International Civil Aviation Organization
Twenty-Fifth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/25)
Video Teleconference, 27 – 30 October 2020

Agenda Item 5: Airspace Safety Monitoring Activities/Requirements in the Asia/Pacific Region

REGIONAL AIRSPACE SAFETY ASSESSMENT

(Presented by the Secretariat)

SUMMARY

This paper presents an overview of safety assessment results from a regional perspective.

1. INTRODUCTION

1.1 Since APANPIRG/22, RASMAG had provided APANPIRG with an overall assessment of Asia/Pacific Flight Information Region (FIR) Reduced Vertical Separation Minimum (RVSM) Target Level of Safety (TLS) in order to meet Asia/Pacific Objective 1 (*Airspace Safety Monitoring to Achieve Regional Target Level of Safety - TLS*).

1.2 At RASMAG17, the meeting agreed to focus much more on operational issues than technical capability. The following extract from the RASMAG/17 report refers:

> *IATA expressed support for the operational emphasis and requested RMAs to provide material that could be used to assist pilot education. The meeting noted that ANSP education and information on detailed recommended operational responses was also necessary to reduce this form of risk. The meeting agreed that a strengthened focus on the minimization of operational risk was appropriate.*

1.3 RASMAG/17 agreed to a task (17/4), which required monitoring agencies, and IATA and IFALPA to conduct an analysis of material and processes required from Regional Monitoring Agencies (RMAs) to assist airline/Air Traffic Control (ATC) education and responses on minimisation of operational errors, including information on ‘hot spots’ and recommended operational responses.

2. DISCUSSION

Regional RVSM TLS Compliance

2.1 **Figure 1** is an Asia/Pacific RVSM TLS compliance overview, as at RASMAG/24:

