisory Circular does not cancel any previous document.

4. WHO DOES THE AC AFFECT?

Aerodrome Operators, AGA Section Aerodrome Inspectors, Airline Operators, ANS service, ANS regulator

5. RELATED READING MATERIAL.

- BCAR 139 Certification, Operation and Surveillance of Aerodromes
- Doc 9991 PANS-Aerodromes
- ICAO CIR-355

6. APPROVAL:

Capt. Nigel Carter
Director ,
Belize Department of Civil Aviation

Preamble

1. Purpose.

This circular describes the obligation of assessment and notification of the condition of the runway surface, which are necessary to provide the flight crew with the information necessary for the safe operation of the aircraft, such notification is made by means of the runway condition report (RCR), in accordance with ICAO Cir-355, This provision will enter into force as of November 4, 2021.This circular is adapted to tropical regional conditions where there is no presence of snow or ice. The global reporting format for assessing and reporting runway surface conditions is outlined in amendments to the following documents:

2. Involved ICAO Publications

a) Annex 3 — Meteorological Service for International Air Navigation

b) Annex 6 — Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes and Part II — International General Aviation — Aeroplanes

c) Annex 8 — Airworthiness of Aircraft

d) Annex 14 — Aerodromes, Volume I — Aerodromes Design and Operations

e) Annex 15 — Aeronautical Information Services

f) Procedures for Air Navigation Services (PANS)- Aerodromes (Doc 9981)

g) Procedures for Air Navigation Services (PANS) — Aeronautical Information Management (Doc 10066)

h) Procedures for Air Navigation Services — Air traffic management (Doc 4444)

i) Aeroplane Performance Manual (Doc 10064)

j) Airport Services Manual, Part 2 — Pavement Surface Conditions, Part 8 Airport Operational Services and Part 9 — Airport Maintenance Practices (Doc 9137)

3.Table of Contents

3. Applicability

1. This document applies to:

(a) Operators of controlled airports whether or not they hold an Aerodrome Certificate issued in accordance with the rules established by the BDCA;
(b) Aerodrome operators.
(c) BDCA inspectors with safety certification and oversight responsibilities;
(d) Air traffic services and aeronautical information management services;
(e) Pilots and flight dispatchers
(f) This document is also available to the aviation industry in general for informational purposes. Its content is of particular interest to:
  (i) Domestic and foreign air operators, and
  (ii) Individuals and organizations exercising privileges granted to them within the framework of an External Delegation of Authority.

4. Glossary

1. Abbreviations and Acronyms

AC	Advisory Circular
EASAAs	European Aviation Safety Agency
AFM	Aircraft Flight Manual
AIC	Aeronautical Information Circular
AIM	Aeronautical Information Management
AIP	Aeronautical information Publication
AIREP	Air-report
AIS	Aeronautical Information Services
ARC	Aviation Rulemaking Committee (FAA)
ASTM	American Society for Testing and Materials
ATC	Air Traffic Control (in general)
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATS	Air Traffic Service
CFR	Code of Federal Regulations (FAA)
CRM	Crew Resource Management
CS	Certification Specifications (AESA)
BDCA	Belize Department of Civil Aviation
ESDU	Engineering Sciences Data Unit
FAA	Federal Aviation Administration (United States)

FAR	Federal Aviation Regulations (United States)
FTF	Friction Task Force
HF	High Frequency
HMA	Hot-mix Asphalt
IATA	International Air Transport Association
JAA	Joint Aviation Authorities (Europe)
JAR	Joint aviation Requirements (Europe)
LDA	Landing Distance available
MET	Meteorological Services
MPD	Mean Profile Depth
MTD	Mean texture Depth
NASA	National Aeronautics and Space Administration (United States)
NOTAM	Notice to Airmen
NTRS	NASA Technical Report Server
OAT	Outside Air Temperature
ICAO	International Civil Aviation Organization
WMO	World Meteorological Organization
PANS	Procedures for Air Navigation Services
PCC	Portland Cement Concrete
PFC	Porous Friction Course
PSV	Polished Stone Value
RCAM	Runway Condition Assessment Matrix
RCR	Runway Condition Report
RESA	Runway End Safety Area
RST	Runway Safety Team

2. Terms used

The terms contained herein are used in the context of this circular. Unless otherwise indicated, these terms have no official recognition with ICAO. An ICAO-recognized definition is included in this document, it is indicated with an asterisk (*).

Air-report (AIREP)*. A report from an aircraft in flight prepared in conformity with the requirements for position, and operational and/or meteorological reporting.

Critical tire-to-ground Contact Area. An Area (approximately 4 square meters for the largest aircraft currently in service) which is subject to forces drive the rolling and braking characteristics of the aircraft, as well as directional control.

Significant Change. A change in the magnitude of a hazard, which leads to a change in the safe operation of the aircraft.

Surface Friction Characteristics The Physical, functional, and operational features or attributes of friction that relate to the surface properties of the pavement and can be distinguished from each other.

Note.— The friction coefficient is not a property of the pavement surface, but a systemic response from the measuring system. Friction coefficient can be used to evaluate the surface properties of the pavement provided that the properties belonging to the measuring system are controlled and kept stable.

Aeronautical Information Circular (AIC)*. A notice containing information that does not qualify for the origination of a NOTAM or for inclusion in AIP, but which relates to flight safety, air navigation, technical, administrative or legislative matters.

Runway Condition Code (RWYCC)*[1]. A number describing the runway surface condition to be used in the runway condition report.

Note.— The purpose of the runway condition code is to permit an operational aeroplane performance calculation by the flight crew. Procedures for the determination of the runway condition code are described in the PANS-Aerodromes, Doc 9981.

Coefficient of Friction. A Dimensionless ration of the friction force between two bodies to the normal force pressing these two bodies together.

[1] Applicable from 4 November 2021

Contaminant. Deposit (of snow***,*** melting snow, ice, stagnant water, mud, dust, sand, oil or rubber) on the pavement of an aerodrome whose effect is detrimental to the friction characteristics of the surface of said pavement.

Landing Distance Available *(LDA).** The length of the runway which is declared available and suitable for the ground run of an aeroplane landing.

Braking Action. A term used by pilots to characterize the deceleration associated with the wheel braking effort and directional controllability of the aircraft.

***Runway Safety Team*.** A team comprising representatives from the [aerodrome operator], air traffic service providers, airlines or aircraft operators, pilot and air traffic controllers associations and any other group with a direct involvement in runway operations [at a specific aerodrome], that advise the appropriate management on potential runway [safety] issues and recommend mitigation strategies.

Note.— This definition is based on ICAO Doc 9870, Manual on the Prevention of Runway Safety Incursions*, but takes into consideration evolving concepts resulting from recent work of the ICAO Runway Safety Programme. It therefore slightly improves the original definition without contradicting but rather clarifying it for the purposes of this document (Runway Safety Team Handbook). It may or may not be eventually harmonized in other publications, based on feedback on its use. For easy identification, the differences are between square brackets.*

ESDU scale. A grouping of hard runway surfaces based on macrotexture depth.

Runway Surface Condition*. [2] ***A*** Description of the condition(s) of runway surface used in the runway condition report which establish the basis for the determination of the runway condition code for aeroplane performance purposes.

Note 1.— The runway surface condition used in the runway condition report establish the performance requirements between the aerodrome operator, aeroplane manufacturer and the aeroplane operator.

Note 2 — Aircraft de-icing chemicals and other contaminants are also reported but are not included in the list of runway surface condition descriptors because their effects on runway surface friction characteristics and the runway condition cannot be evaluated in a standardized manner.

Note 3.— Procedures on determining runway surface conditions are available in the PANS-Aerodromes (Doc 9981) contain the

[2] Applicable from 4 November 2021

a) *Dry Runway*. A runway is considered dry if its surface is free of visible moisture and not contaminated within the area intended to be used.

b) *Wet Runway*. The runway surface is covered by any visible dampness or water up to and including 3 mm deep within the intended area of use.

c) *Slippery Wet Runway*. A wet runway where the surface friction characteristics of a significant portion of the runway have been determined to be degraded.

d) *Contaminated Runway. A runway is* contaminated when a significant portion of the runway surface area(whether in isolated areas or not), within the length and width being used is covered by one or more of the substances listed in the runway surface condition descriptors.

Note.— Procedures on determination of contaminant coverage on runway is available in the PANS-Aerodromes (Doc 9981).

e) *Runway surface condition descriptors.* In tropical areas without snow or ice, descriptors related to them do not apply: *Compact snow, Dry snow. Hoarfrost. Ice, Melting snow, Wet ice. Wet snow* and *wet ice. Therefore, the only applicable descriptor is:*

i) *Standing water.* Water of depth greater than 3 mm.

Note.—, Running water of depth greater than 3 mm is reported as standing water by convention.

Aeronautical Information Management (AIM)*. The dynamic, integrated management of aeronautical information through the provision and exchange of quality-assured digital aeronautical data in collaboration with all parties.

Runway Condition Report (RCR)*[1]. A comprehensive standardized report relating to runway surface conditions and its effect on the landing and take-off performance.

Runway Condition Assessment Matrix (RCAM)* . [3]***A*** matrix allowing the assessment of the runway condition code, using associated procedures, from a set of observed runway surface condition(s) and pilot report of braking action.

Industry codes of practice*. Guidance material developed by an industry body, for a particular sector of the aviation industry to comply with the requirements of

[3] Applicable from 4 November 2021

International Civil Aviation Organization standards and recommended practices, other aviation safety requirements and best practices deemed appropriate.

Note.— Some States accept and reference industry codes of practice in the development of regulations to meet the requirements of annex 19, and make available, for the industry codes of practice, their sources and how they may be obtained.

NOTAM. A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to the personnel concerned with flight operations.

Hazard. Condition or an object with the potential to cause injuries to personnel, damage to equipment or structures, loss of material or reduction of the ability to perform a prescribed function.

***Operational personnel**.** Personnel involved in aviation activities who are in a position to report safety information.

Note.— Such personnel include, but are not limited to: flight crews; air traffic controllers; aeronautical station operators; maintenance technicians; personnel of aircraft design and manufacturing organizations; cabin crews; flight dispatchers; apron personnel and ground handling personnel.

***Runway**.** A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

***Grooved or porous friction Course Runway*.** A paved runway that has been constructed and maintained with lateral grooving or a porous friction course (PFC) surface to improve braking characteristics when wet in compliance with the *Aerodrome Design Manual* (Doc 9157) or equivalent.

Skid resistant. A runway surface that is designed, constructed and maintained to have good water drainage, which minimizes the risk of hydroplaning when the runway is wet and provide aircraft braking performance shown to be better than that used in the airworthiness standards for a wet, smooth runway.

Retardation. The deceleration of a vehicle braking, measured in m/s^2.

Friction. A resistive force along the relative line of motion between two surfaces in contact.

Safety*. The state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.

Automatic Terminal Information Service (ATIS)*. The automatic provision of current, routine information to arriving and departing aircraft throughout 24 hours or a specified portion thereof:

a) *Data Link-Automatic Terminal Information Service (D-ATIS*). The provision of ATIS via data link.

b) *Voice-Automatic Terminal Information Service (Voice-ATIS).* The provision of ATIS by means of continuous and repetitive voice broadcast.

Aeronautical Information Service (AIS)*. A service established within the defined area of coverage responsible for provision of the aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation.

Air Traffic Service (ATS)*. A generic term meaning variously, flight information service, air traffic control service (area control service, approach control service or aerodrome control service).

Safety Management System (SMS)*. A systematic approach to managing safety, including the necessary organizational structures, accountability, responsibilities, policies and procedures.

SNOWTAM. A special series NOTAM given in a standard format providing a surface condition report notifying the presence or cessation of hazardous conditions due to snow, ice, slush, frost standing water or water associated with snow, slush, ice or frost on the movement area.

V_1. The maximum speed in the take-off at which the pilot must take the first action (e.g. apply brakes, reduce thrust, deploy speed brakes) to stop the aeroplane within the acceleration-stop distance. V_1 also means the minimum speed in the take-off, following a failure of the critical engine at the calibrated speed at which the critical engine is assumed to fail ($V_{EF)}$, at which the pilot can continue takeoff and achieve the required height above the take-off surface within the take-off distance.

Introduction

1. Objective

Runway surface condition can be reported using various types of descriptive terms such as: type and depth of contaminant, readings from a runway friction measuring device, aircraft braking action reports or braking condition of airport vehicles. The described means used for this purpose are not standardized worldwide.

2. Event Causes

Investigations of reported runway safety events have identified flaws in the accuracy and timeliness of runway surface conditions that are reported as contributing factors to many runway excursions.

Such shortcomings include a lack of standardization in:

1) The evaluation of the condition of the runway surface and the braking action.

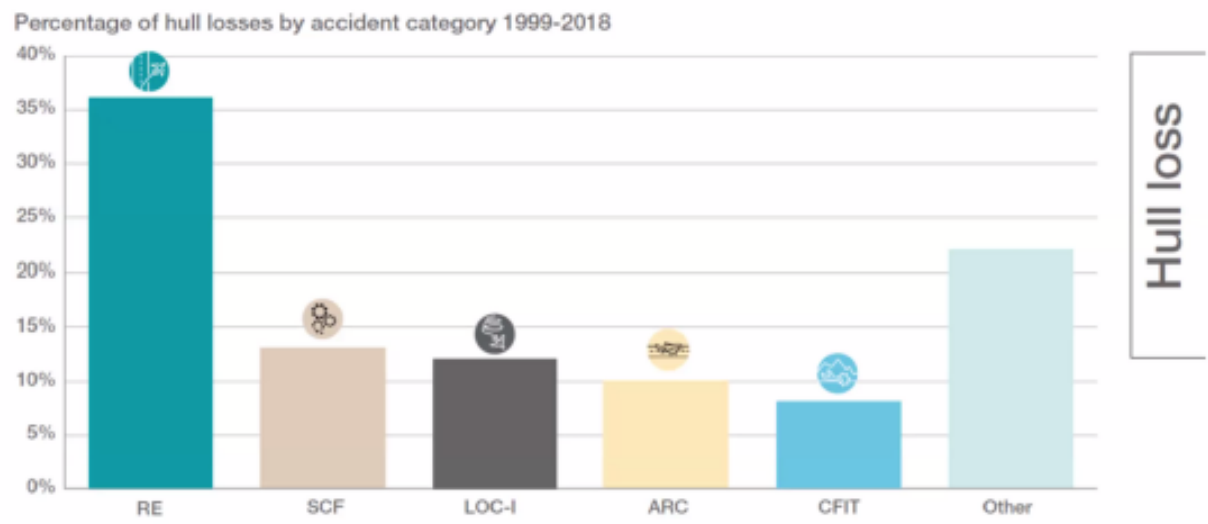
2) The collection and reporting of runway surface conditions to end-users (flight crews and flight planners), in particular the use of different terminology, formats and timeliness of reports.

3) Use of information reported by flight crews.

3. Effects

A discrepancy between the reported condition of the runway surface and the actual condition can affect performance calculations, the use of deceleration devices, and the flight crew's ability to maintain directional control that can result in a runway excursion.

The following table shows the highest incidences by types of accidents with aircraft with major damage:



Percentage of accidents by type 1999-2018

RE: Runway Excursion
CFS: Component Failure System
LOC-I: Loss of control in flight
ARC: Abnormal Runway Contact
CFIT: Controlled Flight Into Terrain

It is easy to observe the Runway excursions represent the highest percentage of accidents.

4. Defenses

The *Aviation Rulemaking Committee* (ARC) created by the FAA proposed the following corrective actions:

a) New standards for Runway condition assessment and reporting.

b) Correlation between runway condition reports and aircraft performance data.

c) New operational rules for calculating landing performance at arrival time.

The *European Action Plan for the Prevention of Runway Excursions* (EAPPRE) made the following recommendations to EASA:

1) Establish and implement a consistent method for the assessment and reporting of the condition of the contaminated runway surface by the aerodrome operator for use by aircraft operators. Ensure the relationship of

this report to the performance of the aircraft as published by aircraft manufacturers.

2) Aircraft operators should always perform an in-flight evaluation of landing performance before landing and apply an appropriate margin to the results.

