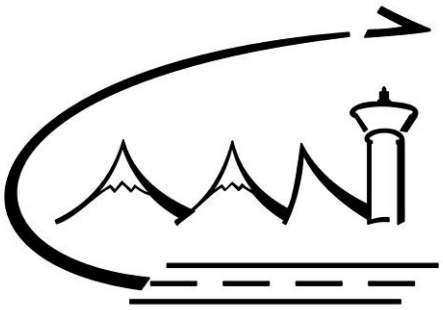

Civil Aviation Authority of Nepal

Advisory Circular
[AC/AD-021]

Guidance Material

On

GRF for Aerodrome Operator

Approved by Director General on November 11, 2020
Civil Aviation authority of Nepal
Babarmahal, Kathmandu

First Edition
November, 2020

AERODROME SAFETY and STANDARDS DEPARTMENT

RECORD OF AMENDMENTS

After making amendment to this Advisory Circular, a record shall be entered in the appropriate columns below showing amendments number, date, part or section amended, description of changes, signatures and entry date.

Amendment No	Amendment Date	Amended Section/Part	Amended Description	Signature and Entry Date

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FOREWORD

Nepal as a Contracting State to the Convention on International Civil Aviation has an obligation to the international community to ensure that civil aviation activities under its jurisdiction are carried out in strict compliance with the Standards and Recommended Practices contained in the nineteen Annexes to the Convention on International Civil Aviation in order to maintain the required aviation standards.

As per the standards of the Annex 14 to the Convention, States are required to Implement Global Reporting format (GRF). Hence, Aerodrome Safety standards Department has made commendable attempt in this regard and has developed this Advisory circular(AC) to introduce and explain the essentials of International Civil Aviation Organization (ICAO) Global Reporting Format (GRF) for runway condition reporting. It is expected of the concerned aerodrome operators to take this AC as a reference/guidance material in order to comply with the required regulations and standards for the implementation of GRF. Moreover, all aerodrome personnel involved directly or indirectly with runway condition assessment should also be aware of it and are encouraged to utilize this AC to their specific operations.

The Civil Aviation Authority shall, without any prior notice, change the content of this Advisory Circular as deemed appropriate.

……
Director General
Civil Aviation Authority of Nepal
Babarmahal, Kathmandu, Nepal

November, 2020

Chapter1: General Overview

1.1 Introduction

We have been reporting the runway surface condition in terms of measured friction co-efficient but the Friction Task Force (FTF), established by ICAO, inferred that there is no correlation between runway friction values and aircraft braking performance, thereby potentially causing safety events especially runway excursion, which we, too, are the victim of. In addition, poor reporting system which is not consistent across States and airport operators has also been attributed to contribute to such event.

With the objective of improving safety level in such area, International Civil Aviation Organization (ICAO) has developed an updated and harmonized procedure, known as Global Reporting Format (GRF), for assessment and reporting of runway surface conditions. This new concept eliminates most of the shortfalls in accuracy and timeliness of current procedures through effective communication among all concerned stakeholders like aerodrome operator, aircraft operator, pilot etc., of relevant and reliable information on runway surface condition with respect to the nature of contaminants, the depth and coverage of contamination and their effect on friction between the runway and the aircraft's wheels.

Considering the various constraints in normalizing operations in airports like ours with limited resources, it is imperative that our airports implement GRF so that the risk of occurrence of a safety event like runway excursion is further reduced thereby averting untoward consequences in airport. Thus, this advisory, which is hereby issued as guidance material to prepare for GRF, be followed sooner than later so that GRF is implemented no later than 4 November 2021, the target date for the same as per ICAO.

1.2 Objective

The purpose of this document is to introduce and provide information pertinent to the implementation of Global Reporting Format (GRF) for assessment and reporting of runway surface conditions so that all the concerned stakeholders viz., aerodrome operators, airlines operators apply it to their respective operations.

1.3 Scope

This advisory is applicable to the aerodromes that are not exposed to Ice or Snow and are affected with only water as the contaminant.

1.4 Expected benefits of the GRF

1.3.1 Reporting of Runway surface condition in a standardized manner

1.3.2 Establish a common language between all actors in the system: aerodrome operators, aircraft operators, pilots, ANSPs (ATCs), AIM, MET, aircraft manufacturers, etc.