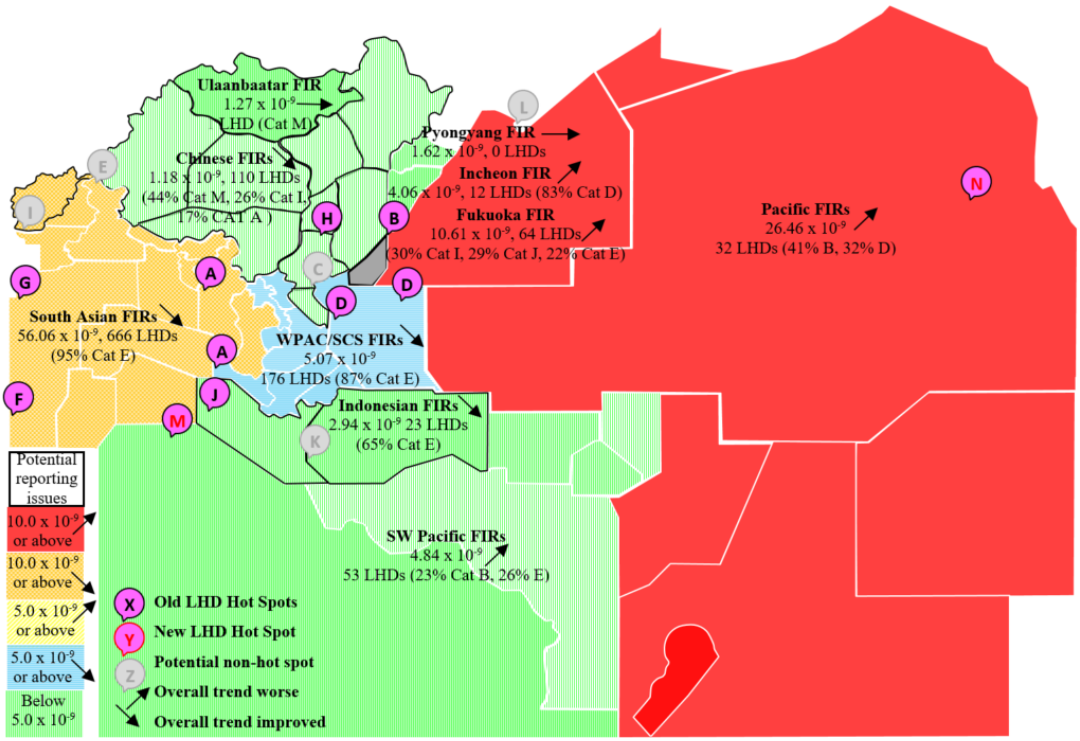

Figure 1: Asia/Pacific RVSM TLS subregion compliance reported to RASMAG/24

2.2 **Figure 2** is an Asia/Pacific RVSM TLS compliance overview, as at RASMAG/25:

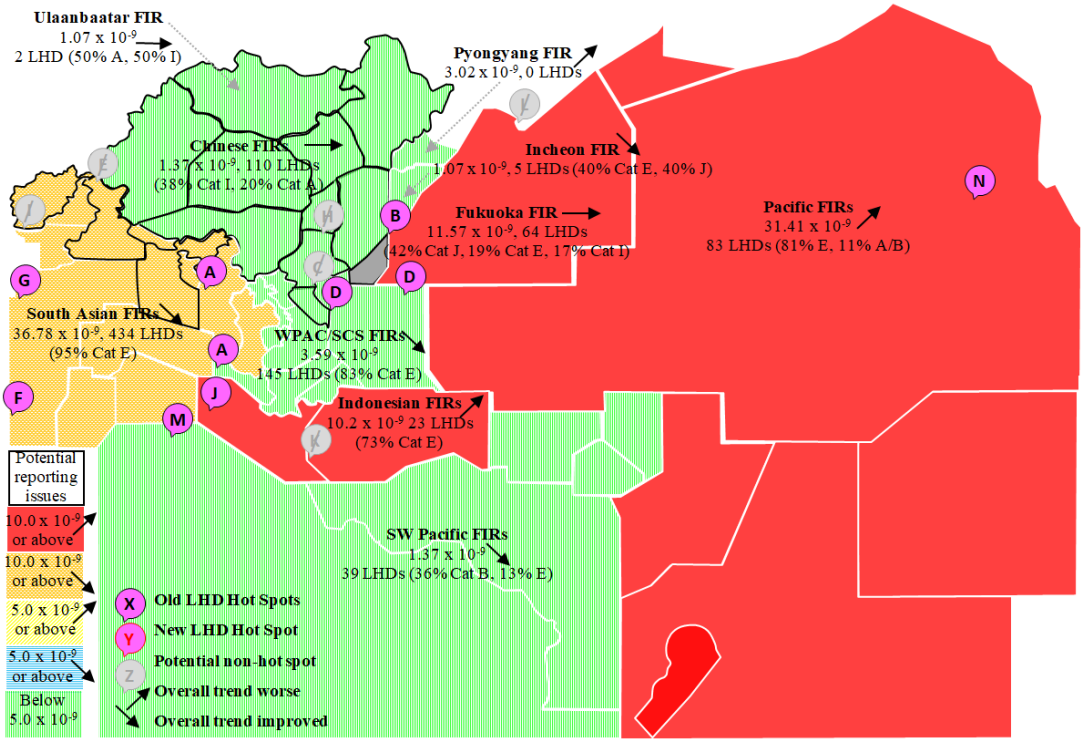

Figure 2: Asia/Pacific RVSM TLS subregion compliance reported to RASMAG/25

2.3 **Table 1** highlights the following RMA airspace subdivision aspects:

RMA Airspace Subdivision	Safety trend	Notes
Chinese FIRs	No change	Potential ATC reporting issues
Incheon FIR(excl. AKARA)	Improving	AKARA would dramatically worsen
Indonesia FIRs	Worsening	Improving reporting
Fukuoka FIR	No change	Still affected by the Manila FIR
Pacific FIRs	Worsening	Dramatic increase in CAT E LHDs
Pyongyang FIR	Worsening	Insufficient traffic to judge compliance
South Asia Indian Ocean FIRs	Improving	Still has the second worst hot spots
Southwest Pacific FIRs	Improving	Best performing APAC airspace
Ulaanbaatar FIR	No change	Potential ATC reporting issues
W Pacific/Southeast Asia FIRs	Improving	Second best performing APAC airspace

Table 1: Airspace Vertical Safety Performance Overview

2.4 **Table 2** provides a comparison of Asia/Pacific Region (APAC) RVSM risk as a measure against the TLS by grouped FIRs, according to the RMA responsibilities for airspace. Over the past six years, the performance of APAC in compliance with the TLS for RVSM had been poor overall, averaging 40% when measured by the grouped FIRs. However, of the 29 FIRs that achieved TLS, 10 FIRs had potential reporting issues (discussed later in this paper). Therefore, the compliance rate may be significantly worse than reported. In conclusion, measures taken to improve adherence to the TLS in the past six years have yielded localised improvements, but overall had failed to produce a positive result for the APAC Region as a whole.

	2014	2015	2016	2017	2018	2019
FIRs	53%	32%	51%	16% (8 FIRs)	37% (18 FIRs)	53% (26 FIRs)

Table 2: Comparison of Regional RVSM TLS Achievement

2.5 Unfortunately, the measurement of TLS conformance by grouped FIRs was a coarse metric, which resulted in the yearly result fluctuating rapidly. It should be noted that the use of grouped FIR evaluations may mask poor performing FIRs within those grouped FIRs that met the TLS; whereas many well-performing FIRs that achieved TLS were not recognised within those grouped FIRs that did not meet TLS.

South Asian/Indian Ocean

2.6 **Hot Spot A** – in the East Indian Ocean interface between the Dhaka/Yangon FIRs and the Kolkata/Yangon FIRs (A1) and to a lesser extent, between the Chennai FIR and Kuala Lumpur FIRs (A2) had been previously identified as the area with the highest number of LHDs in the Asia/Pacific Region. Overall, this Hot Spot had been improving, with better surveillance and data sharing. Yangon ACC had enhanced its surveillance coverage with ADS-B technology to cover the Kolkata-Yangon interface, including waypoint TEBOV and AVLED. **Table 3** contains information on AIDC status relevant to Hot Spot A.

ATC Units	Chennai	Dhaka	Kolkata	KL	Yangon	Notes
Chennai			Testing	√	Trials	
Dhaka			Q4 2023		Q4 2023	
Kolkata	Testing	Q4 2023			X	
Kuala Lumpur	√				X	
Yangon	Trials	Q4 2023	X	X		

Table 3: AIDC Status – Hot Spot A

2.7 **Hot Spot F** – in the West Indian Ocean, the risk at Mogadishu/Mumbai FIR interface had significantly reduced at position ORLID In 2018 there had been 24 non-nil duration reports at ORLID and in 2019 there were only three, so there had been a safety improvement at the interface with the ICAO African (AFI) Region.

2.8 **Hot Spot G** – On the Muscat/Sana'a/Mumbai FIR interface (ASPOX-RASKI) the number of LHDs identified by MAAR had not significantly decreased, with 93 non-zero duration LHDs in 2017, 97 in 2018 and 76 in 2019. This resulted in 55% of the area's total operational risk at **24.71 x 10^{-9} FAPFH**. A number of trans-regional meetings had been organised to address these issues, but as yet no progress had been made since the testing in 2018 between Oman's On-Line Data Interchange (OLDI) – and Mumbai's AIDC system. The ICAO Regional Office's Regional Officer Communications, Navigation, Surveillance (RO/CNS) had been requested to discuss this with the Middle East (MID) Office.