For its part, ICAO has developed an improved assessment of the global condition of the runway and a reporting format based on the proposals of the TALPA (Take-off and Landing Performance Assessment) carried out by the ARC. The methodology for global implementation is based on the following:

1) An agreed set of criteria used consistently for the assessment of runway surface condition, aircraft certification (performance) and calculation of operational performance.

2) A single runway condition code (RWYCC) that links the agreed set of criteria to aircraft performance data that may relate to the braking action experienced and reported by the flight crew.

3) A common standardized terminology for the description of the reported condition of the runway surface by airport operator operations personnel , air traffic controllers and Aeronautical Information Services (AIS) for use by flight crews.

5. Solution

The ICAO methodology envisages:

1) Assessments and reporting by operations personnel responsible for conducting inspections that are trained, through a runway condition report (RCR), of runway surface conditions, including contaminants for each third of the runway length. This includes categorizing Contaminant according to their effect on aircraft braking performance and coding information in a Runway Condition Assessment Matrix (RCAM).

2) Use of an RCAM by aircraft manufacturers to determine appropriate performance data for specific runway surface conditions and provide approved data and guidance material to aircraft operators for the safe operation of aircraft on dry, wet and contaminated runway surfaces.

3) Provision of RCR information to end users (by AIS) in an enhanced SNOWTAM form.

4) Provision of RCR information to the flight crew by ATS through voice communication, CPDLC and ATIS. The information shall be presented according to the direction of movement of the aircraft, taking the first third of the runway as the closest to the aircraft approaching the ground.

5) The use of runway condition reports in conjunction with aircraft performance data provided by the manufacturer to determine along with other information but not limited to weather conditions and aircraft weight whether landing and takeoff operations are performed safely. A D

6) Aircraft crews will report the braking action experienced when different than expected. This solution will be implemented as of November 4, 2021.

6.. Recommendation for aircraft and crew operations

1. Aircraft operators should consider and have knowledge of the methodology for reporting on runway surface conditions at the airports where they operate. Special attention should be paid to those aerodromes that are critical in terms of runway length, challenging weather conditions, aerodrome capacity and reliability for the assessment and reporting of runway surface conditions. Particular consideration should be given to the format of the runway surface condition reports and the terminology in use. Operators should base their assessment at least on:

    a) Information contained in the AIP

    b) Service Experience

    c) Safety Event Report

2. Aircraft operators must include at least the following elements in their flight crew training program:

    a) Description of the methods for reporting runway surface conditions.

    b) Types of runway contamination and their effects

    c) Performance of take-off and landing of aircraft on wet and contaminated runways.

3. Where substantial differences are identified at a particular aerodrome or in a particular State or region with respect to the assessment and reporting runway surface conditions, the operator should ensure that runway conditions are notified in a timely manner.
4. In case of uncertainty about the runway surface condition report, conservative assumptions should be made in terms of aircraft performance calculations or when different conditions are reported for different runway segments in terms of assuming the worst condition for the entire runway.

5. Flight crews must report the braking action on the runway when it is not as good as expected according to previously reported values. Flight crew reports must be consistent with the format in use at the airfield being operated since the airfield operator can use them to degrade the condition of the runway. Also flight crews of later flights can use them by using the same runway.

PART I
ASSESSMENT AND REPORTING OF RUNWAY SURFACE CONDITIONS

1. General

1. Aeroplane performance can be considered to be impacted whenever the coverage of any water-based contaminant on any third of a runway exceeds 25 percent.
2. The intent of the assessment and reporting procedures is to communicate the runway surface conditions impacted by any remaining contamination to the aeroplane operators in a way consistent with the effect on aeroplane performance.

3. The intent of the RCR is to put into place a common language between all system actors that is based on the impact of runway surface conditions on aeroplane performance. It is therefore necessary that all members of the information chain, from data origin to end users have been given proper training. An outline of the necessary training for aerodrome personnel can be found in Appendix C to this document.

4. It is important that aerodrome personnel make every effort to accurately report runway surface conditions, rather than seek a systematically conservative assessment. Conservatism is recommended in the judgement of observations versus criteria such as 3 mm depth or 25 percent coverage, but for RWYCC. "Conservatism" is different from "downgrade" motivated by other observations or local knowledge. Flight crews are asked to evaluate the worst runway surface condition that are acceptable for the intended operation. This is an additional measure of safeguard against lack of conservatism.

5. Aircraft manufacturers have determined that variances in contaminant type, depth, and air temperature cause specific changes in aircraft braking performance. As a result, it has been possible to take the aircraft manufacturers' data on specific contaminants and produce the RCAM for use by aerodrome operators.

2. Operational need for Reporting

The flight crew needs information relevant for the safe operation of the aircraft, as far as it is relevant to the conditions of the runway surface, obtained through the use of NOTAMs (Slippery wet runway) and the RCR.

It is the task of the aerodrome personnel assessing and reporting runway surface conditions to determine the RWYCC that appropriately reflect the conditions on the runway and that are to be used for the performance check at the time of arrival. It is important that the aerodromes personnel understand the operational use of the RWYCC by the flight crew in order to assess and report it properly.

The RCR continues to include information on contaminant types and depth for determining performance limitations at time of take-off. Take-off performance data are provided for each type of winter contaminant and the operable range of depths of loose contaminant. The RWYCC alone does not permit a conservative description of the effect of the runway surface condition on aeroplane take-off performance. The RCR contains all the necessary information for the determination of the relevant runway condition for the performance assessment by the flight crew. This information is required at several stages of the flight, in particular in dynamic winter event conditions. The flight crew may need updates throughout the flight.

3. Categories of information

The operational need for information can be categorized as:

a) relevant for aeroplane performance;

b) relevant for situational awareness; and

c) relevant if there has been any significant change.

Note.— The need for information on any significant changes coincides with the trigger for generating information in the RCR.

Table 4-1 shows that information relevant for aeroplane performance is needed for:

a) flight planning;

b) cockpit preparation for departure;

c) cruise (i.e. alternative flight surveillance, in-flight rescheduling); and

d) approach preparation.

Information Relevant for situational awareness is needed for:

a) flight planning;

b) cockpit Preparation for departure

c) cruise;

d) approach preparation;

e) descent;

f) approach; and

g) taxi-in.

4.2 If there has been any significant change, such information may be needed for:

a) Taxi-out;

b) Line-up and take-off or missed approach;

c) descent;

d) approach; and

e) taxi-in.

4.3 There is an operational need for information in the RCR during all phases of flight except for the climb phase and actual landing phase. Consequently, for aerodrome personnel monitoring and reporting runway surface condition, it is important to focus on identifying and reporting any significant changes when they occur. A significant change is one that requires new information in any item of the RCR.

Note.— The flight crew's ability to receive the RCR in the various phases of flight is dependent upon the technology made available to them and, as a consequence, such ability will vary between aeroplane operators.

	Flight planning	Cockpit Preparation for departure	Taxi-out	Line-up and take-off or missed approach	Climb	Cruise	Approach Preparation	Descent	Approach	Landing	Taxi-in
AEROPLANE PERFORMANCE CALCULATION											
Aerodrome location indicator	P SA	P SA				SA	P	ASC			
Date and time of the Assessment	P SA	P SA	ASC	ASC		SA	P	ASC	ASC		
Lower Runway Designation Number	P SA	P SA	ASC	ASC		SA	P	ASC	ASC		
RWYCC for every third of Runway	P SA	P	ASC	ASC		SA	P	ASC	ASC		
Per cent coverage contaminant for each third of Runway	P	P	ASC	ASC		SA	P	ASC	ASC		
Depth of Loose contaminant for each third of runway	P	P SA	ASC	ASC		SA	P	ASC	ASC		
Condition description for each third of runway	P	P SA	ASC	ASC		SA	P	ASC	ASC		
Width of runway to which the RWYCC apply if less than published width	P SA	P	P			SA	P ASC	ASC	ASC		
SITUATIONAL AWARENESS											
Reduced runway length	P SA	P	ASC	ASC		SA	P	ASC	ASC		
Loose sand on the runway							SA	SA	SA		
Chemical treatment of the runway											

	Flight planning	Cockpit Preparation for departure	Taxi-out	Line-up & take-off or missed approach	Climb	Cruise	Approach Preparation	Descent	Approach	Landing	Taxi-in
Taxiway Conditions		SA	ASC				SA ASC		ASC		ASC
Apron Conditions		SA	SA				SA				SA
State-approved and published use measured coefficient of friction											
Plain language remarks											

Table 4-1.Surface friction characteristics by flight segment

Legend: P = Relevant to aeroplane performance
HS = Relevant for Situational Awareness
ASC =If there has been any significant change

4. The Defined Concept

The definitions of the terms listed in 4.1 to 4.3 define the fundamental conceptual part of the report and the assessment of the runway surface condition methodology.

4.1There are five fundamental elements:

a. Runway Condition Report (RCR);

b. Runway Condition Assessment Matrix (RCAM);

c. Runway Condition Code (RWYCC);

d. Runway Surface Condition; and

e. Runway Surface Condition Descriptors.

4.2 There are four runway surface conditions:

a. dry runway;
b. wet runway; (up to 3 mm of standing water)
c. slippery wet; and
d. contaminated runway (more than 3 mm of standing water)

4.3 There are eight contaminated runway surface condition Descriptors: (Not applicable to Belize are crossed out):

~~a. compact snow;~~

~~b. dry snow;~~

~~c. frost;~~

~~d. ice;~~

~~e. Slush;~~

f. stagnant water;

~~g. wet ice; and~~

~~h. Wet snow.~~

Based on the defined concept outline above, the RCR is a validated method that replaces subjective judgments with objective assessments that are directly tied to criteria relevant for aeroplane performance. These criteria have been determined by aeroplane manufacturers to cause specific changes in the aeroplane braking performance.

The above constitutes the conceptual integrity of the global reporting format. Any change to the definitions of the above elements can cause the conceptual integrity to fall apart.

5. Runway Condition Assessment Matrix (RCAM)

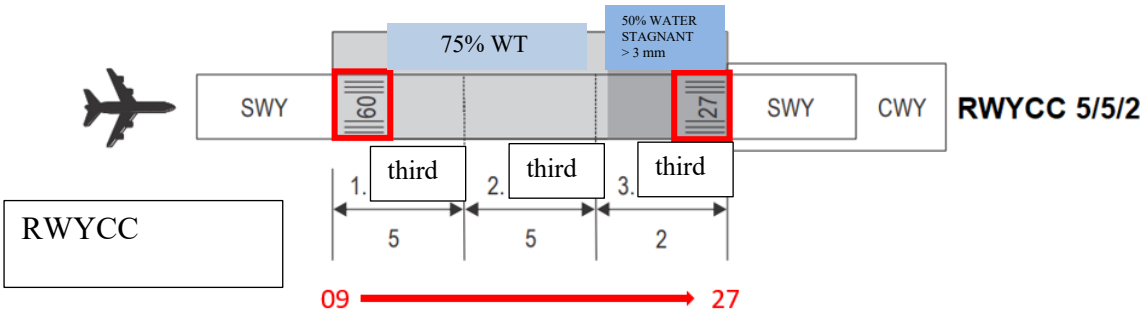
Central to this concept is the RCAM, shown in Table 5-1. In Belize it is possible to use a simplified version that does not include winter conditions as shown below

Runway Condition Assessment Matrix (RCAM)			
Assessment Criteria		***Downgrade Assessment Criteria***	
Runway Condition Code (RWYCC)	***Runway Surface Description***	***Aeroplane deceleration or directional control observation***	***Pilot report of runway braking action***
6	• **DRY**	---	**---**
5	• **WET** (the runway surface is covered by any visible dampness or water up to and including 3mm depth)	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal.	**GOOD**
4	---	Braking deceleration OR directional control is between Good and Medium	**GOOD TO MEDIUM**
3	**WET** ("slippery wet" runway)	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	**MEDIUM**
2	***More than 3 mm Depth of water*** • **STANDING WATER**	Braking deceleration or directional control is medium and poor.	**MEDIUM TO POOR**
1	---	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	**POOR**
0		Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain.	**LESS THAN POOR**

Table 5-1. Simplified Runway Condition Assessment Matrix (RCAM) [Source: PANS-Aerodromes (Doc 9981)]

Considerations:

The evaluation is carried out for each third of the runway:



The Matrix has two components:

- Evaluation criteria for the assignment of the Runway Condition Code (RWYCC)
- Evaluation criteria for lowering the code number, showing the correlation of the Runway Condition Code (RWYCC) and the driver's reports on braking efficiency on the Runway.

The variables that can affect the Runway Condition code in the tropics are:

- The type of contaminant
- Depth of the contaminant

The variables that the pilot must assess are:

- Braking slowdown
- Directional control

1. States:

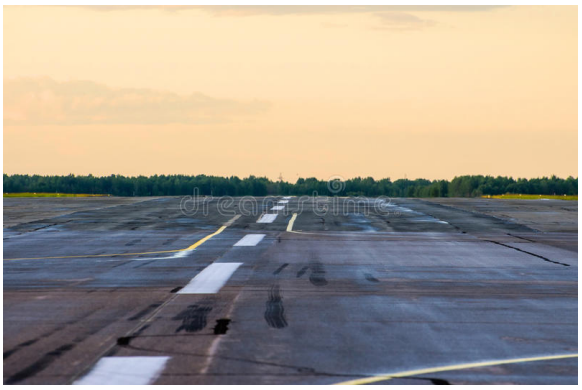
DRY Runway:

- A runway is considered dry if its surface is free of visible moisture and not contaminated within the area intended to be used.
- RWYCC = 6
- It is only notified when there is a need to notify one or more of the other thirds of the runway.
- It is notified in the event that the runway condition report (RCR) closes a period in which the runway was contaminated. That is, if there was a

previous report and returns to dry Runway, 6/6/6 is notified to clarify the change.

Wet Runway (WET):

- The runway surface is covered by any visible dampness or water up to and including 3 mm deep within the intended area of use.
- RWYCC = 5



Slippery Wet Runway (SLIPPERY WET):

- A wet runway where the surface friction characteristics of a significant portion of the runway have been determined to be degraded.
- RWYCC = 3

Contaminated runway:

- A runway is contaminated when a significant portion of the runway surface area (whether in isolated areas or not) within the length and width being used is covered by one or more of the substances listed in the runway surface condition descriptors.
- RWYCC = 2 or 3, as applicable.

2. Descriptors of the contaminated state of the runway surface:

For countries in tropical areas where it does not snow, a single descriptor will be used:

STANDING WATER:

- Water of depth greater than 3 mm.
  Note- Running water of depth greater than 3mm is reported as standing water by convention.
- RWYCC = 2

Visually inspecting the movement area to assess the surface condition is the core method for determining an RWYCC. An overall assessment, however, implies more than that. Continuously monitoring the development of the situation and prevailing weather condition is essential to ensuring safe flight operations. Other information that might influence the assessment results includes the outside air temperature (OAT), surface temperature, dew point, wind speed and direction, control and deceleration of the inspection vehicle, pilot reports of runway braking action, friction readings (continuous friction measuring device or decelerometer), weather forecasts, etc. Due to the interaction between such factors, it is not possible to define a precise deterministic method for determining how they affect the RWYCC to be reported.

Aerodrome personnel use their best judgment and experience to determine an RWYCC that best reflects the prevailing situation.

The RCAM supports the classification of runway surface conditions according to their effect on aeroplane braking performance using a set of criteria identified and quantified based on the best industry knowledge, built on dedicated flight test and in-service experience. The agreed thresholds at which a criterion changes the classification of a

surface condition are intended to be reasonably conservative, without being excessively pessimistic.

Percentage of coverage of contamination in each third of runway

A runway is considered to be contaminated when the extent of the coverage is more than a quarter of the surface of at least one third of the runway. It is important to note that whenever coverage is assessed to be below the 25 percent threshold in each third, the calculation assumption made by the flight crew will be a dry runway (uniformly bare of moisture, water and contamination). It has been demonstrated that in conditions of contamination just below the reporting threshold but concentrated in the most unfavourable location, for example in the TDZ, it could mislead the pilot in the configuration of the aircraft's performance, this assumption of dry runway still provides positive stop margins.