1.3.3 Allow pilots to accurately determine airplane take-off and landing performance.

1.5 Reference Documents

1.4.1 ICAO Annex 6 , 11th Edition, July 2018: Operation Of Aircraft - Part I - International Commercial Air Transport – Aeroplanes

1.4.2 ICAO Annex 11, 15th Edition, July 2018: Air Traffic Services;

1.4.3 ICAO Annex 14, 8th Edition, July 2018 – Volume –I: Aerodrome Design and Operations ;

1.4.4 ICAO Annex 15, 16th Edition, July 2018 : Aeronautical Information Services;

1.4.5 ICAO Circular 355 AN/211: Assessment, Measurement and Reporting of Runway Surface Conditions ;

1.4.6 ICAO Doc 9981: Procedures for Air Navigation Services – Aerodromes;

1.4.7 ICAO Doc 10066:Procedures for Air Navigation Services (PANS) — Aeronautical Information Management; and

1.4.8 ICAO Doc 4444: Procedures for Air Navigation Services (PANS) - Air Traffic Management

1.6 Definitions and Abbreviations

The following definitions are used in this document:

Contaminant: Material that collects on a surface, including standing water, snow, slush, compacted snow, ice, frost, sand, and ice control chemicals.

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 following substances: compacted snow, dry snow, frost, ice, slush, standing water, wet ice or wet snow.

Dry: A surface condition that is free of visible moisture, and has no observed contaminants.

Dry snow: Snow that does not contain sufficient water to allow the crystals to stick together or bond to a surface. (Dry snow, when compressed, falls apart, and a snowball cannot readily be made from it.)

Frost: Ice crystals formed from airborne moisture on a surface whose temperature is below freezing. Frost differs from ice in that the frost crystals grow independently and therefore have a more granular texture.

Ice: Water that has frozen on a surface and includes the condition commonly known as black ice and the condition in which compacted snow has turned into a polished ice surface.

Paved surface: A surface of asphaltic concrete (flexible) or Portland cement concrete (rigid).

Percent coverage of contaminant: The estimated amount of contaminant present on the surface of the runway and reported as percentage of the assessed surface.

Runway Condition Assessment Matrix: A matrix allowing for the assessment of runway condition code, using associated procedures, from a set of observed runway surface condition(s).

Runway Condition Code: A number describing the runway surface condition.

Runway Surface Condition: A description of the condition(s) of the runway surface used in the runway condition report which establishes the basis for the determination of the runway

condition code for aeroplane performance purposes.

Sand: Small particles of crushed angular mineral aggregates or natural sand material used to improve runway surface friction levels.

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

Slippery (when) wet runway: A wet runway where the surface friction characteristics of the runway have been determined to be degraded.

Slush: Snow that is so water-saturated that water will drain from it when a handful is picked up or will splatter if stepped on forcefully.

Snow drift: A heap or mound of snow created by action of the wind.

Standing water: Water of depth greater than 3 mm.

Wet: A surface condition where there is any visible dampness or water up to and including 3 mm deep.

Wet ice: Ice with water on top of it or ice that is melting.

Wet snow: Snow that will stick together when compressed but will not readily allow water to flow from it if squeezed. (Wet snow contains enough water to be able to make a well-compacted, solid snowball, but water will not squeeze out.)

The following abbreviations are used in this document:

AC: Advisory Circular

AIM: Aeronautical Information Manual

ANSP: Air Navigation Service Provider

ATC: Air Traffic Controller

FTF: Friction Task Force

GRF: Global Reporting Format

ICAO: International Civil Aviation Organization

MET: Meteorological

NOTAM: Notice to airman

RCAM: Runway Condition Assessment Matrix

RFI: Runway Friction Index

RWY: Runway

RWYCC: Runway Condition Code

TWY: Taxiway

KTM/VNKT: Tribhuvan International Airport

BIR/VNVT: Biratnagar Airport

KEP/VNNG: Nepalgunj Airport

Chapter 2: Assessment of Runway Surface Condition

2.1 Runway Condition Assessment Matrix (RCAM)

2.1.1 The Runway Condition Assessment Matrix (RCAM) (Table 2.1) is the method by which the aerodrome operator determines a Runway Condition Code (RWYCC) for each runway third, whenever water, snow, slush, ice or frost is present on the runway surface.