2.9 **Hot Spot I** – this Hot Spot at the Karachi/Kabul FIR interface had been identified in 2018, with 34 LHDs near position GADER. This had been recommended for deletion in 2020, due to the lack of reported LHDs in 2019 and part of 2020 since the establishment of new route Z627.

2.10 A new potential Hot Spot (O?) emerged between the Chennai and Mumbai FIRs at positions OPIRA, KAKIB, VATSU, POMAN and ANODA with seven LHDs reported. This was probably due to improved safety reporting by the units involved.

Southeast Asia

2.11 **Hot Spot D –** the Manila FIR interface with the Ujung Pandang, Singapore, Ho Chi Minh, Sanya, Hong Kong and Fukuoka FIRs was expected to improve as the Manila ACC's new ATM system began to be implemented and operationalised. However, there were still a significant number of LHD incidents reports in 2019, according to the data provided by MAAR and the RO/CNS (**Table 4**).

Manila Interface with–	**AIDC Implemented**	**LHDs**	**Non-Zero-Duration LHD**
Kobe/Fukuoka	?	15	1
Ho Chi Minh	Testing, Q4 2020	20	0
Hong Kong	√	17	0
Kota Kinabalu	Testing, Q1 2021	11	3
Oakland Oceanic	Testing, Q3 2020	0	0
Singapore	√	17	5
Taibei	√	16	0
Ujung Pandang	Testing, Q3 2020	3	1
Total		99	10

Table 4: Manila FIR AIDC and LHD Overview

2.12 **Hot Spot J** at the interface between the Jakarta and the Singapore/Kota Kinabalu FIRs had been confirmed in 2017. In 2019 there were still a number of LHDs reported, with a cluster of 14 at positions ANITO, KADAR and SURGA on the Jakarta/Singapore interface (**Figure 3**).

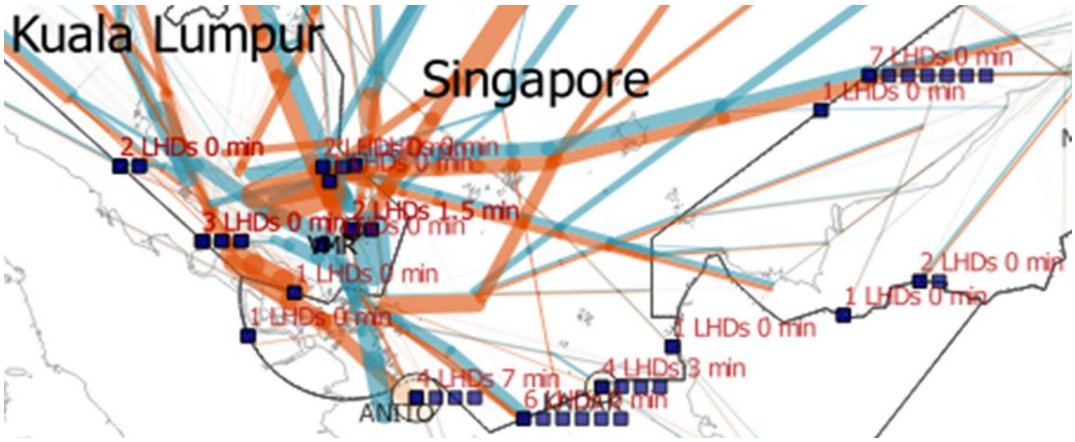

Figure 3: Hot Spot J LHDs, 2019

2.13 **Hot Spot K** consisting of Category E LHDs at the interface between the Jakarta FIR and the Ujung Pandang FIRs had been confirmed in 2017. In 2018 there had been a major reduction to only three reports. However, after safety awareness workshops in 2019 safety reporting appeared to have noticeably improved from the Indonesian ACCs. Notwithstanding this, there had been only three Category E events within proximity of this interface. This Hot Sport may be considered for deletion by RAMAG/25.