Type of contaminant

Different contaminants affect the contact area between the tire and runway surface, where the stopping force is generated, in different ways. A water film of any depth leads to partial separation (viscous aquaplaning) or total separation (dynamic aquaplaning) of the tire from the surface. The smaller the surface, the smaller the force of adhesion and the less braking is available. That is why the maximum braking force decreases at higher speeds and depends on contaminant depth. Other fluid contaminants have a similar effect. A deterministic classification of the stopping performance can be made only for the contaminants listed in the RCAM. For other reportable contaminants (oil, mud, ash, etc.), there is a large variance in the aeroplane performance effect, or insufficient data to permit a deterministic classification. An exception is Rubber contamination, for which in-service data indicate that an assumption of RWYCC 3 restores usual performance margins. Runway surface treatment with sand, grit or chemicals may be very effective or detrimental depending on the conditions of the application; and no credit can be attributed to such treatment without verification and validation.

Depth of the Contamination

The industry accepts that the threshold for the effect of depth of fluid contaminants on aeroplane performance is 3 mm. Below this threshold, any type of fluid contaminant can be removed from the tire/runway contact zone either by forced drainage or by compressing the contaminant into the macrotexture of the surface, thus allowing adhesion between the tire and the surface, albeit on less than the full footprint surface area. This is why contamination depths of up to 3 mm are expected to provide similar stopping performance as a wet runway. The Physical effects causing reduced friction forces begin to have an effect from very small film thicknesses, and that is why wet conditions are considered to offer no better braking efficiency than a wet runway. It is important for aerodrome personnel to be aware that the ability to generate friction in wet conditions (or with thin layers of liquid contaminant) depends largely on the inherent qualities of the runway surface (friction characteristics) and may be lower than what might normally be expected to occur. on poorly drained, polished or rubber-contaminated surfaces. Above the 3 mm threshold, the impact on friction forces is more significant, leading to lower RWYCC. Above this depth, and depending on the density of the fluid, additional drag effects start to apply due to displacement or compression of the fluid and impingement on the airframe of the aeroplane. These latter effects depend on the depth of the fluid and affect the aeroplane's ability to accelerate for takeoff. It is thus important to report depth with the precision required.

PART II
BUILDING THE RUNWAY CONDITION REPORT (RCR) CODE

1. General.

This part details how to construct the runway condition report (RCR) from field information, RCAM and RWYCC. The RCR is a comprehensive standardized report related to the condition of the runway surface and its effect on the landing and take-off performance of aircraft.

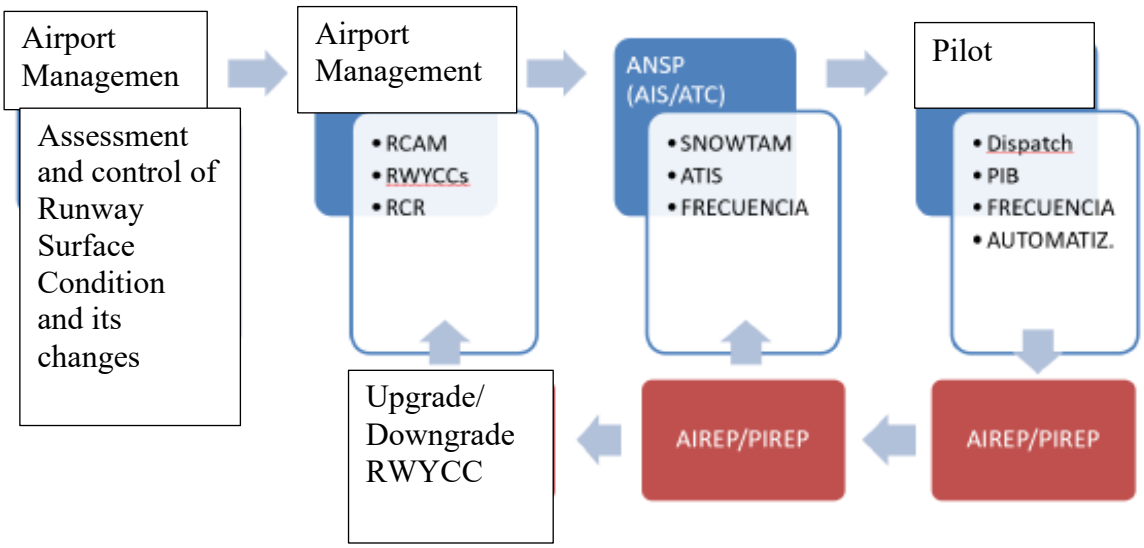
Here is an example of an RCR to create the idea:

MRPV 04151040 09 5/3/5 50/75/50 03/03/03 WET/SLIPPERY WET/WET

As you can see the Runway Condition Report (RCR) is a Runway Condition Code (RWYCC) with a series of information that is obtained in the field, evaluated with the runway condition assessment matrix (RCAM), completed with additional information and notified.

2. Information flow

The following diagram sets out the required roles, order, and flow of information:



The Airport Manager has to make a continuous assessment of the situation, following a process of evaluation of the state of the runway to generate an RCR.

This evaluation process consists of the following steps:

- Preparation
- Evaluation of runway condition (aircraft performance)
- Additional assessments (situational awareness)
- Notification

3. Methodology

The aim is a standardized method for notifying runway conditions, with a common language for all actors involved (aerodrome operator, airlines, dispatchers, air navigation service providers, AIM and MET).

This information will allow aircraft crews to determine landing and takeoff performance as it is based on runway surface conditions.

To create the report (RCR) common and consistent criteria must be used by developing a code (RWYCC) that links the agreed criteria with the table of takeoff and landing performance of the aircraft, which is also related to the braking action experienced and reported by the pilots.

So, as a reminder some concepts from Part 1:

a. The fundamental elements of the methodology:

- runway condition report (RCR);
- runway condition assessment matrix (RCAM);
- Runway Condition Code (RWYCC);
- condition of the runway surface; and
- Descriptors of the runway surface condition.

b. The runway surface states to be applied in the region are:

- Dry Runway
- Wet Runway
- Wet and slippery Runway
- Contaminated Runway (more than 3 mm of standing water)

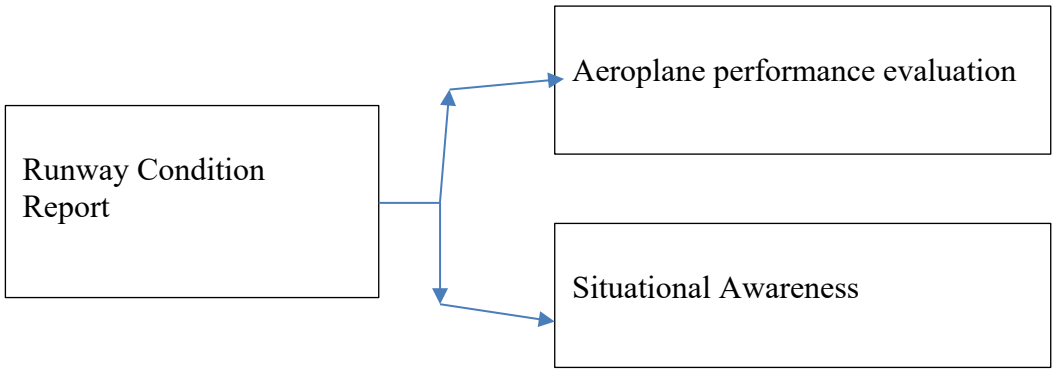
c. Descriptors applicable in regions without snow or ice

- Stagnant water only

Stagnant water is defined when there is a waterlogging thickness of more than 3 mm

4. RCR sections

Information must be given to the crew for two specific purposes:



4.1 Sources of Information

Certain information is useful for assessing the condition of the runway surface:

- control and deceleration of the inspection vehicle
- Drivers' reports on the effectiveness of braking on the runway
- friction readings (continuous friction measuring device or decelerometer)
- weather forecasts
- Other.

Because of the interaction between them, it is not possible to precisely define a deterministic method on how these factors affect the RWYCC to be reported**, but it is useful qualitative information.**

4.2 Aircraft Performance Calculation Section

Table 4.2-1 shows the source of the information provided in the order in which it appears in the Runway Condition Report (RCR), which is associated with the performance calculation section of the aircraft.

Information	Source
Aerodrome location indicator	Location Indicators Doc 7910
Date and time of assessment	UTC Time
Lower Runway designation number	Actual Runway (RWY)
RWYCC for every third of Runway	Assessment based on the RCAM and associated procedures
Percentage of contaminant coverage for each third of runway	Visual observation and measurements for each third of runway
Loose contaminant depth for each third of runway	Visual observation assessed for each third of runway confirmed by measurements where appropriate
Description of the status (type of contaminant) for each third of runway	Visual observation for each third of the runway
Situational Awareness Section	
Reduced Runway Length	NOTAM
Loose sand on the runway	Visual observation while at the runway
Taxiway conditions	Visual observations, AIREP, reports by other aerodrome personnel, etc.
State-approved and published use of measured friction coefficient	Dependent upon the standard set or agreed by the state
Plain language remarks using only allowable characters in capital letters	Any additional significant operational information to be reported
Apron conditions	Visual observations, AIREPS, reports by other aerodrome personnel, etc.

Table 4.2-1.

Table 4.2-2 shows an applied example of the information provided in the order in which it appears in the Runway Condition Report (RCR), which is associated with the performance calculation section of the aircraft.

AIRCRAFT PERFORMANCE CALCULATION SECTION			
Information	Inclusion	Format	Example
Aerodrome location indicator	Obligatory	4 letters ICAO code	MRLB
Evaluation date and time	Obligatory	UTC date and time format: MMDDhhmm	04221658 (April 22 at 4:58 PM)
Smaller number of Runway designator	Obligatory	NN (L,R,C)	07
Runway Condition Code (RWYCC) for each third of the runway.	Mandatory (see note 1)	N/N/N RWYCC according to RCAM	2/5/6
Percentage of contaminant coverage of each third of the runway.	Condition1: Not notified for all thirds of		6/6/6 by ATS only if it is by dry return. If its initial condition nothing is notified.

	runway that is dry or with a Coverage less than or equal to 25% (see Note 2)		
Percentage of contaminant coverage of each third of the runway.	Condition 2: In case the 25% threshold is exceeded for any third of the runway, the remaining ones are notified according to Table 4.2-3	N/N/N	As it exceeds 25%: - 25/50/100 if water coverage is less than or equal to 25% in the first third but greater than 10% -50/25/100 if the water cover is less than or equal to 25% and greater than 10% in the second third. -50/50/25 if water coverage is less than or equal to 25% and greater than 10% in the last third
depth of the loose contaminant in each third of runway in mm	Condition 1: not notified if the three-thirds of runway is dry or with coverage less than or equal to 25% (see Note 5).	N/N/N (see note 2)	6/6/6 by ATS only if it is by dry return. If its initial condition nothing is notified.
Depth of the loose contaminant in each third of runway in mm	Condition 2: Notified in case any third exceeds the 25% threshold (RWYCC 2 or 5) (See Note 5)	N/N/N	2/5/6 50/25/NR 04/02/NR The first third is more than 25% water with 4 mm depth, the second between 10% and 25% with 2 mm depth and the third with less than 10% water
Descriptor of the contaminant in each third of the runway	Obligatory	XXXX/XXXX/XXXX In capital letters	From the previous example STANDING WATER/WET/DRY

Table 4.2-2

Note 1: When ATS transmits information to the flight crew, the sections are referred to as the first, second and third parts of the runway. **The first part always means the first third seen in the direction of takeoff or landing. (runway in use)**

Note 2: Requires on-site evaluation. It is not notified in case a third of the runway is dry or has a coverage of less than 25% water. In which case it is written NR. When they are isolated non-uniform water loggings it should be indicated in "observations" with clear language. When the threshold of 25%

runway water is exceeded, percentages of the remaining two-thirds between 10 and 25% shall be reported as 25 in the RCR and the depth shall be indicated, even if less than 3 mm

The coverage notification criteria shall be used in this way:

Percentage evaluated	Percentage reported
0-25% (see Note 3)	Not notified (NR)
10-25	25% (Conditional* see Note 4)
26%-50%	50%
51%-75%	75%
76%-100%	100%

Board. 4.2-3 Percentage of coverage for contaminants

Note 3: That is, if the result of the evaluation is 20% % it is not notified; and if it is 26%, 50% is reported.

Note 4: * Conditional: In case any third has more than 25% with more than 3 mm (RWYCC 2 STAGNANT WATER) This criterion will be used only for the remaining two thirds. There could be an unusual condition that the percentage of coverage in the remaining two thirds is less than 10% in which case the condition would be dry runway (RWYCC 6 DRY) and no percentages of coverage ni thickness of contaminant (NR) would be reported.

Note 5 On-site evaluation is required for each third of the runway. When the thickness varies significantly (**significant change)** over time, in any third of the runway for example from 3 to 10 mm, a new RCR will be provided. Additionally, additional information will be provided in the "clear language observations" portion of the "situational awareness" section.

4.3 Section on situational awareness

Table 4.3-1 shows the source of the information provided in the order in which it appears in the Runway Condition Report (RCR), which is associated with the situational awareness section.

Information	Fountain
Reduced runway length	NOTAM
Loose sand on the runway	Visual observation on the runway
Chemical treatment of the runway	Application of known treatment. Visual observation of chemical residues on the runway
State of the taxiway	Visual observation, AIREP, notification of other aerodrome officials, etc.
Ramp Status	Visual observation, AIREP, notification of other aerodrome officials, etc.
State-approved and published use measured coefficient of friction	Depends on the standard established or agreed by the State
Clear language comments using only permissible uppercase characters	Any other important additional information that needs to be reported

Board. 4.3-1

Table 4.3-2 shows an applied example of the information provided in the order in which it appears in the Runway Condition Report (RCR), which is associated with the performance calculation section of the aircraft.

SECTION ON SITUATIONAL AWARENESS			
Information	Guy	Format	Example
Reduced runway length	Conditional when a NOTAM has been published modifying the declared distances affecting the LDA	RWY [nn] REDUCED LDA [n] nnn	RWY 25 LDA REDUCED TO 1450
Loose sand on the Runway	Optional	RWY [nn]LOOSE SAND	RWY 07 LOOSE SAND.
Chemicalor Runway treatment	Obligatory	RWY [nn] CHEMICALLY TREATED	RWY 07 CHEMICALLY TREATED
Taxiway condition	Optional	TWY [nn]n DEFICIENT	TWY B DEFICIENT
Ramp status.	Optional	DEFICIENT Ramp [nnnn]	POOR NORTH SHELF
Estimated friction of each third of the Runway.	Optional	Will not be communicated (see note 6)	N/A
Observations in clear and concise language	Optional	combination of permissible characters in which the use of the endpoint sign [.] indicates the end of the message. (see note 7)	ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789 /[line oblique] . [period] [space]
Decontaminated Runway width	Optional	Will not be communicated (see note 6)	N/A

Board. 4.3-2

Note 6: No reliable correlation has been established between the values of the coefficient of friction measured by equipment on the runway and the braking action of aircraft.