TABLE 2.1

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 upto and including 3 mm depth)	Braking deceleration is normal for the wheel braking effort applied and directional control is normal.	GOOD
4	N/A	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 between Medium and Poor	MEDIUM TO POOR
1	N/A	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced	POOR
0	N/A	Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain.	LESS THAN POOR

2.1.2 The RCAM applies only to paved (asphalt and concrete) runway surfaces, and does not apply to unpaved or partially paved surfaces.

2.1.3 When runway condition information is reported in thirds, a RWYCC is to be reported. Conversely, if the runway condition information is not entered for each runway third, then the RWYCC will not be reported.

2.1.4 The first column of RCAM is for Assessment Criteria that consists of a Runway Surface Description and a Runway Condition Code. The Runway Surface Descriptions in each category are linked to the corresponding Runway Condition Code based on their effect on aeroplane braking performance.

2.1.5 The Runway Surface Description column lists contaminants that are directly

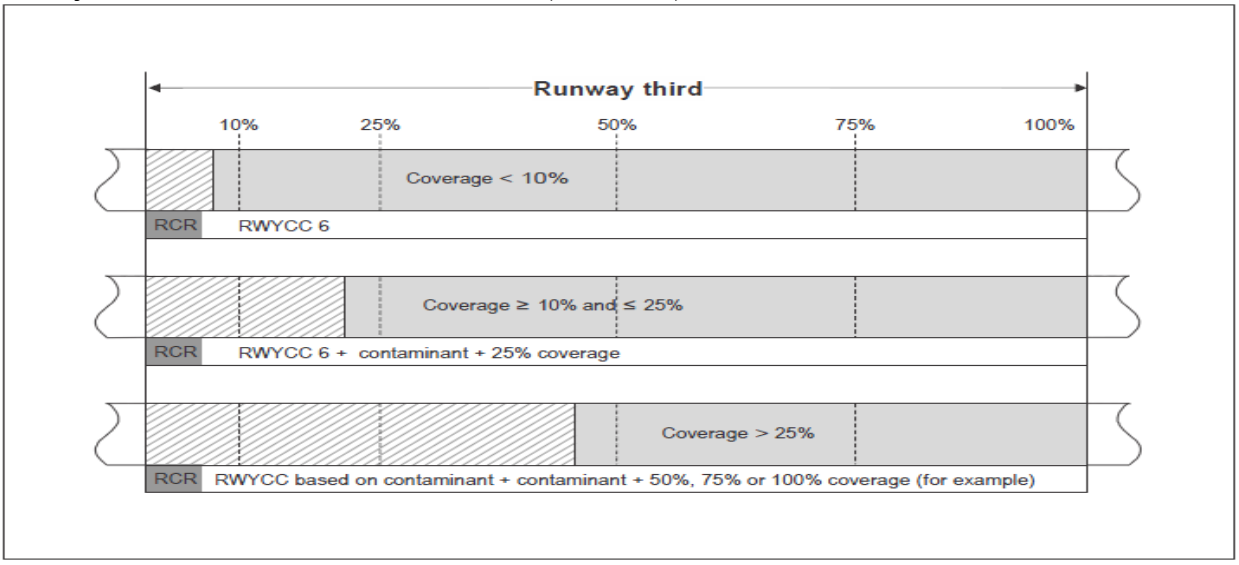
correlated to aeroplane landing performance. The description sections, ranging in terms of slipperiness, are categorized based on type and depth of contaminant and outside air temperature.

2.1.6 Runway Condition Codes in RCAM represent the runway condition description based on defined terms and increments. Use of these codes harmonizes with ICAO Annex 14, providing a standardized "shorthand" format for reporting runway condition, which can be used by pilots to determine landing performance parameters.

2.1.7 A RWYCC is determined using the RCAM based on type and depth of contaminant, percentage coverage and outside air temperature. When available, the runway surface temperature should be used.

2.2 Determination of RWYCC:

When the runway third contains a single contaminant, the RWYCC for that third is based directly on that contaminant in the RCAM (Table 2.1) as follows:



2.2.1 If the contaminant coverage for that third is less than 10 per cent, a RWYCC of 6 is to be generated for that third and no contaminant is to be reported. If all thirds have less than 10 percent contaminant coverage, no report is generated; or

2.2.2 If the per cent contaminant coverage for that third is greater than or equal to 10 percent and less than or equal to 25 per cent, a RWYCC of 6 is to be generated for that third and the contaminant reported at 25 per cent coverage; or

2.2.3 If the per cent contaminant coverage for that third is greater than 25 per cent, the RWYCC for that third shall be based on the contaminant present;

2.3 Downgrade Assessment Criteria

2.3.1 The RWYCC is initially determined through use of the RCAM.

2.3.2 The aerodrome operator should consider downgrading a RWYCC when RFI measurements (if available), pilot reports or other observations reveal that the runway surface is more slippery than the RWYCC that was initially determined.