East Asia

2.14 The portion of the Incheon FIR known as the AKARA– FUKUE Corridor (**Hot Spot B**) failed to meet the TLS at 247.0 x 10^{-9}, due to the extreme sensitivity of this airspace to any deviation, and a total of 29 LHDs being reported in 2019 (refer to RASMAG/25/WP14). In terms of safety mitigations, a new direct ATS communications line had been installed between Shanghai and Incheon. The operational response to this Hot Spot was being managed by Technical Working Groups (TWGs) led by ICAO Headquarters.

2.15 **Hot Spot C** – there had been a major reduction in the LHDs at the Sanya/Hong Kong – Guangzhou interface. This was presumably due to actions taken by China and Hong Kong, China, and the implementation of a new ATM system in Hong Kong, China.

2.16 Regarding **Hot Spot E** on the Urumqi/Lahore FIR interface, China had installed enhanced surveillance and communication facilities, so there had been only a single LHD reported in 2018 and 2019. This Hot Spot was recommended for deletion by RASMAG/25.

2.17 The number of LHDs at **Hot Spot H** on the Guangzhou/Wuhan FIR interface had reduced, indicating the use of positive operational measures. China RMA reported that they had been taking measures such as the conduct of scrutiny groups, so that the number of LHDs had reduced significantly. This Hot Spot was recommended for deletion by RASMAG/25.

2.18 **Hot Spot L** had been identified near position LUMIN at the interface between the Fukuoka (Japan) and Khabarovsk (Russian Federation) FIRs during 2017, consisting of Category E ATC transfer errors. However, only one LHD had been reported during 2018 and two in 2019, so this Hot Spot was recommended for deletion by RASMAG/25.

Pacific

2.19 **Hot Spot M** was detected in the north-western portion of the Melbourne FIR which interfaced with the Chennai FIR, involving Category A, B and E events. The number of events in 2019 had fallen to only three in the vicinity of this airspace, so this should be considered as a potential non-Hot Spot.

2.20 The Central East Pacific (CEP) area between Continental USA and Hawaii (**Hot Spot N**), had contributed to the increased risk in 2018. This area witnessed a large number of Category E events in 2019, which were being investigated by PARMO and the ACCs involved.

2.21 **Table 5** provides a summary of the Hot Spots.

Hot Spot	Involved FIRs	Identified	Remarks
A1	Kolkata/Dhaka – Yangon;	2015	LHDs increased, risk bearing LHDs reduced
A2	Chennai – Kuala Lumpur	2015	
B	Incheon	2015	AKARA Corridor
~~C~~	~~Hong Kong – Guangzhou~~	~~2015~~	~~Potential non-hot spot~~
D	Manila – all adjacent FIRs	2015	Increase of LHDs to Fukuoka
~~E~~	~~Lahore – Urumqi~~	~~2015~~	~~Potential non-hot spot~~
F	Mogadishu – Mumbai	2015	LHDs reducing
G	Sana'a/Muscat – Mumbai	2015	Cat. E LHDs increasing ()
~~H~~	~~Guangzhou – Wuhan~~	~~2015~~	~~Hong Kong/Sanya reduction~~
~~I~~	~~Karachi – Kabul~~	~~2018~~	~~Potential non-hot spot~~
J	Jakarta – Singapore/Kota Kinabalu	2018	Minor, Cat. E LHDs
~~K~~	~~Jakarta – Ujung Pandang~~	~~2018~~	~~Potential non-hot spot~~
~~L~~	~~Fukuoka – Khabarovsk~~	~~2018~~	~~Potential non-hot spot~~
M	Chennai - Melbourne	2019	~~New; Cat. A, B and E LHDs~~ Potential non-hot spot
N	Oakland USA – Hawaii CEP	2019	New; Cat. A, B and D LHDs

Table 5: Comparison Summary of LHD Hot Spots

Non-RVSM Approved Aircraft

2.22 **Table 6** compared the number of non-RVSM airframes reported by each RMA annually:

Report	AAMA	China RMA	JASMA	MAAR	PARMO	Total
RASMAG/20	8	45	15	234	26	328
RASMAG/21	5	6	15	106	11	143
RASMAG/22	7	40	11	163	25	246
RASMAG/23	5	20	9	43	38	115
RASMAG/24	5	4	17	34	1	61
RASMAG/25	2	24	6	26	9	67

Table 6: Trend of Non-RVSM Airframes Observed by Asia/Pacific RMAs

Regional Horizontal TLS Compliance

2.23 The following Asia/Pacific En-Route Monitoring Agency (EMAs) reported horizontal risk assessments as follows, which all met the TLS of 5.0 x 10^{-9} (**Table 7**):

ATC Separation	EMA	2018 Estimated Risk	2019 Estimated Risk
50NM Lateral	BOBASMA	2.05 x 10^{-9}	1.59 x 10^{-9}
	JASMA	0.05 × 10^{-9}	1.45 x 10^{-9}
	PARMO	-	-
	SEASMA	0.52 x 10^{-9}	0.012 x 10^{-9}
30NM Lateral	PARMO	0.16 × 10^{-9}	3.35 × 10^{-9}
50NM Longitudinal	BOBASMA	4.21 x 10^{-9}	4.97 x 10^{-9}
	PARMO	2.22 × 10^{-9}	-
	SEASMA	0.38 x 10^{-9}	0.38 x 10^{-9}
30NM Longitudinal	BOBASMA	-	-
	JASMA	0.001 × 10^{-9}	0.015 x 10^{-9}
	PARMO	4.08 × 10^{-9}	4.08 × 10^{-9}

Table 7: Comparison of Horizontal Risk Assessments

2.24 In addition, JASMA's assessment of the 10-minute longitudinal standard without Mach Number Technique, which had not met TLS at 20.1 x 10^{-9}.

Safety Reporting

2.25 RASMAG/25/WP11 and WP34 indicated that the following States had reporting issues:

a) Afghanistan, which did not report any LHDs during 2019;

b) India – Delhi and Kolkata FIRs (although Mumbai and Chennai had made distinct improvements); and

c) Mongolia had a rate of reported LHDs per hour that was very low, many factors less than that expected.

2.26 MAAR had also noted: *In most cases, ATCO report LHDs only when they are affected by mistakes made by ATCO in their neighboring FIRs. However, in 2018, the MAAR started to receive LHD reports which occurred inside an FIR.*

2.27 Significant improvements in safety reporting had been noted in RASMAG/25/WP14 within the AKARA – FUKUE Corridor. Previously, some States had insisted that there were no safety issues within the Corridor, and it had been very rare to receive information on safety incidents. WP14 now illustrated the level of data that RASMAG could rely upon that showed the Corridor was indeed a Hot Spot with very high latent safety risks.

2.28 AAMA also noted that Indonesia had probably improved its safety reporting culture.

2.29 **Table 8** provides an overview of the proportion of Category E (ATC – ATC Transfer Errors) over the period 2016 – 2019.

	SW Pacific	Indonesia	China	Japan	South Asia	Southeast Asia	Pacific	Incheon
2017	18%	44%	14%	30%	96%	69%	30%	60%
2018	26%	65%	3%	22%	95%	87%	22%	0%
2019	13%	72%	5%	19%	95%	83%	81%	40%
Ave.	19%	60%	7%	24%	95%	80%	44%	20%

Table 8: Category E Proportions of Reported LHDs, 2016 - 2018

2.30 **Table 8** indicates data for the period 2017 – 2019 showing that for areas that do not generally use AIDC, Category E LHDs constituted 60 – 95% of the total (78% average), whereas in areas that do utilise AIDC, Category E events normally constituted a much smaller proportion of between 19 – 44% (average 29%).