Note 7: Where possible, standard text should be developed to notify specific conditions

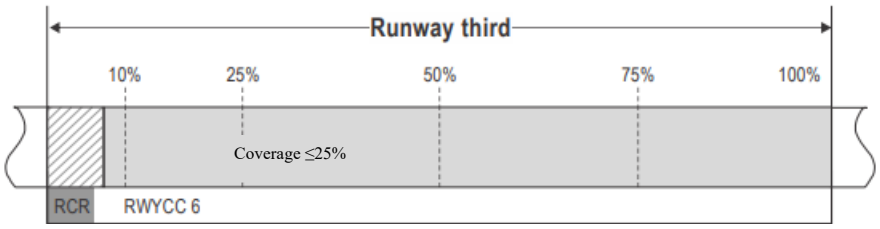
Note 8: It is used when contaminants such as loose sand are present and a portion or reduced width of the runway is cleaned, on both sides of the runway axis, or when lateral portions of the runway are flooded

4.4 Single contaminant

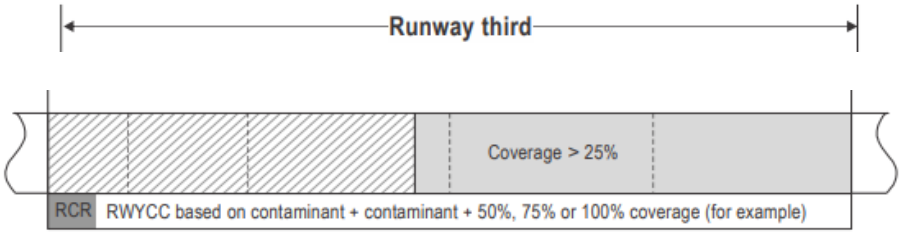
When we have only one type of contaminant, water for example, we consider the following aspects:

a. If the water coverage for one third is less than or equal to 25 %, an RWYCC of 6 must be generated for that third and no contaminants must be reported. If all thirds have less than or equal to 25% water

coverage, **no report is generated,** except if it is return to dry runway in which case 6/6/6 is notified.



b. If the percentage of water coverage for that third is greater than 25% it will be reported as 50%, 75% or 100% as appropriate (Table 4.2-3), the other thirds will be reported if they are between 10% and 25% as 25% according to the condition set out in Table 4.2-3 and the RWYCC for all thirds will be based on the contaminant present according to RCAM. Additionally, if a condition below 10% coverage were given for the remaining two-thirds, coverage would not be notified (NR)



4.5 Example runway condition report (RCR)

- **Aircraft Performance Calculation Section**

MROC 04142114 07 6/2/5 NR/50/25 NR/10/03 DRY/STANDING WATER/WET

RWY RWYCC % mm (depth)

Note1: ATC shall notify the RCR in the direction of the runway in use.
Note 2: AIM will notify via SNOWTAM at the address of lowest to highest designator
(The subject of notifications will be discussed in Part III of this document)

The above example indicates that:
By April 14 at 21:14 UTC.

The condition of Runway 07 is dry/standing water (more than 3 mm)/wet.
The percentage of the contaminant is less than 10% in the first third, between 26% and 50% in the second and 10% and 25% in the third respectively.
The depth of the contaminant is 2 mm, 10 mm, and 3 mm deep respectively.
The descriptor of the contaminant is DRY/STAGNANT WATER/WET.

- **Situational Awareness Section**

LDA RWY 07 REDUCED BY NOTAM TO 2800. RWY 25 LOOSE SAND, RWY 07 CHEMICALLY TREATED. TWY ALPHA POOR. APRON INTNL. POOR

The above example indicates that:
LDA of runway 07 reduced by NOTAM to 2800 m. Loose sand in runway 07. Runway 07 chemically treated. ALPHA taxiway low friction. International ramp with low friction.

Note: In this case as there is a section of the runway with standing water (condition 2) it must be published using SNOWTAM but we will see that later in more detail.

4.6 Process flowcharts

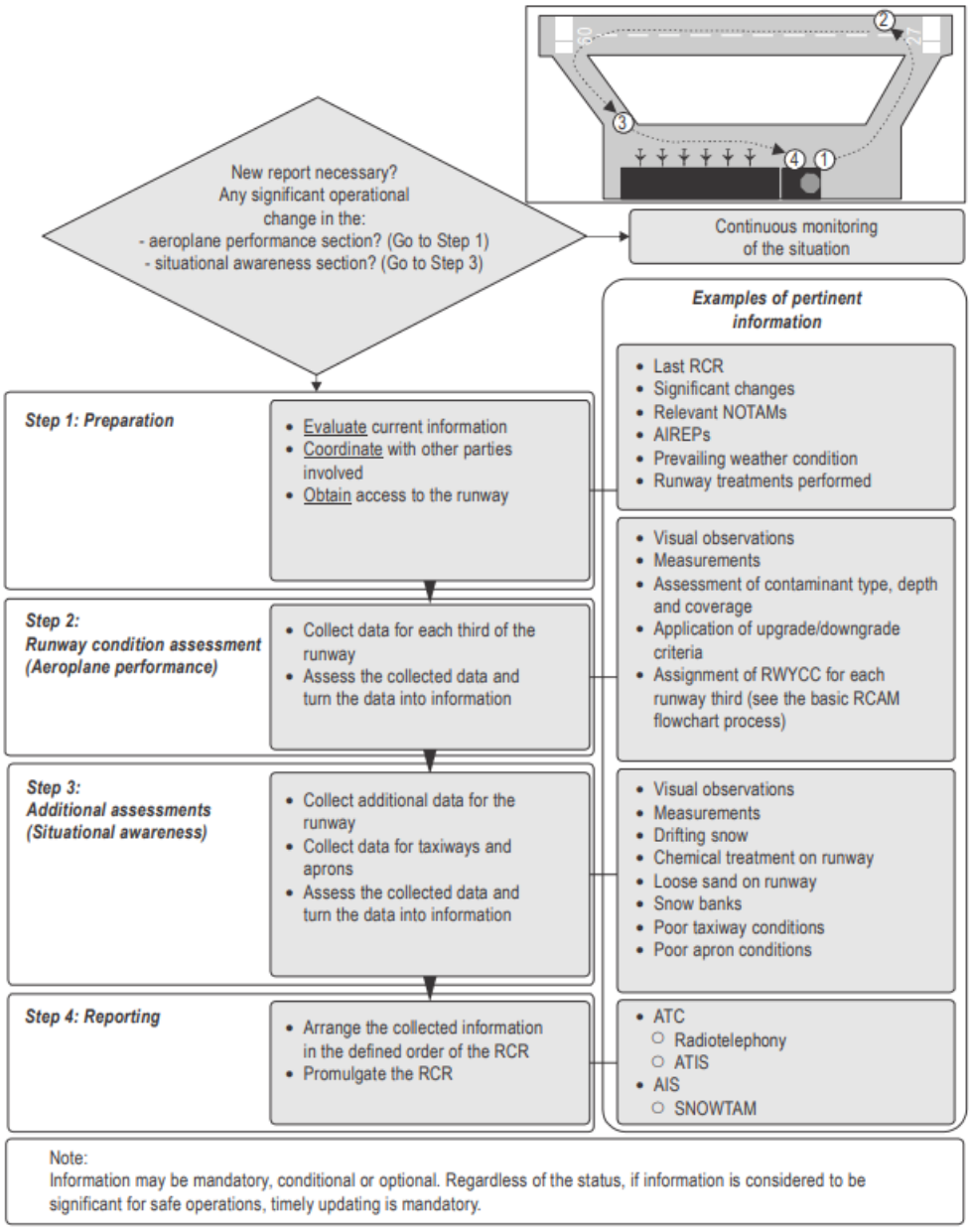


Fig. 2.5-1 Generic runway condition assessment process

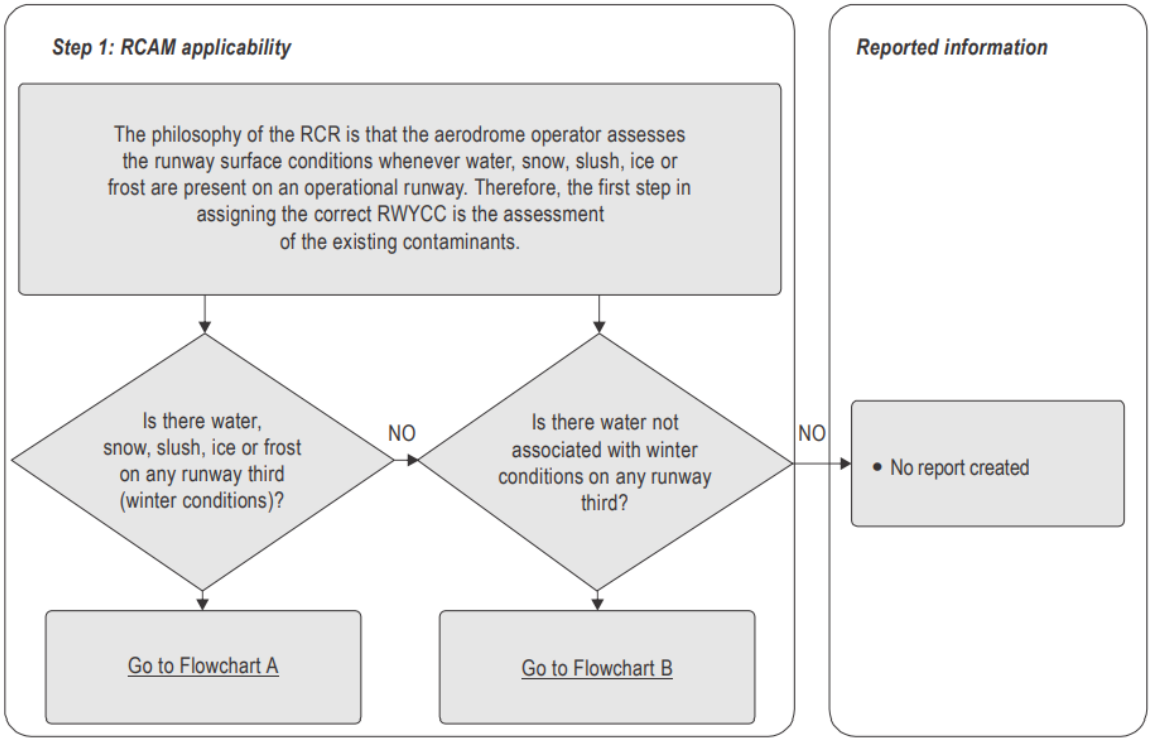
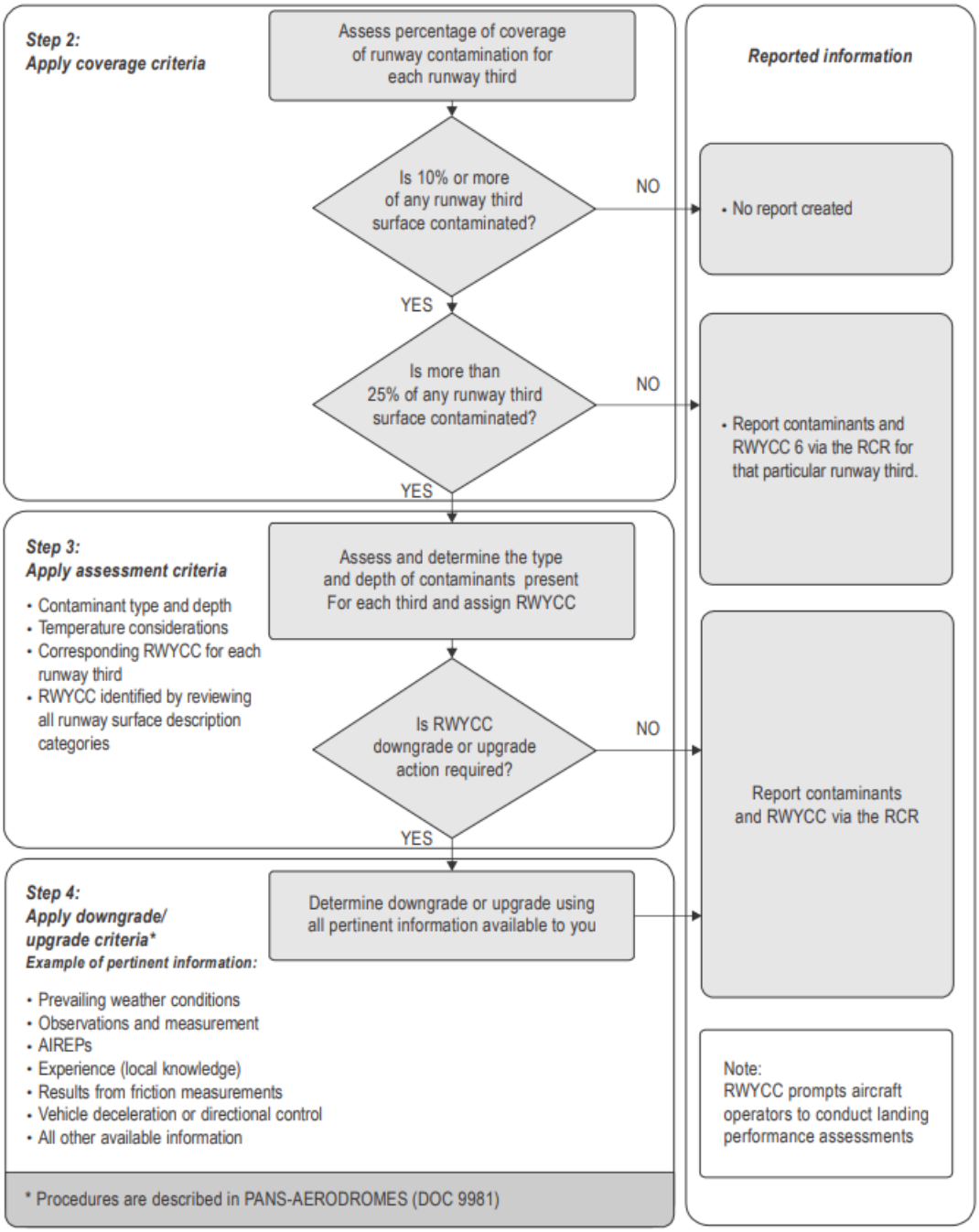


Fig. 2.5-2 The basic RCAM flowchart process.
Source: (Modified from Figure 4-3 of CIR 355 for regional conditions.)



Flowchart A
(Modified from Figure 4-5 of IARC 355)

4.7 Downgrading and upgrading the RWYCC.

The RCAM enables aerodrome personnel to make an initial assessment based on visual observation of contaminants on the runway surface, specifically the contaminant type, depth and coverage, as well as the OAT. Downgrading and upgrading is an integral part of the assessment process and is essential to making relevant reports of the prevailing runway surface conditions. When all other observation, experience and local knowledge indicate to trained aerodrome personnel that the primary assignment of the RWYCC does not accurately reflect the prevailing conditions, a downgrade or upgrade can be made.

Aspects to be considered when assessing the runway slipperiness for a downgrade include:

a. Prevailing weather conditions:
    i. dynamic conditions;
    ii. active precipitation;

b. Observations (information and source):

c. measurement:
    i. friction measurements;
    ii. vehicle behaviour;
    iii. shoe scraping;

d. experience (local knowledge); and

e. AIREP.

A change in the condition of the runway surface used in the runway condition report is considered significant when there is:

⇒ a change in the RWYCC

Note: A change in the RWYCC from, for example, 5/5/2 to 5/5/3 is considered significant.

⇒ a change in the type of contaminant

⇒ a change in the coverage of the reported contaminant, as follows:

Percentage evaluated	Percentage reported
0-25%	Not notified
10-25	25% (Conditional*)
26%-50%	50%
51%-75%	75%
76%-100%	100%

Board. 4.2-3 Percentage of coverage for contaminant

* Conditional: In case any third has more than 25% with more than 3 mm (RWYCC 2 STAGNANT WATER) This criterion will be used only for the remaining two thirds. An unusual condition could be that the percentage of coverage in the remaining two-thirds is less than 10% in which case the condition would be dry runway (RWYCC 6 DRY) and no percentages of coverage or contaminant depth (NR) would be reported.

⇒ a change in contaminant depth A change in the coverage of the reported contaminant, as follows:

Evaluation of contaminant depth

Contaminant	Valid values to be reported	Significant Change
Stagnant Water	04. after the assessed value	3 mm up to and including 15 mm

⇒ any other information, e.g. a report from the driver on the braking efficiency on the runway, which, according to the evaluation techniques employed, is known to be significant.

Changes to the RWYCC

An assigned RWYCC 5, 3 or 2 will not be exchanged for a higher one.

Changes in the RWYCC by pilot reports (AIREP/PIREP)

When available, rider reports on on-runway braking efficiency should be taken as part of the ongoing monitoring process, using the following principle:

- a pilot report on braking efficiency is taken into account for purposes of lowering the code number; and
- A pilot report on the braking efficiency on the runway can be used to change the code to a higher one only if it is used in conjunction with other qualifying information to raise the code.
- Two consecutive driver reports on runway braking efficiency as DEFICIENT (RWYCC = 1) will result in an assessment, if an RWYCC of 2 or better is reported.
- When a driver has notified that the braking efficiency on the runway is LOWER TO POOR (RWYCC = 0), the information will be disseminated, a new evaluation will be carried out and the suspension of operations on that runway will be considered.