2.3.3 The aerodrome operator should exercise vigilance and downgrade the RWYCC when appropriate so that flight crews are provided with a RWYCC that best reflects the actual slipperiness of the runway.

2.3.4 A pilot report of braking action should be taken into consideration for downgrading purposes

2.3.5 When previous pilot braking action reports have indicated GOOD or MEDIUM braking action, two consecutive pilot braking action reports of POOR indicates

that surface conditions may be deteriorating. In this situation, the airport or aerodrome operator should conduct a runway assessment prior to the next operation.

2.4 Upgrade Assessment Criteria

2.4.1 Given the variability of certain contaminants, there are circumstances when a RWYCC of 0 or 1 may not be as slippery as the RWYCC generated by the RCAM.

2.4.2 An assigned RWYCC of 5, 4, 3, or 2 cannot be upgraded.

2.4.3 The airport or aerodrome operator may upgrade a RWYCC of 0 or 1 up to but no higher than a RWYCC of 3.

Note: *Since the aerodromes at TIA, BIR and KEP are not exposed to Ice or Snow, upgrading of RWYCC cannot be done there*.

Chapter 3: Runway Condition Reporting – RCR

The Runway condition Reporting comprises of two sections: (i) Aeroplane Performance Calculation Section (ii) Situational awareness section

3.1 Aeroplane Performance Calculation Section

This section basically consists of eight elements that are described by the block diagram as shown in Figure 3.1 where M, C and O stand for Mandatory, Conditional and Optional.