2.31 As China had not comprehensively implemented AIDC, the very low proportion of 7% Category E events on average was plausibly low at 3% during 2018 and 7% in 2019, thus indicating a possible safety reporting issue within Chinese airspace. Noting China RMA's past work to increase improve reporting culture that resulted in a steep increase in reports, China RMA is urged to consider steps to further strengthen its 'Just Culture' policies and effective implementation of those policies to support open reporting of safety occurrences.

2.32 It was always difficult to compare reporting rates between States. However, the methods used to analyse the data had successfully highlighted poor reporting in the past, and after action by States the reporting had changed dramatically. It was appropriate to remind States, even those which had taken significant positive steps to improve reporting, to continually monitor their reporting culture and systems to optimise reporting. Experience from developed nations had shown that educating operational personnel was not enough to achieve the open reporting objective of the 'aviation culture', as described in the *Asia/Pacific Seamless ATM Plan*.

2.33 Given that operational errors constituted by far the vast majority of safety risk in both the vertical and horizontal planes, the assurance of having an appropriate safety reporting culture was one of the most critical functions of airspace safety monitoring agencies. Yet, analysis of safety reporting culture, associated policies and the identification of potential missing reports remained almost non-existent in RMA/EMA safety reports.

2.34 In order to be more proactive, ICAO recommended that RMAs and EMAs better analyse safety data to identify potential under-reporting and undertake safety culture surveys and audits to monitor safety reporting culture. An example of a safety reporting questionnaire is as follows:

Q1. Protection for Personnel Reporting Airspace Safety Incidents or Concerns:

Does your State/Administration have in place written policies and rules to ensure that personnel who report airspace safety incidents are not subjected to punitive action, except in the case of Q2?

Q2. Punitive Action for Personnel Not Reporting Airspace Safety Incidents or Concerns:

Does your State/Administration have in place written policies and rules to ensure that personnel who do not report airspace safety incidents that they are aware of or whose wilful actions negatively impacted or had the potential to negatively impact airspace safety are subjected to appropriate corrective action?

Q3. Management Airspace Safety Incidents and Key Performance Indicators:
Does your State/Administration have in place written policies and rules to ensure that managers are not rewarded specifically for the level of reported incidents (or for performance indicators or targets using reported incidents as a metric)?

2.35 RASMAG/25 was invited to consider the following Decision on safety reporting as part of RMA/EMA safety reports.

<table>
<tr><td colspan="3">Decision RASMAG/25-X: Safety Reporting Assessments</td></tr>
<tr><td colspan="2">What: That, RMAs and EMAs will include within their vertical and horizontal safety reports to RASMAG an assessment of the safety reporting culture of the States concerned (including ‘Just Culture’), and specifically, whether safety reports for events such as LHDs were consistently being made by pilots and ATC.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: Very few RMA and EMA safety reports include an analysis of reporting culture; yet this is demonstrably important to verify the validity of the data being used.</td><td colspan="2">Follow-up: ☐Required from States</td></tr>
<tr><td>When: 30-Oct-20</td><td colspan="2">Status: Draft to be adopted by Subgroup</td></tr>
<tr><td colspan="3">Who: ☐Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:</td></tr>
</table>

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) discuss the extremely elevated safety issues concerning:

i) Indian airspace (western and eastern FIR boundaries);

ii) Pacific airspace; and

iii) the AKARA – FUKUE Corridor;

c) discuss the possible lack of reporting within Afghanistan, Chinese, Indian (Delhi and Kolkata FIRs) and Mongolian airspace;

d) note the stability in long-term non-RVSM airframe numbers;

e) agree that the overall increase in RMA Monitoring Burdens was mainly due to the COVID-19 pandemic, so APANPIRG Deficiencies should not be considered until 2021;

f) agree to *Decision RASMAG/25-X: Safety Reporting Assessment*; and

g) discuss any other relevant matters as appropriate.

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