Note: The states related to a RYWCC 1 and 0 refer to conditions of Melting Snow and Wet Ice among other related to the presence of water on the runway due to winter conditions, so they will not be used in the region. However, braking conditions from poor to lower to deficient may be related to the depth and percentage of water of an RWYCC 2. In these cases, the suspension of operations on that runway will be considered. (as modified by the author from Cir. 355.)

4.8 Equipment to be used during the evaluation

In this section we will describe some useful equipment to make the evaluation of the condition of the runway surface. The qualification of personnel is of paramount importance for the correct interpretation of the results.

4.8.1 Evaluation of the Aerodrome Operator

It is important that aerodrome personnel make every effort to accurately notify the condition of the runway surface, rather than attempting to make a systematically prudent assessment. In appendix A, guide documentation is provided as an example, methodologies that can be used by personnel who collect information in the field.

It is recommended to be cautious in issuing observations before criteria such as 3 mm thickness or 25 percent coverage, but not in terms of RWYCC.

Aircraft manufacturers have determined that variations in Contaminant type, depth, and air temperature produce specific changes in aircraft braking performance.

The aerodrome operator must assess and collect information for each third of the runway corresponding to:

- Percentage of coverage
- Type(s) of contaminant
- depth (mm)
- The evaluation of the coefficient of friction (although it should not be reported), can serve to have a greater knowledge to the airport manager in the initial evaluation of the runway and its modifications.

It is characteristic of the data collection process that almost all information on the runway can be collected through visual observations. If the information is collected with measuring apparatus or instruments, these must be calibrated and operated within their limits and in accordance with the standard established or agreed by the State.

The data collected is converted into information, a task carried out by the personnel trained to carry out these tasks.

- **Automated Systems.**

Several manufacturers have started with the development of equipment for remote obtaining the state of the runway. At the time of this circular its use is not widespread and those that provide an accurate indication of braking efficiency seem to be still a long way off.

- **Meteorological Equipment**

Some airports have automated weather equipment with sensors that provide real-time information on the thickness of water on the runway in every third. Before considering this reliable information, it must be ensured by means of field tests contrasted with the readings indicated by the equipment in order to establish a correlation of the accuracy of the automatic measurement. If it is found that the measurement is unreliable or has unacceptable margins of error, its use for RWYCC and RCR processing should be excluded. The airport operator is in any case responsible for ensuring the accuracy and reliability of the information.

- **Visual inspection**

As we said before, this is the most effective method if it is carried out with trained personnel. It is of utmost importance that markings be placed indicating the start and end of each third of the runway from each threshold in order to maintain an appropriate order in the verifications.

We have two types of routine inspections that must be done:

1. Routine inspections several times a day. These inspections basically assess the following:
    a. Sudden changes in pavement condition
    b. Status of visual aids
    c. Presence of FOD (Foreign Objects and Debris)
    d. Water on runway
    e. Quality of runway drainage
    f. Other emerging conditions.

2. Inspections in emerging conditions:
    a. Increase in contaminants due to excess rainfall
    b. Increase of contaminants in volcanic ash conditions.
    c. Etc.

When a routine inspection detects water on the runway, a trained observer will easily perform if it is only wet or already has a water accumulation condition that makes it suspect that measurements and monitoring are required. In the latter case, the observer must possess technical tools for measuring the area and depth of the stagnations. Appendix A provides guidance material for measurements of the amount of water on the runway for each third.
When there are conditions of persistent rain of high intensity it could happen that the rainfall flow exceeds the capacity of the drainage systems or that the conformation of the safety strips has degraded and they have lost their ability to channel the waters by runoff to the collection and discharge systems. In this

condition it is imperative to evaluate the runway conditions more often to identify if a change in the RWYCC should be generated to be reported by a new RCR.

It is a good idea to ask pilots to report the braking and control conditions of the aircraft during takeoff and landing.

- **Additional on-runway coefficient of friction measurements**

When it is known that the coefficient of friction on the runway has degraded below the level of "maintenance planning" approved by the State and even more so when it approaches the minimum level. Additional measurements should be carried out to verify whether due to the conditions of the sum of contaminants (rubber + excess water) there is no significant degradation to be considered for the definition of the RWYCC.

- **Associated procedures.**

The aerodrome operator must develop and submit to the regulator for approval all procedures for runway water verifications for inclusion in its Aerodrome Manual.

PART III
DISSEMINATION OF RUNWAY SURFACE CONDITION INFORMATION

1. Introduction.

According to the latest date set by ICAO, the use of the global format to assess and report the condition of the runway surface should apply from 4 November 2021.

It is then necessary that for States that cannot meet the requirement by that date, notify the difference to ICAO, establishing their own date of implementation.

Note: Doc. 1055 sets out the requirements for notifications of differences.

2. Information Flow

The following figure shows the production cycle and transmission media from the generation of the RWYCC to the diffusion of the RCR.

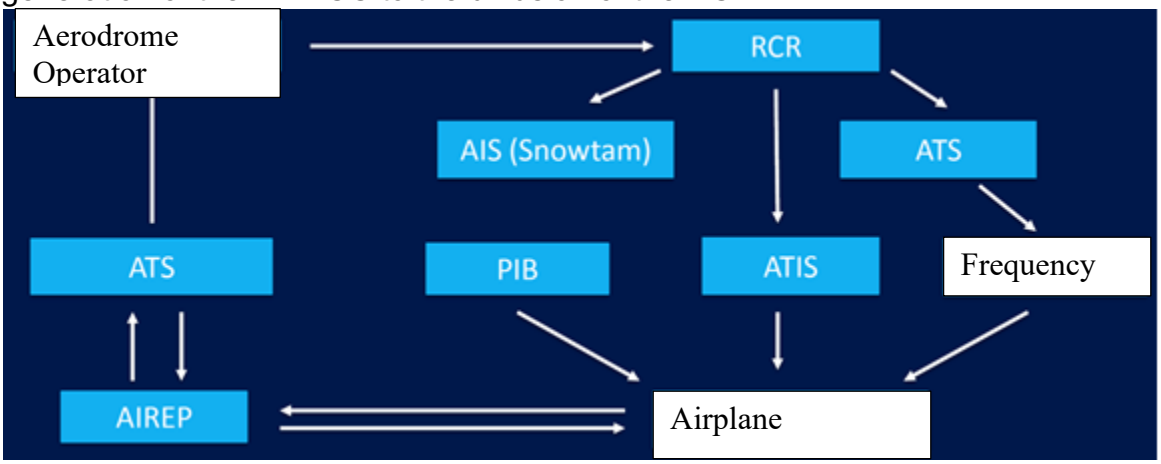
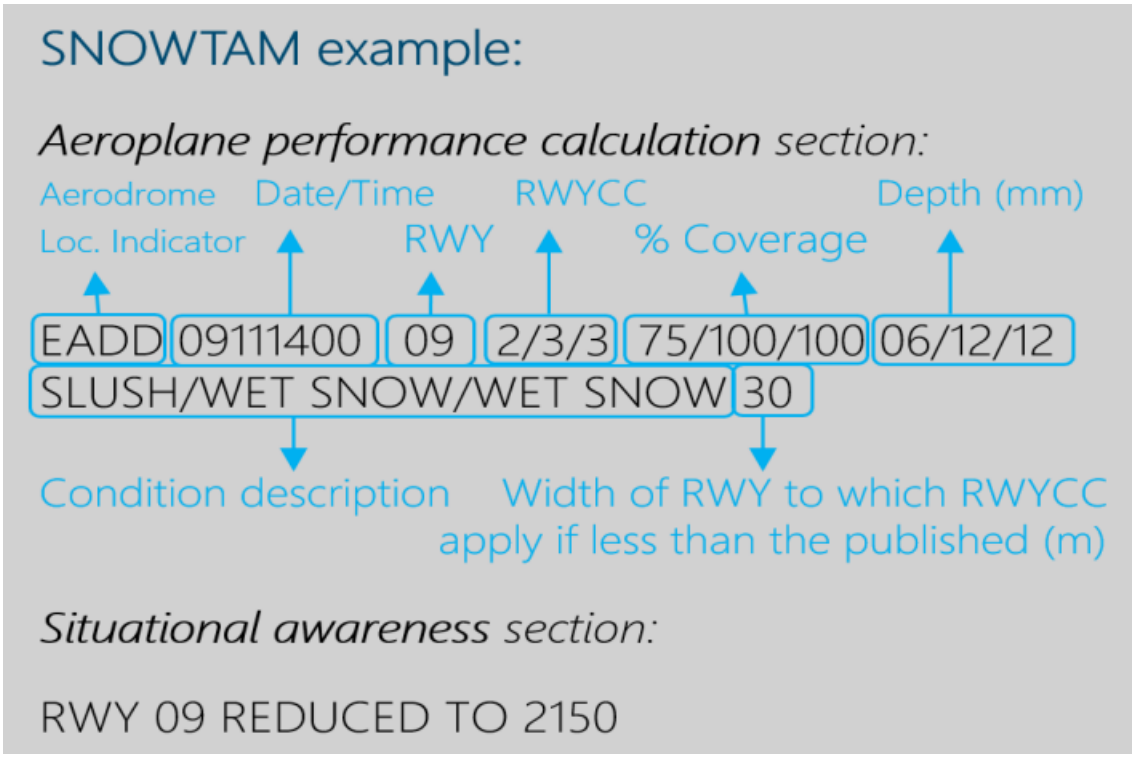


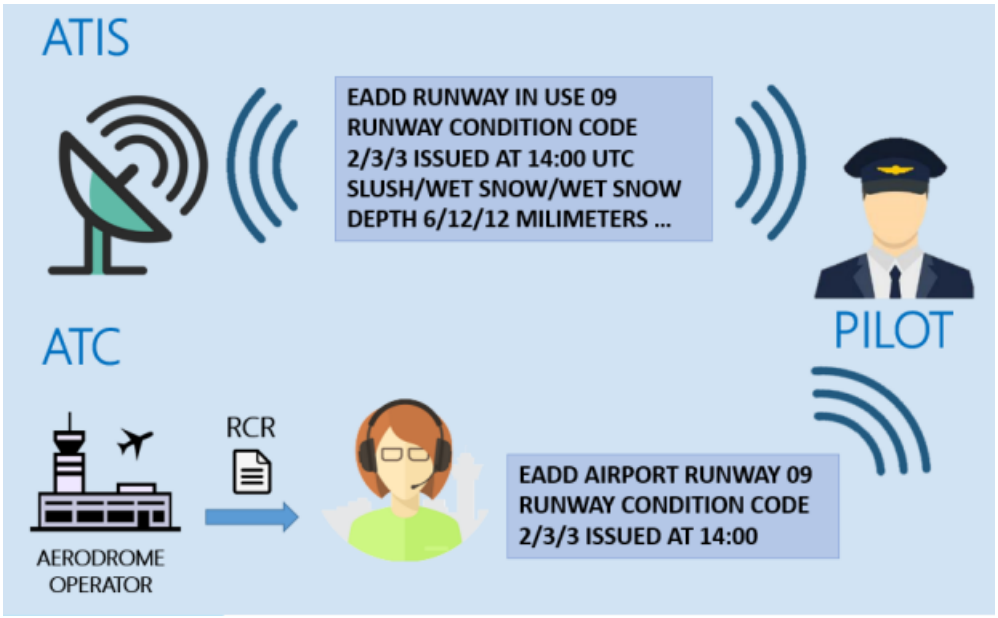
Fig. 3. 3-1

The dissemination of information in real time can be done by any of the following means:

- AIS: SNOWTAM



- ATS: Radio Frequency Voice and ATIS



Notification to pilots (NOTAM)

This section is oriented to the methodology and content of the information to be disseminated regarding the RCR.

Information for arriving aircraft

With regard to the RCR in Doc 4444 PANS-ATS, it is indicated that as soon as possible after the aircraft has established communication with the unit providing approach control service, the current state of the runway surface will be transmitted to the aircraft, when precipitation residues or other temporary hazards exist.
In addition, it is indicated that at the beginning of the final approach, information regarding significant changes in the condition of the runway surface will be transmitted to aircraft.

What runway distance to notify

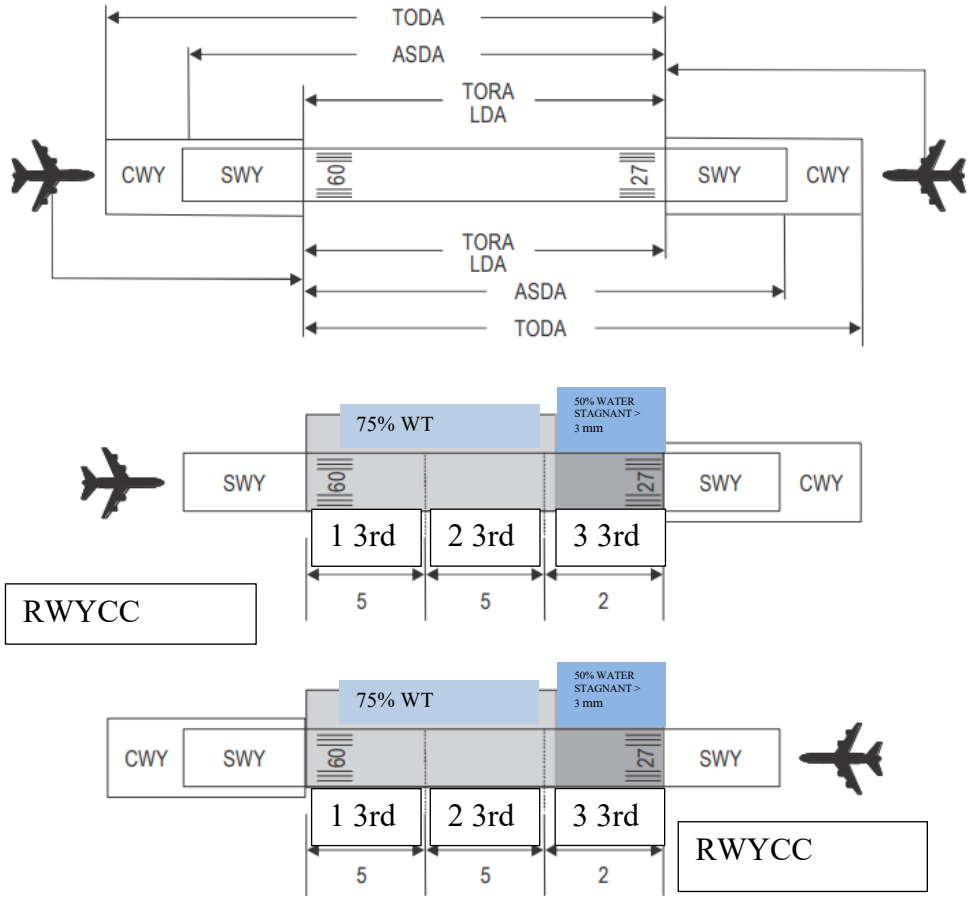
The information reported in the RCR relates to the physical extent of the runways (what is published in the aerodrome physical characteristics section of the AIP), regardless of the length and position of the distances declared within that extent.