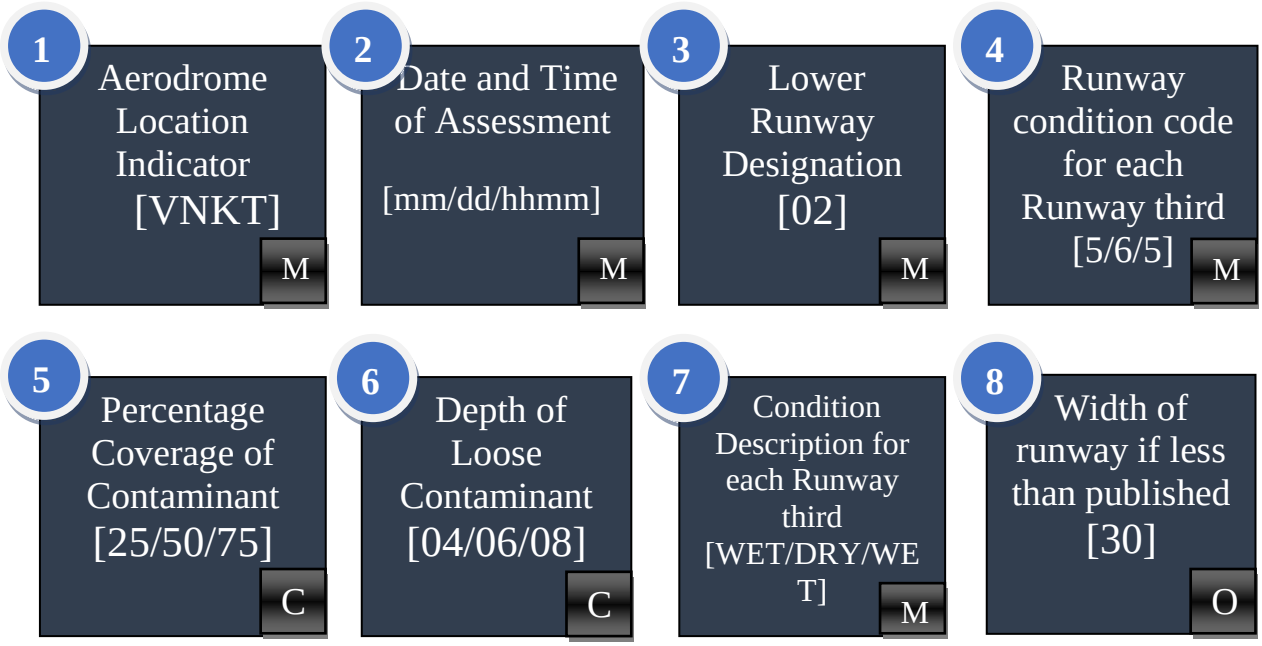


Figure 3.1

3.1.1 Aerodrome Location Indicator

This is the first element of RCR that clearly specifies the Aerodrome for which the RCR is prepared. A four-letter ICAO location indicator assigned to the aerodrome is provided to this element of RCR. For example, VNKT, VNVT and VNNG shall be required to be provided to this element for Tribhuvan International Airport, Biratnagar Airport and Nepalganj Airport.

3.1.2 Date and time of Assessment

This is the second element of RCR to which Coordinated Universal Time (UTC) is provided complying the time frame 'mm/dd/hhmm'. For example, if the Runway Condition is assessed at 8:30 am on july 12 at TIA, the corresponding RCR upto 2nd element shall be as follows:

RCR VNKT 07120245☑

Note: Nepal time is 5 hours and 45 minutes ahead of UTC time. Date shall be corresponding to UTC.

3.1.3 Lower Runway Designation

The Runway shall be considered to be of three equal segments and the runway condition shall be assessed for each third of the runway considering the assessment from lower runway designation side.

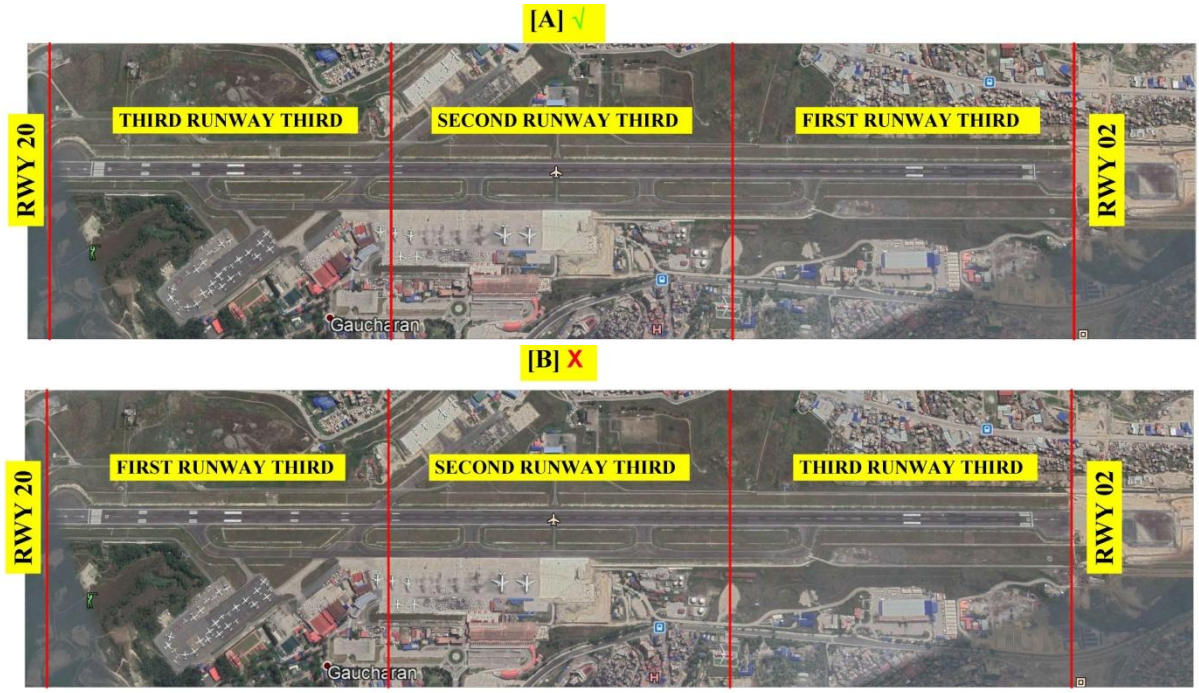


Figure 3.2

For example, the assessment of runway condition at TIA should be carried out from lower designation side 'RWY 02' as shown above in Figure 3.2. This is third element of RCR to which 02, 09 and 08 shall be required to be provided by TIA, Biratnagar Airport and Nepalgunj airport.

3.1.4 Runway Condition Code for each Runway Third

After assessment of condition for each runway third, a corresponding Runway Condition code (RWYCC) shall be assigned to them from Runway Condition Assessment Matrix (RCAM) and shall be separated by slash '/'. For example, if 1st, 2nd and 3rd Runway third from lower designation is dry, Wet and slippery wet, this element of RCR shall be described as: 6/5/3.

3.1.5 Percent Coverage Contaminant for each Runway Third

For assessed percent of coverage of contamination for each runway third, a corresponding value in column B of the Table 3.1 shall be reported to this fifth element of RCR. The value for each Runway Third shall be separated by slash '/'

Table 3.1

Assessed percent	Percent to be Reported	RWYCC
≤9	NR	6
10-25	25	6
26-50	50	Based on contaminant/Descriptor
51-75	75	
76-100	100	

3.1.6 Depth of Loose Contaminants

The depth in millimeter (mm) of any loose contaminant is required to be provided for each Runway third. Such values shall be expressed in two digit form and be separated from each other by slash '/'. The Table 3.2 describes the contaminant applicable for RCR with respect to the RCAM.

Table 3.2

Contaminant	Valid values to be reported	Significant change
STANDING WATER	Any assessed value rounded to nearest integer and higher than 03.	3 mm upto and including 15mm

Note: The significant change shows the depth when standing water becomes hazard and reporting with reassessment is to be done again.

3.1.7 Condition Description for each Runway third

The surface condition of each Runway Third is required to be provided to this element of RCR in terms of various surface descriptors given in RCAM like DRY, WET, STANDING WATER. They shall be in capital letter and be separated by slash '/'

3.1.8 Width of Runway to which the RWYCC apply

If the width of the runway to which the RWYCC applies is less than the published width, it should be provided through this element of RCR.

3.1.9 RCR Information String

RCR information string that consists of all eight elements as described above is expressed as below:

RCR	_ _ _ _	_ _ _ _ _ _ _ _	_ _	_/_/_	__/___/___	_/_/_	…./…/…	….
	Aerodrome	**Date &Time**	**RWY**	**RWYCC**	**%Coverage of Contaminant**	**Depth**	**Contaminant type**	**Reduced RWY Width**

EXAMPLE:

Runway assessment done at 8am on 12 July 2020 at TIA shows that First Third is 20% Wet, Second Third is 5% Wet and Third Third has 40% water of maximum 5mm depth.

ICAO Location Indicator for TIA: VNKT

UTC timeframe for 8 am: month 07, day 12, time 02h 15m

Lower Runway Designation: RWY 02

Referring table, 20% damp is to be reported as 25% WET and RWYCC is assigned as 6 for First Third, 5% damp is not required to be reported thereby reported as NR and RWYCC is assigned as 6 for Second Third. And 40% water is to be reported as 50% STANDING WATER and RWYCC is assigned as 2 for Third Runway Third.

Since the depth of contaminant like STANDING WATER only above 3mm is to be reported, the reporting of the same shall be **NR** for the First and Second Runway Third. Hence, the RCR for this case will be as follows:

RCR VNKT 07120215 02 6/6/2 25/NR/50 NR/NR/5 WET/DRY/STANDING WATER

3.2 Situational Awareness Section

This section provides information on various eleven elements that have been shown in the Table 3.3 below. The information to be provided must be in the order of listed eleven elements.

Table 3.3

Situational Awareness Section		
1	Reduced Runway length	C
2	Drifting snow on the runway	O
3	Loose sand on the runway	O
4	Chemical treatment on the runway	M
5	Snowbanks on the runway	O
6	Snowbanks on the taxiway	O
7	Snowbanks adjacent to the runway	O
8	Taxiway conditions	O
9	Apron conditions	O
10	State-approved and published use of measured friction	O
11	Plain language remarks	O

Note: Aerodromes at TIA, BIR, KEP are not exposed to ice or snow and, therefore, may consider only Taxiway conditions and Apron conditions for reporting. The reporting format shall be as follows:

Situational Awareness Format: TWY name POOR. APRON name POOR

Example
TWY A POOR. APRON NORTH POOR

Chapter 4: Training

4.1 Requirement

4.1.1 Aerodrome operators shall ensure that their personnel are adequately trained to perform their duties.

4.1.2 It is recommended that aerodrome operators develop a training program for all personnel who will assess and report runway conditions. This training program should include: i) Initial Training ii) Annual Recurrent training