Two possible options should be considered:

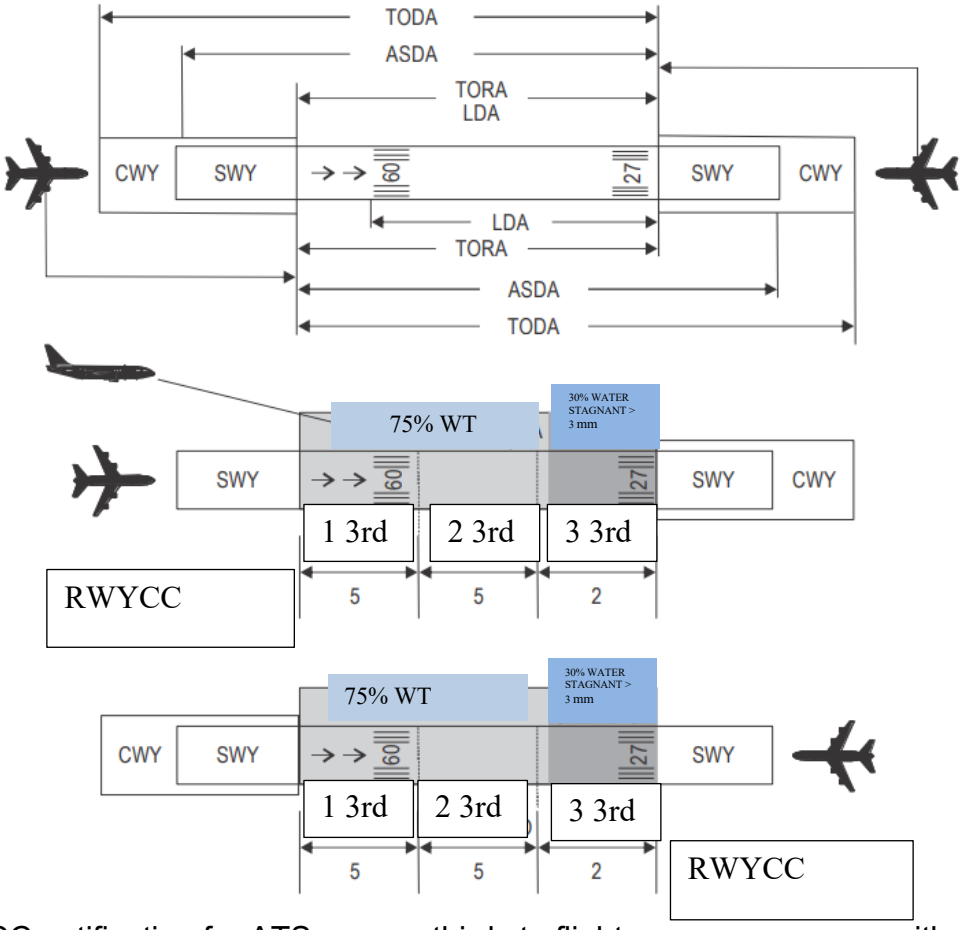
- Threshold at runway start
- Shifted threshold

When ATS transmits information to the flight crew, the sections are referred to as the first, second and third parts of the runway. The first part always means the first third seen in the direction of takeoff or landing. Here the important thing is that regardless of whether the threshold is displaced or not, what is notified is the physical distance from the runway, that is, the TORA for it covers the takeoff and landing operations. (Active Runway)

Note 1: When ATS notifies pilots it will always do so in the direction of operation.
Note 2: When notified via SNOWTAM or NOTAM it is done in the direction of the threshold with lower runway designator.



RWYCC notification for runway thirds by ATS to flight crew on a runway



RWYCC notification for ATS runway thirds to flight crew on a runway with shifted threshold

Address or direction of runway being reported

The relevant ATS units shall have available to transmit to the aircraft, upon request, data from the runway condition report (RCR). This will be transmitted to the aircraft in the order of landing or take-off direction.

Phraseology of aerodrome information.

Where information is provided concerning runway surface conditions that may adversely affect the braking efficiency of the aircraft, the following terms shall be used, as necessary:

- DRY
- Wet

- STANDING WATER
- Wet and Slippery (SLIPPERY WET)

The following table shows the phraseology to be used:

a) [*(lugar)* CONDICIÓN DE LA SUPERFICIE DE LA PISTA *(número)* [CLAVE *(número de tres dígitos)*];	a) [*(location)*] RUNWAY *(number)* SURFACE CONDITION [CODE *(three digit number)*]
seguido, si es necesario, de:	*followed as necessary by:*
1. EXPEDIDO EL (fecha y hora UTC);	1. ISSUED AT (date and time UTC);
2. DRY o HIELO MOJADO, o AGUA SOBRE NIEVE COMPACTA, o NIEVE SECA, o NIEVE SECA SOBRE HIELO, o NIEVE MOJADA SOBRE HIELO, o ICE, o NIEVE FUNDENTE, o AGUA ESTANCADA, o NIEVE COMPACTA, o NIEVE MOJADA, o NIEVE SECA SOBRE NIEVE COMPACTA, o NIEVE MOJADA SOBRE NIEVE COMPACTA, o MOJADA, o ESCARCHA;	2. DRY or WET ICE, or WATER ON TOP OF COMPACTED SNOW, or DRY SNOW, or DRY SNOW ON TOP OF ICE, or WET SNOW ON TOP OF ICE, or ICE, or SLUSH, or STANDING WATER, or COMPACTED SNOW, or WET SNOW, or DRY SNOW ON TOP OF COMPACTED SNOW, or WET SNOW ON TOP OF COMPACTED SNOW, or WET, or FROST;
3. DE ESPESOR (espesor del depósito) MILÍMETROS o NO NOTIFICADO);	3. DEPTH ((depth of deposit) MILLIMETRES or NOT REPORTED);

3. Rules for broadcasting according to runway state

a. Exclusive ATS broadcast

When the runway is <u>WET (water ≤ 3 mm)</u> the message is broadcast via:

- ATS (Voice and/or ATIS)

For example 5/5/5 because it is less than 3 mm (wet)

b. ATS and AIS Broadcasting

When the runway is contaminated <u>with standing water</u>, the information is disseminated via

- ATS: frequency and/or ATIS; and
- AIS: SNOWTAM

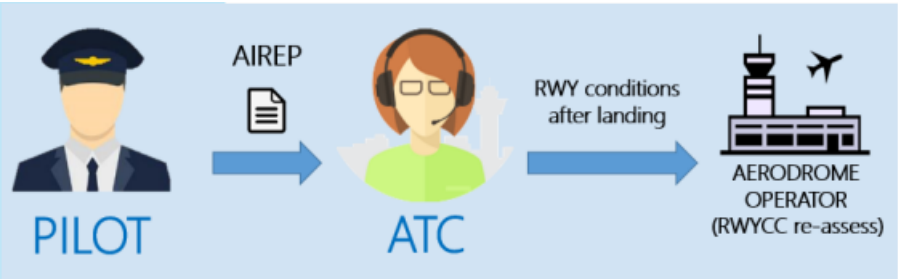
4. RCR distribution formats by transmission route

AIS	• New SNOWTAM format RCR complete • Eg. MROC 04191417 07 5/2/2 100/75/75 NR/06/06 WET/STANDING WATER/STANDING WATER
ATIS	• RCR Format abreviated with relevant information • Ej. 1417 07 5/2/2 100/75/75 NR/06/06 WET/STANDING WATER/STANDING WATER TWY B POOR
Voice with Radio frequency	• RCR Format only RWYCC (braking action) • Ej. 07 5/2/2 (wthout ATIS or frequency not saturated: RCR-ATIS) • RCR complete with request

5. Aero notifications : AIREP / PIREP

ICAO Annex 6: The pilot-in-command shall report on the special aero-notification (AIREP) of braking efficiency on the runway when the braking efficiency experienced is not as good as that reported.

Note.— The PANS-ATM (Doc 4444), Chapter 4 and Appendix 1 contain the procedures for special aero-notifications on braking efficiency on the runway.



The Airport Manager must use the AIREP notified by a pilot to initiate the re-evaluation of the RWYCC, which may vary based on the report given.

6. Wet and Slippery Runway Condition Notification (RWYCC 3)

BCAR 139.339 (i) 3) and 139.339 (i) 4 respectively indicate:
(3) Information shall be provided indicating that a runway or a portion thereof is wet and slippery.

Note 1.— The friction characteristics of the surface of a runway or part thereof may deteriorate due to rubber deposits, surface polishing, poor drainage or other factors. The determination that a wet runway or a portion thereof is considered slippery results from different methods that are applied alone or in combination.

(4) *Relevant aerodrome users shall be notified when the friction level of a paved runway or a portion thereof is less than the minimum friction level specified by the State in accordance with BCAR14 304(b).*

Note 3.— The information to be promulgated in a NOTAM includes specifying the portion of the runway that is below the minimum friction level and its location on the runway.

A 100 m portion of runway should be considered significant when considering the runway wet and slippery.

As a reminder, the following figure illustrates a flowchart, which shows the evaluation process to be carried out.

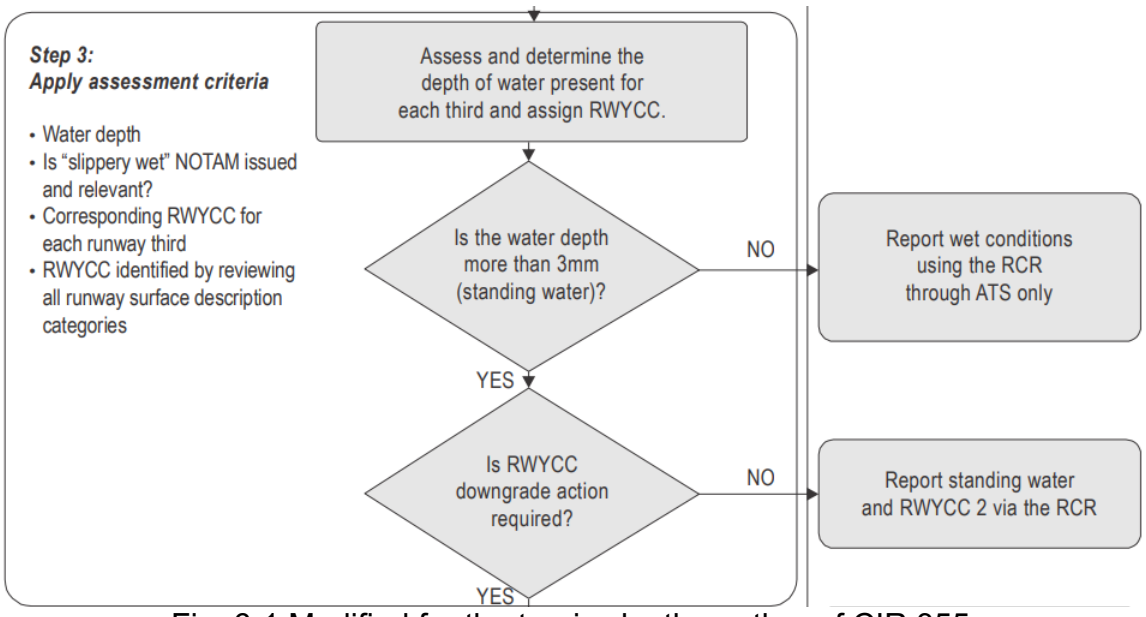
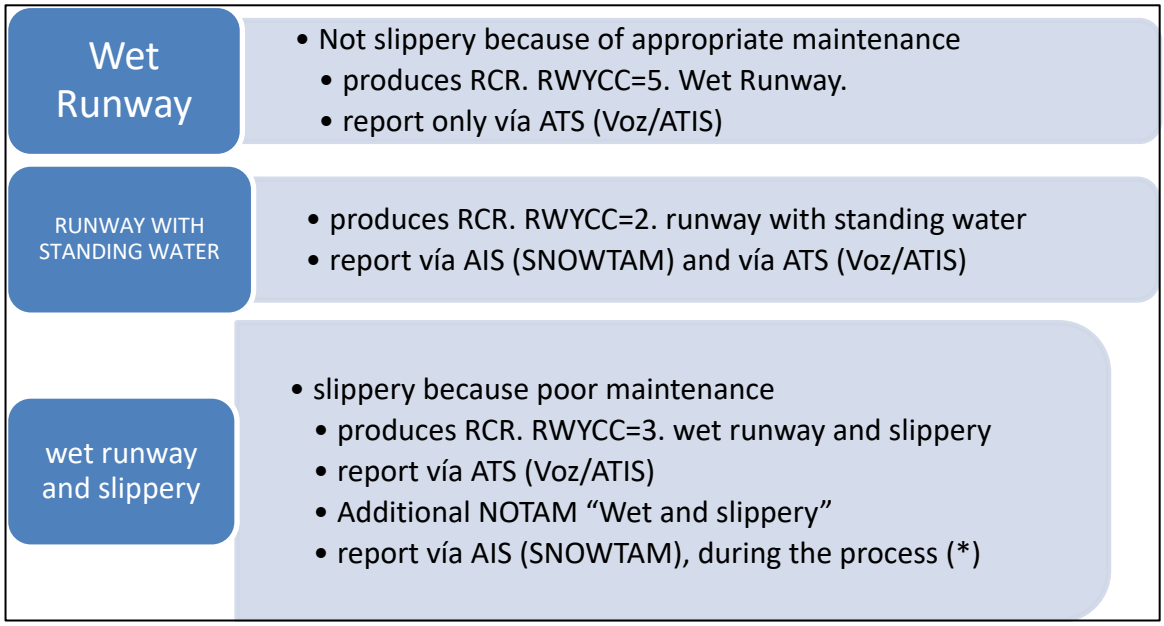


Fig. 6-1 Modified for the tropics by the author of CIR 355

When the runway is in a SLIPPERY WET condition the notification is made additionally by means of a NOTAM

BROADCAST SUMMARY FOR WATER-CONTAMINATED RUNWAYS

The following table shows a summary of diffusion for water-contaminated runways.



(*) Take into account the forecast of weather conditions.

7. Data integrity

The level of assurance of the quality and integrity of the data must be maintained throughout the process of collection, preparation, pre-notification and publication of information. Therefore, a degree of assurance is required that no aeronautical data or its values have been lost or altered after the authorized initiation or amendment.

8. SNOWTAM

The new SNOWTAM format applicable from November 4, 2021 is shown below.

(COM heading)	(PRIORITY INDICATOR)	(ADDRESSES)		<≡
	(DATE AND TIME (OF FILING)	(ORIGINATOR'S INDICATOR)		<≡
(Abbreviated heading)	(SWAA* SERIAL NUMBER) S W * *	(LOCATION INDICATOR)	DATE/TIME OF ASSESSMENT	(OPTIONAL GROUP) <≡ (

SNOWTAM →	(Serial number)	<≡

Aeroplane performance calculation section			
(AERODROME LOCATION INDICATOR)	M	A)	<≡
(DATE/TIME OF ASSESSMENT *(Time of completion of assessment in UTC)*)	M	B)	→
(LOWER RUNWAY DESIGNATION NUMBER)	M	C)	→
(RUNWAY CONDITION CODE (RWYCC) ON EACH RUNWAY THIRD) *(From Runway Condition Assessment Matrix (RCAM) 0, 1, 2, 3, 4, 5 or 6)*	M	D)	/ / →
(PER CENT COVERAGE CONTAMINANT FOR EACH RUNWAY THIRD)	C	E)	/ / →
(DEPTH *(mm)* OF LOOSE CONTAMINANT FOR EACH RUNWAY THIRD)	C	F)	/ / →
(CONDITION DESCRIPTION OVER TOTAL RUNWAY LENGTH *(Observed on each runway third, starting from threshold having the lower runway designation number)* COMPACTED SNOW DRY DRY SNOW DRY SNOW ON TOP OF COMPACTED SNOW DRY SNOW ON TOP OF ICE FROST ICE SLUSH	M	G)	/ /

STANDING WATER WATER ON TOP OF COMPACTED SNOW WET WET ICE WET SNOW WET SNOW ON TOP OF COMPACTED SNOW WET SNOW ON TOP OF ICE			→
(WIDTH OF RUNWAY TO WHICH THE RUNWAY CONDITION CODES APPLY, IF LESS THAN PUBLISHED WIDTH)	O	H)	<≡≡
Situational awareness section			
(REDUCED RUNWAY LENGTH, IF LESS THAN PUBLISHED LENGTH *(m)*)	O	I)	→
(DRIFTING SNOW ON THE RUNWAY)	O	J)	→
(LOOSE SAND ON THE RUNWAY)	O	K)	→
(CHEMICAL TREATMENT ON THE RUNWAY)	O	L)	→
(SNOWBANKS ON THE RUNWAY) *(If present, distance from runway centreline (m) followed by "L", "R" or "LR" as applicable)*	O	M)	→
(SNOWBANKS ON A TAXIWAY)	O	N)	→
(SNOWBANKS ADJACENT TO THE RUNWAY)	O	O)	→
(TAXIWAY CONDITIONS)	O	P)	→
(APRON CONDITIONS)	O	R)	→
(MEASURED FRICTION COEFFICIENT)	O	S)	
(PLAIN-LANGUAGE REMARKS)	O	T)	)
NOTES: 1. *Enter ICAO nationality letters as given in ICAO Doc 7910, Part 2 or otherwise applicable aerodrome identifier. 2. Information on other runways, repeat from B to H. 3. Information in the situational awareness section repeated for each runway, taxiway and apron. Repeat as applicable when reported. 4. Words in brackets ( ) not to be transmitted. 5. For letters A) to T), refer to the *Instructions for the completion of the SNOWTAM Format*, paragraph 1, item b), in Appendix 4 of PANS-AIM (Doc 10066).			