4.2 Initial Training

4.2.1 For the purpose of Initial Training, aerodrome operators should utilize the information in this AC to develop and conduct training which includes both:

4.2.1.1 a review of the theoretical concepts; and

4.2.1.2 practical exercises

4.2.2 Initial training should include, but not limited to the following topics:

4.2.1.1 Aerodrome familiarization, including aerodrome markings, signs and lightings

4.2.1.2 Aerodrome procedures as described in the aerodrome manual

4.2.1.3 Aerodrome emergency plan

4.2.1.4 NOTAM initiation procedures

4.2.1.5 Aerodrome driving rules

4.2.1.6 Air traffic control procedures on the movement area

4.2.1.7 Radiotelephone operating procedures

4.2.1.8 Phraseology used in aerodrome control, including the ICAO spelling alphabet

4.2.1.9 Aerodrome inspection procedures and techniques

4.2.1.10 Assessment and reporting of runway surface friction characteristics

4.2.1.11 Calibration, maintenance and use of runway friction measurement device

4.2.1.12 Low visibility procedures

4.2.1.13 Basics of the Global Reporting Format (GRF)

4.2.1.14 Runway Condition Assessment Matrix Components (RCAM)

4.2.1.15 Determination along with Downgrade and Upgrade of RWYCC

4.2.1.16 **Runway Condition Reporting (RCR)**

4.2.1.17 Measurement technique and assessment

Note: The aforementioned topics which are in bold letter are mandatorily required to be provided to the concerned personnel involved.

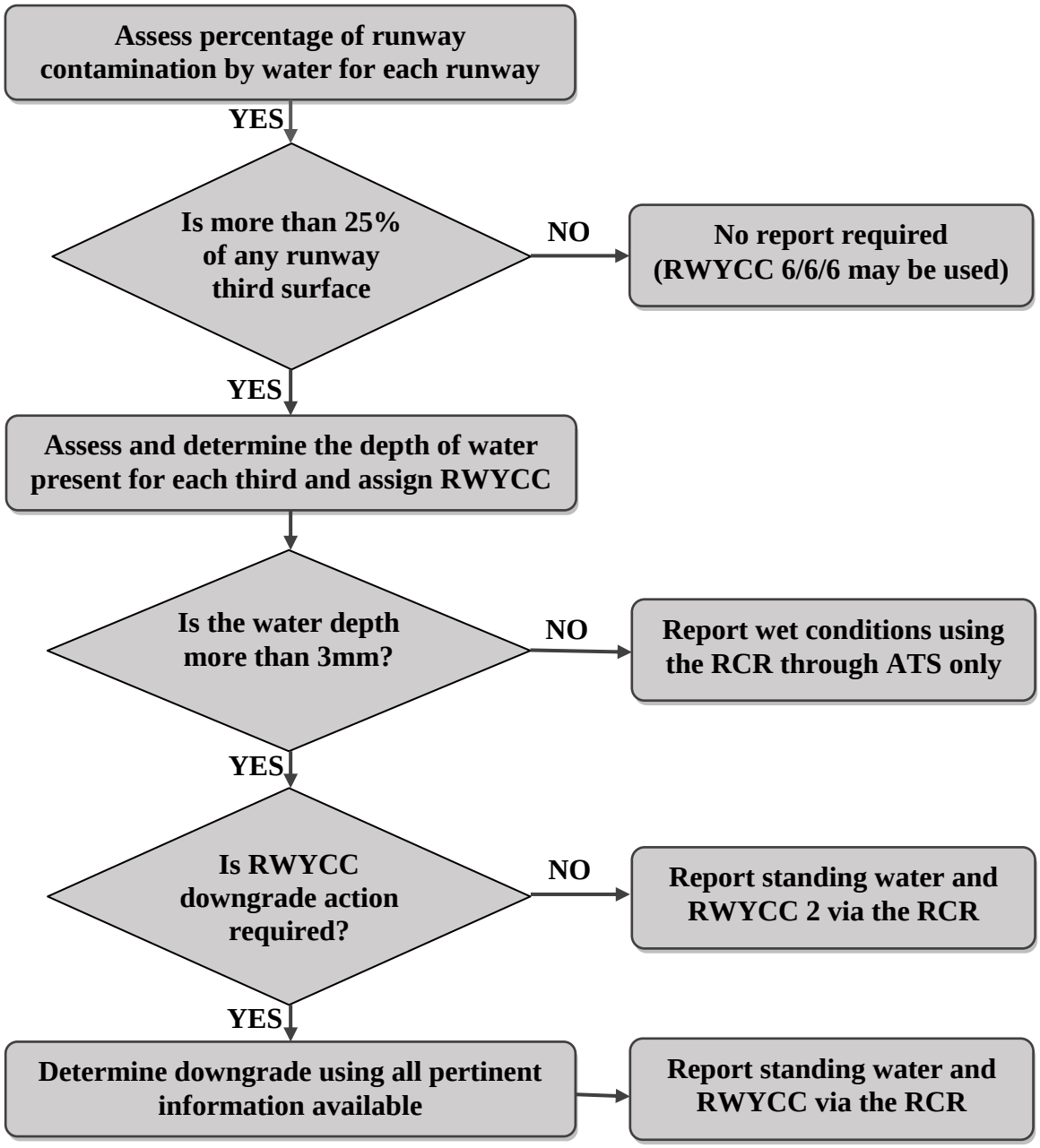
4.3 Annual Recurrent Training

For the purpose of Annual Recurrent Training, aerodrome operators should utilize the information in this AC to develop and conduct appropriate training for their personnel which:

4.3.1 focuses primarily on the practical aspects of runway condition assessment and reporting; and

4.3.2 incorporates “lessons learned” from the previous year(s) operations.

APPENDIX A



Process Flowchart for Runway Surface Condition Assessment

APPENDIX B

Runway Condition Assessment Worksheet

Aerodrome

Date/Time (UTC) of assessment (MMDDhhmm)

Lower Runway Designator

Initials

Is **more than 25%** of any runway third surface wet or contaminated?

☐ **Yes** - assign Runway Condition Codes for each third and complete RWY Condition Report (Blue Box)

☐ **No** - No report created

Note: RWYCC 6/6/6 for all runway thirds may be used to indicate that the runway is no longer wet

1st RWY Third	2nd RWY Third	3rd RWY Third
For coverage 25% or **less** enter Code 6	For coverage 25% or **less** enter Code 6	For coverage 25% or **less** enter Code 6
- Identify % coverage if more than 25% of the RWY third - Identify depth (if applicable) - Identify Runway Condition Code - Record the most restrictive code in the box to the right	- Identify % coverage if more than 25% of the RWY third - Identify depth (if applicable) - Identify Runway Condition Code - Record the most restrictive code in the box to the right	- Identify % coverage if more than 25% of the RWY third - Identify depth (if applicable) - Identify Runway Condition Code - Record the most restrictive code in the box to the right
RWYCC	RWYCC	RWYCC
Dry 6	Dry 6	Dry 6
Wet (Damp) 5 — % Cov. 100	Wet (Damp) 5 — % Cov. 100	Wet (Damp) 5 — % Cov. 100
Slippery Wet (Below Min Friction Level Classification) 3 — % Cov. 100	Slippery Wet (Below Min Friction Level Classification) 3 — % Cov. 100	Slippery Wet (Below Min Friction Level Classification) 3 — % Cov. 100
Standing water 2 >3mm — % Cov.	Standing water 2 >3mm — % Cov.	Standing water 2 >3mm — % Cov.
Depth: 4mm / Assessed depth (mm):	Depth: 4mm / Assessed depth (mm):	Depth: 4mm / Assessed depth (mm):
For Standing water 4mm depth have to be reported as Minimum	For Standing water 4mm depth have to be reported as Minimum	For Standing water 4mm depth have to be reported as Minimum

Situational Awareness Section / Notes

☐ TWY ..... Poor

☐ Apron ..... Poor

☐ Other

State approved CFME Braking coefficient

☐ ☐ ☐

Mμ not to be transmitted in RWY Condition Report

Adjusted RWYCC

☐ ☐ ☐

ONLY if Downgrade/ Upgrade Assessments used

Downgrade/ Upgrade Criteria

☐ AIREP ☐ CFME ☐ Other

RCR ____ Aerodrome ____ Date & Time ____ RWY ___/___/___ RWYCC 100 100 100 % Coverage ___/___/___ Depth in mm

..... / ..... / .....

Contaminant Type 1st third — Contaminant Type 2nd third — Contaminant Type 3rd third

Plain language remarks .....

Reduced RWY width in m (if applicable)