SIGNATURE OF ORIGINATOR *(not for transmission)*

- The maximum validity of a SNOWTAM is 8 hours
- New SNOWTAMs will be released whenever a new runway condition report is received.
- A SNOWTAM cancels a previous SNOWTAM
- When the information is not reported for the corresponding runway thirds, NR will be inserted.
- When reporting data for more than one runway, repeat the data indicated from B to H (the section on calculating aeroplane performance).

- The mandatory information is:
    - aerodrome site indicator;
    - date and time of observation;
    - lowest runway designator number;
    - Runway condition code for each third; and
    - Description of the condition of each third of the runway

- Coefficient of friction measured (field "S" of SNOWTAM). It is possible to transmit it, but it will not be used (neither via SNOWTAM nor via ATS)

(COEFFICIENT OF FRICTION MEASURED*)*	Or	S)	→

In ICAO Annex 14 volume I, the reason is given:

"2.9.8 ***Recommendation.*** *Friction measurements made for the surface condition of a runway with contaminants other than compact snow and ice should not be reported."*

Note 1. Friction measurements on loose contaminants, such as snow or melting snow, in particular, are unreliable due to the effects of drag on the measuring wheel (author's note: this extends to standing water with certain depths).
Note 2: We know that it is not a standard coefficient, it varies with the CFME equipment used

9. Automatic Terminal Information Service (ATIS)

It is a service that automatically provides regular, updated information to arriving and departing aircraft 24 hours a day. These messages shall contain information relating to important runway surface conditions and, where appropriate, braking efficiency.

- Automatic Terminal-Voice Information Service (ATIS-Voice): is the provision of ATIS through continuous and repetitive voice broadcasts.
- Automatic Terminal Information Service by Data Link (ATIS-D): is the provision of ATIS via data link.
- ATIS messages will be prepared and disseminated by ATS services.

c. ATIS-VOICE

- Where possible, the message from ATIS-speech broadcasts should not exceed 30 seconds, ensuring that the readability of the ATIS message is not affected by the transmission speed or by the identification signal of the navigation aid used for ATIS transmission.

- When ATIS-voice is supplied, broadcasting shall be continuous and repetitive.
- ATIS-voice broadcasts supplied at aerodromes intended for use on international air services shall be available in at least English.

d. ATIS-D (by data link)

- Where an ATIS-D supplements the availability of ATIS-voice, the information shall be identical, in content and format, to the corresponding ATIS-voice broadcast.
- When an ATIS-D complements the availability of the ATIS-voice and the ATIS needs to be upgraded, both systems will be upgraded simultaneously.

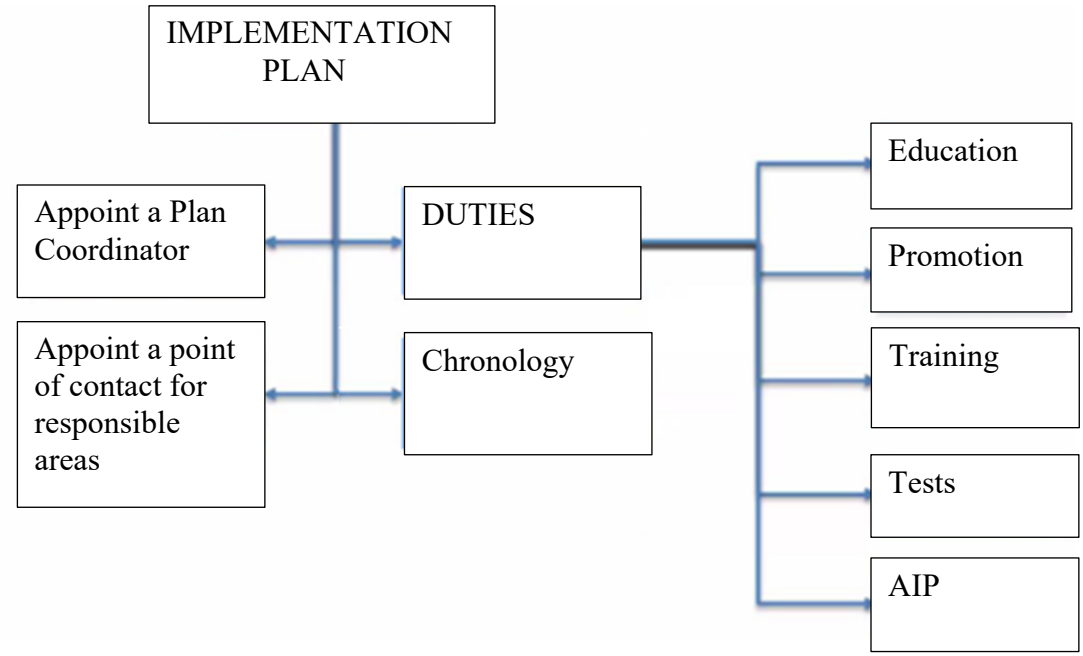
PART IV
RCR IMPLEMENTATION PLAN

1. Introduction

The implementation of the RCR requires a series of well-structured steps in all disciplines involved. BDCA inspectors at aerodromes, SLAs and Operations, as well as airport, air navigation and airline service providers should chart a common course for the orderly implementation of the RCR with minimal risks associated with the change. Change management will be discussed in PART V of this document.

2. Steps for an Implementation Plan:

a) Develop a general outline of the implementation plan. The following example can serve as a guide:



b) Establish the implementation team including all parties involved: aerodrome operations, air navigation service provider (ATS, AIM, MET), airlines, BDCA (AGA, ANS, PAHO). The focal points in each area must be defined. Appoint a general coordinator of the project.

c) List the activities to be carried out, coordination to be carried out, establishment of the regulatory framework, etc.
d) Establish a timeline with timelines for each stage of implementation.
e) Review all existing regulations in this regard
f) Develop a Gantt implementation with well-defined milestones over time
g) Promote the plan within organizations: pamphlets, webinars, website, etc.
h) Identify the training needs of each person and train the personnel of the organizations involved:
   - Ats
   - Ais
   - Pilots
   - Meteorology
   - Etc.

i) Identify appropriate people within the organization and train them as trainers
j) Specify training/instruction according to areas of knowledge required.
   - Theoretical/practical training
   - Initial/Recurring (Training Program)

   a. Adapt training to the necessary skills.

k) Plan and execute tests and drills. (Table preparation, participation of all involved, preparation meetings)
l) Analyze failures and opportunities for improvement:
   - Organize information
   - Compare RCRs with pilot perceptions
   - Analyze causes of failures
   - Improve procedures to compliance

m) Update SNOWTAM formats (train staff), software if any.
n) Publish an AIC with the implementation date.

The following page shows a checklist for RCR implementation:

Status-level RCR Implementation Checklist Model

Id	TASK	WHO	REMARKS
GRF 1	Establish a **national GRF implementation team** at the state level	The state FRG implementation team will include: - CAA (entity responsible for implementation) - Aerodromes - ANSP (ATM/AIM/MET) - Airlines / Flight Operations - Any other relevant stakeholders, as needed	*As part of the State Plan, tasks to develop local GRF implementation teams can be assigned to local RSTs at each airport.*
GRF 1-1	Develop a **National GRF Implementation Plan**, detailing tasks, managers and schedules.	State GRF Implementation Team	
GRF 2	**Train** by reviewing the following documentation: - PANS Aerodromes (Doc 9981) - ICAO Circular 355 - Annex 14 Vol. I. - ICAO Global GRF Symposium Presentations https://www.icao.int/Meetings/grf2019 - ICAO Doc. 10064 - Other relevant ICAO provisions: consequential modifications due to GRF (e.g. PANS-AIM, PANS-ATM, etc.) - SRVSOP Documentation: https://www.srvsop.aero **Educate** by attending: - ICAO Regional Workshops (GRF Workshop (Lima)). - SRVSOP Regional Workshop (Lima, March 2020) **Educate** by performing: - Statewide workshops/seminars	State GRF Implementation Team - In coordination with national bodies representing airports, ANSP, airlines	*Report difficulties to the ICAO SAM Office icaosam@icao.int*
GRF 3	**Promote** GRF at the national level in a security context by developing: - Brochures - Website Material / Videos - AIC (Aeronautical Information Circular)	State GRF Implementation Team - distribution must also include	The video presented by ANAC Brazil is available at: https://www.anac.gov.br/rcc

Id	TASK	WHO	REMARKS
		General/Executive and Military Aviation	
GRF 4	**Train** relevant stakeholders in GRF *Keep in mind that different stakeholders may have different training needs (e.g. airfields, pilots, ATS, AIS, airfields in hot climates versus operators flying to places with winter conditions, etc.)* **Train** relevant groups interacting with customers in GRF so they can inform their customers when they are on audits/inspections	Stakeholders: - ACI - IATA - IFATCA - IFALPA The state GRF implementation team ensures training for: - ADR/ATM - CAA/FO Inspectors	Online training (ICAO/ACI) available in https://www.olc.aero
GRF 5	**Update** SNOWTAM format/template (NOTAM/SNOWTAM systems)	The state GRF implementation team ensures that the SNOWTAM template is updated by: -AIM	
GRF 6	**Training** in the new SNOWTAM format	The state GRF implementation team ensures training in SNOWTAM format by: - Aim - Aerodrome operator	
GRF 7	**Update AIP** as needed	The state GRF implementation team ensures that AIP is updated by: - Aim	
GRF 8	**Perform** GRF parallel testing **Perform** scans using SNOWTAM and AIREPS files (this should also be considered after implementation to identify errors)	The state GRF implementation team coordinates the parallel test with the necessary stakeholders: - Airport operators - ANSP - Regional BDCA - Airlines - Ais	

PART V
CHANGE MANAGEMENT

1. Introduction

This section is a guide or guidance regarding the execution of change management associated with the implementation of the runway surface condition reporting methodology, however, service providers must comply with what the BDCA has established for such management.

Change Management is part of the Safety Assurance Framework set out in Annex 19 to the Chicago Convention. Article 3.2 states that:

Each service provider shall define and maintain a process to identify changes that may affect the level of safety risk associated with its aviation products or services, as well as to identify and manage safety risks that may arise from those changes.

Thus, as part of the minimum requirements for the implementation of an SMS, change management is a pillar within the system.
Doc 9859 Safety Management Manual defines Change Management as follows:

"Change Management - A formal process for managing changes within an organization in a systematic manner, in order to know the changes that may have an impact on identified hazard and risk mitigation strategies before implementing such changes."

From where:

- **Operational safety** is the state in which the risks associated with aviation activities relating to the operation of aircraft, or directly supporting such operation, are reduced and controlled to an acceptable level.
- **Hazard is the** condition or object that involves the possibility of causing or contributing to an aviation incident or accident.
- **Safety risk is the p**redicted probability and severity of the consequences or outcomes of a hazard.

2. Safety Management

The safety management process involves the evaluation of hazards through a systematic analysis of identifying the hazards associated with change, identifying possible unwanted events that could lead to different consequences, identifying threats that could be triggers for unwanted events, analyzing existing proactive and reactive barriers to avoid reaching the consequences.

Since GRF is a new reporting system, it is in itself a danger. So within its implementation there are latent risks for operational safety. It is therefore necessary to carry out as many risk analyses as necessary to mitigate all the identified consequences that could come with the change.

The following figure shows a risk-based decision-making flowchart:

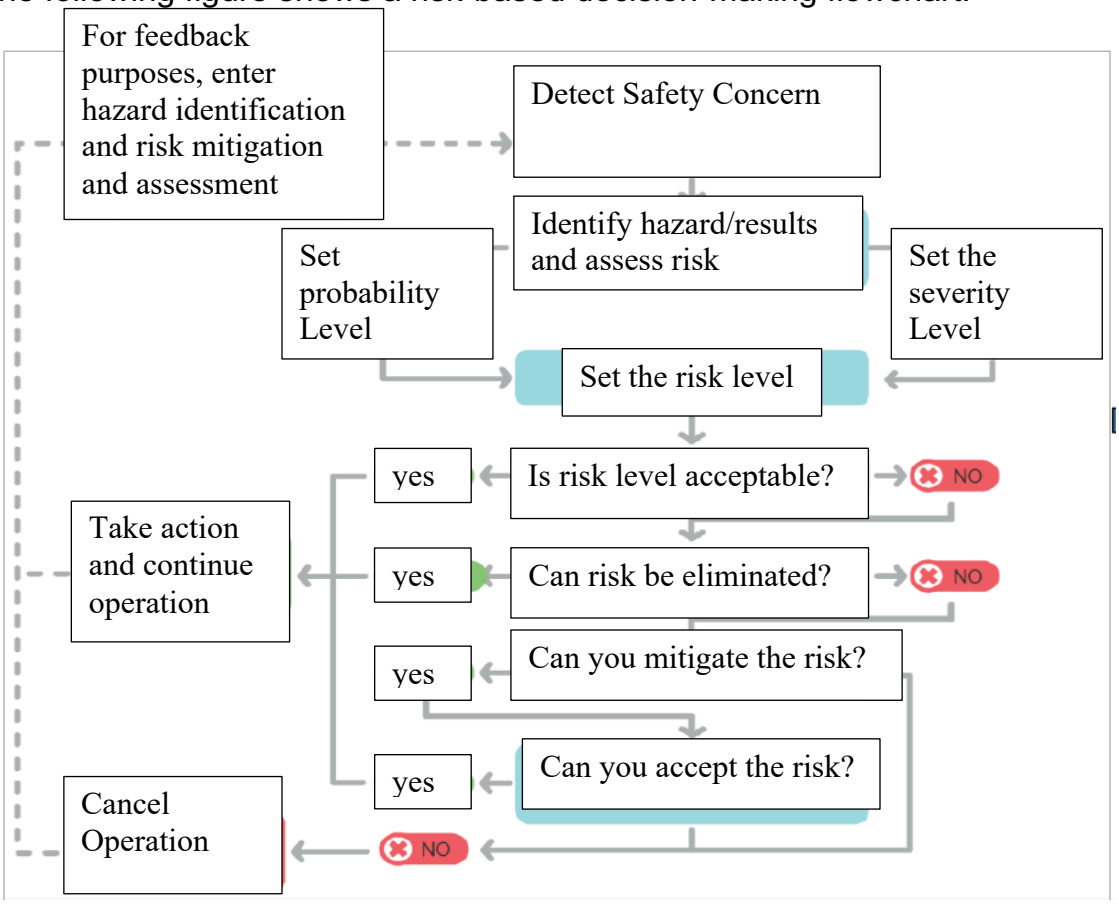


Fig. V-2-1 Risk-based decision making

3. Activities of the change management process

The change management process should include the following activities:

- Understanding and defining change: This should include a description of the change and the reasons for its implementation.

- Understanding and defining who and what aspects will be affected: these can be individuals within the organization, other departments or external people or organizations. There can also be consequences for equipment, systems and processes.

- **Identification of** change-related hazards and conduct of safety risk assessments: hazards directly related to change should be identified.

- **Drawing up an action plan:** this should define what is to be done, by whom and by when. There should also be a clear plan that describes how the change will be implemented and who will be responsible for the actions that are implemented, as well as the sequence and scheduling of tasks.

- **Change approval:** This is necessary to confirm that the change can be safely implemented.

- **Security plan:** This is to determine the follow-up measures that are necessary.

4. The role of the BDCA

The BDCA through its SSP coordinator in conjunction with the areas involved should manage the process step by step with at least the following aspects:

- Pre-approval of the change process and establishment of clear rules
- Review / Acceptance of impact assessments
- Keep runway of change and associated events
- Acceptance of Risk Analysis and Mitigation Measures
    - SSP Coordinator Review
    - Risk analysis
    - Focus: Implementation of GRF
    - Transitional phase (preliminary measures)

        - Adaptation of procedures
        - Diffusion

        - Formation
        - Drills
        - Coordination with ATS / AIS / MET
        - Monitoring ATS / AIS / MET measures

    - -Adaptation phase

        - Risks arising from GRF

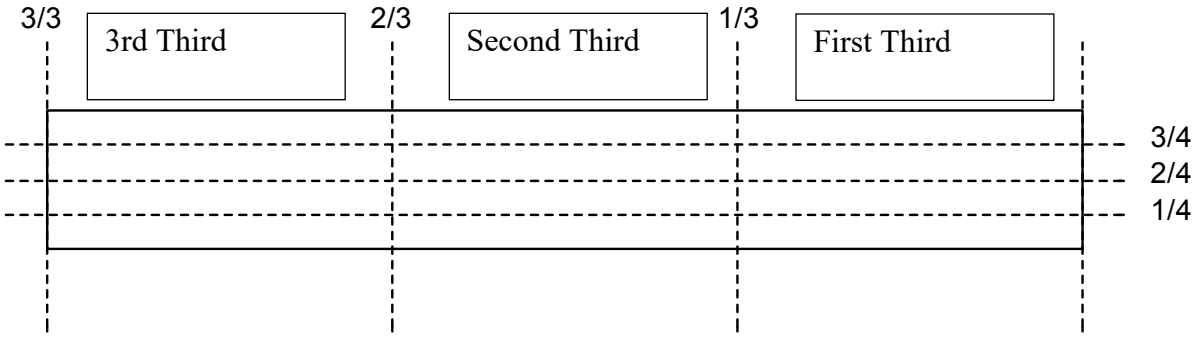
- Acceptance of changes to the Aerodrome and ATS Manuals
    - Inspections of the movement area
    - Procedures for obtaining the RWYCC
    - Procedures for the dissemination of RCR
- Aerodrome and ATS operations coordination procedures
- Staff training, program and training plan.

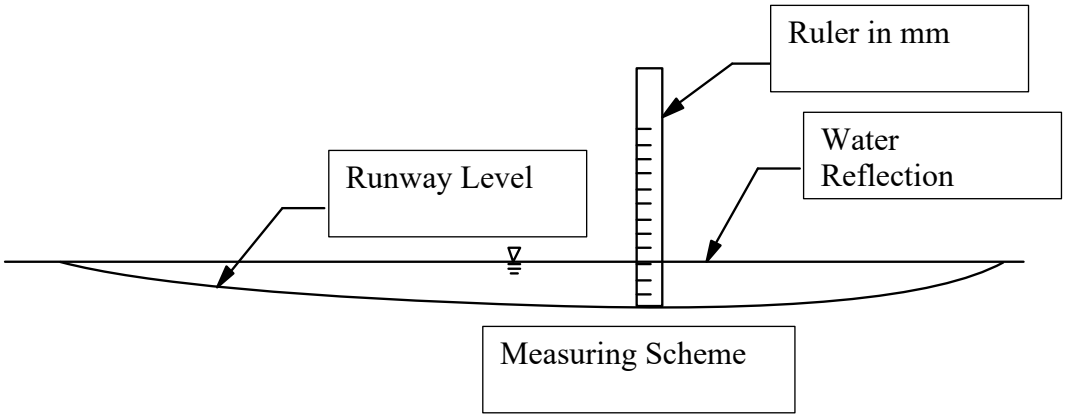
APPENDICES

Appendix A

SIMPLE METHOD FOR WATER MEASUREMENT ON RUNWAY

DIAGRAM OF SECTORIZATION OF THE RUNWAY





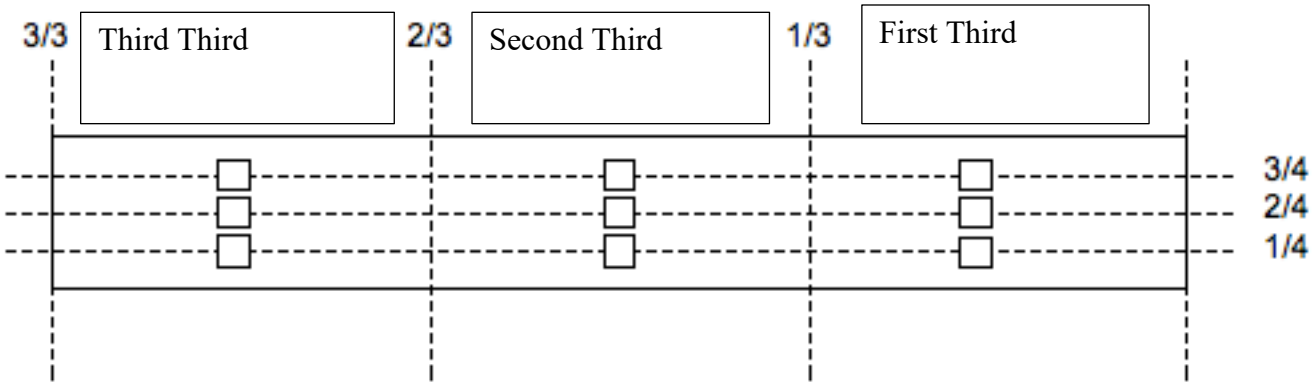
Appendix B WET RUNWAY REVIEW LIST.

INSPECTOR NAME: ____

REPRESENTS A : ____

DATE:__ HORA_____ AERODROME: __

STAGNANT WATER: Review Zone (mark with x)



ORIENTATION:____ __

STAGNANT WATER. Length: _____m Width: _____m

STAGNANT WATER DEPTH: ____MM
WET RUNWAY (EXPLAIN) __ __

PRESENCE OF RUBBER:
LOW: ____

_____
Signature Inspector Signature Operations

Appendix C Table for calculation of standing water by thirds of the runway

Note 1: L x A = water area identified on runway
Note 2: Use the average of the water depths

Appendix B

SNOWTAM FORMAT

Source: *Procedures for Air Navigation Services — Aeronautical Information Management* (PANS-AIM, Doc 10066) (See Appendix 4)
(*Applicable November 4, 2021*)

(COM header)	(PRIORITY INDICATOR)	(ADDRESSES)	<≡
	(DATE AND TIME OF DEPOSIT	(SHIPPER INDICATOR)	<≡
(Abbreviated heading)	(SW* SERIAL NUMBER) S W * *	(PLACE INDICATOR)	DATE/TIME OF OBSERVATION	(OPTIONAL GROUP) <≡(

SNOWTAM	(Serial number)<≡

Aircraft performance calculation section			
(AERODROME SITE INDICATOR)	M	A)	<≡
[DATE/TIME OF OBSERVATION *(Time in UTC, when measurement was completed)*]	M	B)	→
(LOWEST RUNWAY DESIGNATION NUMBER)	M	C)	→
(RUNWAY CONDITION CODE (RWYCC) FOR EACH THIRD OF THE RUNWAY) (From the Runway Condition Assessment Matrix (RCAM) 0, 1, 2, 3, 4, 5 or 6)	M	D)	/ /
(PERCENTAGE OF CONTAMINANT COVERAGE FOR EACH THIRD OF THE RUNWAY)	C	E)	/ /
(THICKNESS *(mm)* OF LOOSE CONTAMINANT FOR EACH THIRD OF THE RUNWAY)	C	F)	/ /
(DESCRIPTION OF THE STATE OF THE ENTIRE LENGTH OF THE RUNWAY) *(Observed over each third of the runway, from the threshold whose runway designation number is lower)* DRY COMPACT SNOW DRY SNOW DRY SNOW ON COMPACT SNOW DRY SNOW ON FROSTY ICE	M	G)	/ /

ICE MELTING SNOW STAGNANT WATER WATER ON WET COMPACT SNOW WET ICE WET SNOW WET SNOW ON COMPACT SNOW WET SNOW ON ICE			→
(RUNWAY WIDTH TO WHICH THE RUNWAY CONDITION CODE APPLIES, IF LESS THAN THE PUBLISHED WIDTH)	Or	H)	<≡≡
Situational awareness section			
[REDUCED RUNWAY LENGTH, IF LESS THAN PUBLISHED LENGTH *(m)*]	Or	I)	→
(BLIZZARD OF SNOW ON THE RUNWAY)	Or	J)	→
(LOOSE SAND ON THE RUNWAY)	Or	K)	→
(TREATMENT WITH CHEMICALS ON THE RUNWAY)	Or	L)	→
(SNOW BANKS ON THE SLOPE) *(If available, distance from runway axis (m) followed by "L", "R" or "LR" if applicable)*	Or	M)	→
(SNOW BANKS ON THE TAXIWAY)	Or	N)	→
(SNOW BANKS ADJACENT TO THE RUNWAY)	Or	O)	→
(TAXIWAY CONDITION)	Or	P)	→
(RAMP STATUS)	Or	R)	→
(COEFFICIENT OF FRICTION MEASURED*)*	Or	S)	→
(REMARKS IN CLEAR LANGUAGE)	Or	T)	)
NOTES: 1. *Note the ICAO nationality letters in ICAO Doc 7910, Part 2, or the appropriate aerodrome identifier. 2. For data on other Runway, repeat B to H. 3. The information in the situational awareness section is repeated for each runway, taxiway and ramp. Repeat as appropriate when notified. 4. Words in parentheses ( ) are not transmitted. 5. For points (A) to (T) see *Instructions for Completing the SNOWTAM Form, paragraph 1(b).*			

SIGNATURE OF THE CONSIGNOR *(not transmitted)*

Appendix C
Instructional Program Example

This appendix contains an example programme for the training of airfield operator personnel and flight crews using the global reporting format. Examples are presented in support of PANS-Aerodromes (Doc 9981), Part II, Chapter 1, applicable from 5 November 2020. The instructional programme provides guidance on the training that will be required for successful implementation of the global reporting format.

1. EXAMPLE OF A LIST OF TOPICS FOR THE INSTRUCTION OF AERODROME OPERATORS ON RUNWAY SURFACE CONDITION NOTIFICATION

Note.— It must be assumed that driving on the runway is permitted with proper ATC permits in all weather conditions.

1. General	
Background	Recommendations of the Committee on Aeronautical Regulation (ARC) on evaluation of FAA takeoff and landing performance (TALPA) ICAO, ICAO Friction Task Force (FTF), SARPs, NSAPs and Guidelines States, rule-making
History of the friction	Accidents Different countries, different methods
2. New notification format — RWYCC *Note.— Prepared with the main aircraft manufacturers involved in the performance of the aircraft*	
Method	RWYCC Evaluation Runway thirds
3. RCAM	
RCAM Scheme	
Definitions of pollution	
Evaluation by visual observation and experience	
Length and width of the runway	

4. RCR	
Criteria for downgrading or upgrading	
Aircraft Performance Section	
Situation awareness section	
Time of modification — if the change is significant	
Landing considerations (side winds are also taken into account in the pilot's decision)	
Take-off considerations (side winds are also taken into account in the pilot's decision)	
Pilot report — AIREP feedback	
Types of errors	☐ Aftermath ☐ Operational safety margin
Reliability	☐ Uniformity ☐ Precision
5. Notification addressed to:	
Atc	☐ ATIS
Aim	☐ SNOWTAM
Coordination with ATC for: • Runway access • time of evaluation; and • Dissemination of results	
6. Maintenance of the "wet and slippery" runway	
☐ Tendency ☐ NOTA ☐ M RCR	
7. Documents and records	

2. EXAMPLE OF A LIST OF TOPICS FOR PILOTS INSTRUCTION ON OPERATIONS ON CONTAMINATED RUNWAYS

21 Both the instruction and the operations themselves should be based on the fact that the evaluation of the condition of the runway, the measurement of friction and the calculation of braking efficiency are not an exact science. Pilots should understand that real operating safety margins shrink when runway conditions worsen and, at the same time, assessing runway condition becomes more difficult as the weather deteriorates further. Consequently, RCAM, RWYCC and braking efficiency are adaptable decision-making tools rather than norms or operating rules. For example, the calculated margin of 1 m in landing distance does not necessarily mean that landing will be safe; The pilot must follow his best judgment, taking into account different variables and verifying between different sources

when making his decisions.

22 It is also good aviation practice to determine how minor changes in runway and/or weather conditions affect operations; for example, how lowering an RWYCC level or a change in the predetermined wind affects operations. It is good CRM to make some decisions by default regarding deteriorating conditions. These "pre-established decisions" improve situational awareness, contribute to last-stage decision-making and improve workload management.

Note.— Items marked with an asterisk (*) are directly linked to the runway status notification

1. General	
Contamination	☐ Definition* ☐ contaminants that cause increased drag and impair acceleration, and contaminants that cause reduced braking efficiency and impair deceleration ☐ Slippery when wet: status*
Runway Contaminated	☐ Runway surface status descriptors* ☐ Operational observations with friction measuring devices* ☐ Operator's policy on the use of: reduced take-off thrust runway othirds in take-off and landing performance calculations; and Ooperations in low visibility and automatic landing. ☐ Stopping area ☐ Slotted runway

RWYCC*	☐ RCAM* o Differences between those published for aerodromes and flight crew* o Format in use* o Using runway friction measurements* o Temperature utilization* o The concept of performance categories and ICAO Runway surface condition code * o Interpretation of "wet and slippery" o Criteria for downgrading or upgrading* o Difference between a calculation and an evaluation*

	☐ Braking efficiency* o Notification of LOWER TO DEFICIENT □ no operation ☐ Use of the maximum wind pattern of the aircraft with pollution
RCR (Reference: Doc 10064)	☐ Availability* ☐ Validity* ☐ Performance and situational awareness* ☐ Decoding* ☐ Situational awareness (Reference: Doc 10064)*
Control of the aircraft at take-off and landing (Reference: Doc 10064)	☐ Side control o Weather vane effect o Effect of investors o Turning forces o Limitations on sideways wind □ Operations if the authorized Runway width is less than the published width
	☐ Longitudinal control o Correction V_1 in correlation with the minimum speed with domain of the aircraft on the ground o Hydroplaning o Anti-skid o Automatic braking
Distance of takeoff	☐ Acceleration and deceleration ☐ Takeoff performance limitations ☐ Take-off distance models ☐ Relevant factors ☐ Reasons to use the type and depth of contaminant instead of RWYCC* ☐ Operational safety margins
Distance of landing	☐ Distance model at landing ☐ Relevant factors

	☐ Operational safety margins o The minimum equipment list (MEL) does not include any additional margin (e.g. 15%)
ICAO exceptions in runway notification	☐ States do not comply with ICAO*
2. Flight planning	
Conditions for dispatch/in-flight	
MEL/Configuration Deviation List (CDL) Elements Affecting Takeoff and Landing Performance	
Operator's policy on variable wind and wind gusts	
Landing performance at destination airfield and alternative airfields	☐ Selection of alternative airfields if the airport is not available due to runway condition o On the way o Alternative destination airfields ☐ Number ☐ Runway condition
3. Take-off	
• Runway selection • Take off from a wet or contaminated runway	
4. In-flight operations	
Distance of landing	☐ Distance at the time of landing calculations o Considerations for flight crew (Reference: Doc 10064)* o Operator Policy ☐ Relevant factors ☐ Runway selection for landing ☐ Operational safety margins
Use of The systems of the aircraft	☐ Automatic brakes/brakes ☐ Difference between friction-limited braking and different automatic brake modes ☐ Investors ☐ The aircraft as a friction measurement and/or notification system

5. Landing techniques
Pilot procedures and flight techniques for landing on a runway of limited length (Reference: Doc 10064)
Use of the stop system with special materials (EMAS) in case of runway overrun
6. Safety considerations
• Possible types of errors* • Principles of care necessary for high reliability*
7. Documentation and records
8. AIREP (Reference: Doc 10064)
• Evaluation of braking efficiency* • Terminology* • Possible automated AIREP* (the aircraft as a friction measurement and reporting system) • Air safety reports if flight safety is compromised.

Appendix D
Other Reference Documents

- AC 150/5200-30D: Airport Field Condition Assessments and Winter Operations Safety, March 2017

- RCAM Braking Action Codes and Definitions for Pilots, AC 91-79A CHG1 Appendix 1, April 2016

- ICAO Circular 355 Assessment, measurement and notification of status of the Runway surface

- *SIB No. 2018-02: Runway Surface Condition Reporting, January 18,* 2018 *Runway friction characteristics measurement and aircraft braking (RuFAB) by Werner Kleine-Beek*, published in HindSight 12

- Advisory Circular (AC) No. 300-019 - Transport Canada

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