International Civil Aviation Organization

The Nineteenth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/19)

Pattaya, Thailand, 27-30 May 2014

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

REGIONAL SAFETY MONITORING 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 has provided APANPIRG with an overall assessment of Asia/Pacific FIR RVSM TLS Compliance in order to meet Asia/Pacific Objective 1 (*Airspace Safety Monitoring to Achieve Regional TLS*).

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

> *The United States noted that it was important to consider an emphasis on risk mitigation procedures such as Strategic Lateral Offset Procedure (SLOP), which had been inconsistently applied in the Asia/Pacific. The Secretariat stated that this would be considered as part of the Seamless ATM development. He emphasized the need for RASMAG to support key infrastructure Seamless ATM improvements such as AIDC, ATS surveillance (particularly ADS-B), and data sharing.*
>
> *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. AAMA and PARMO agreed to undertake an analysis on this matter and report to RASMAG.*

1.3 RASMAG/17 agreed to a new task (17/4), which required AAMA, PARMO, IATA, and IFALPA to conduct an analysis of material and processes required from RMAs to assist airline/ATC education and responses on minimisation of operational errors, including information on hot spots[1] and recommended operational responses. This WP also endeavours to assist that task by identification and analysis of regional 'hot spots' where operational errors appeared to be relevant.

[1] Defined for the purposes of this paper as areas where there were more than one proximate (100NM or less) risk bearing occurrence.

2. DISCUSSION

Regional RVSM TLS Compliance

2.1 The state of Asia/Pacific regional RVSM Target Level of Safety (TLS) compliance is indicated as follows:

- **Figure 1** is as reported to RASMAG/18; and
- **Figure 2** is as reported to RASMAG/19.

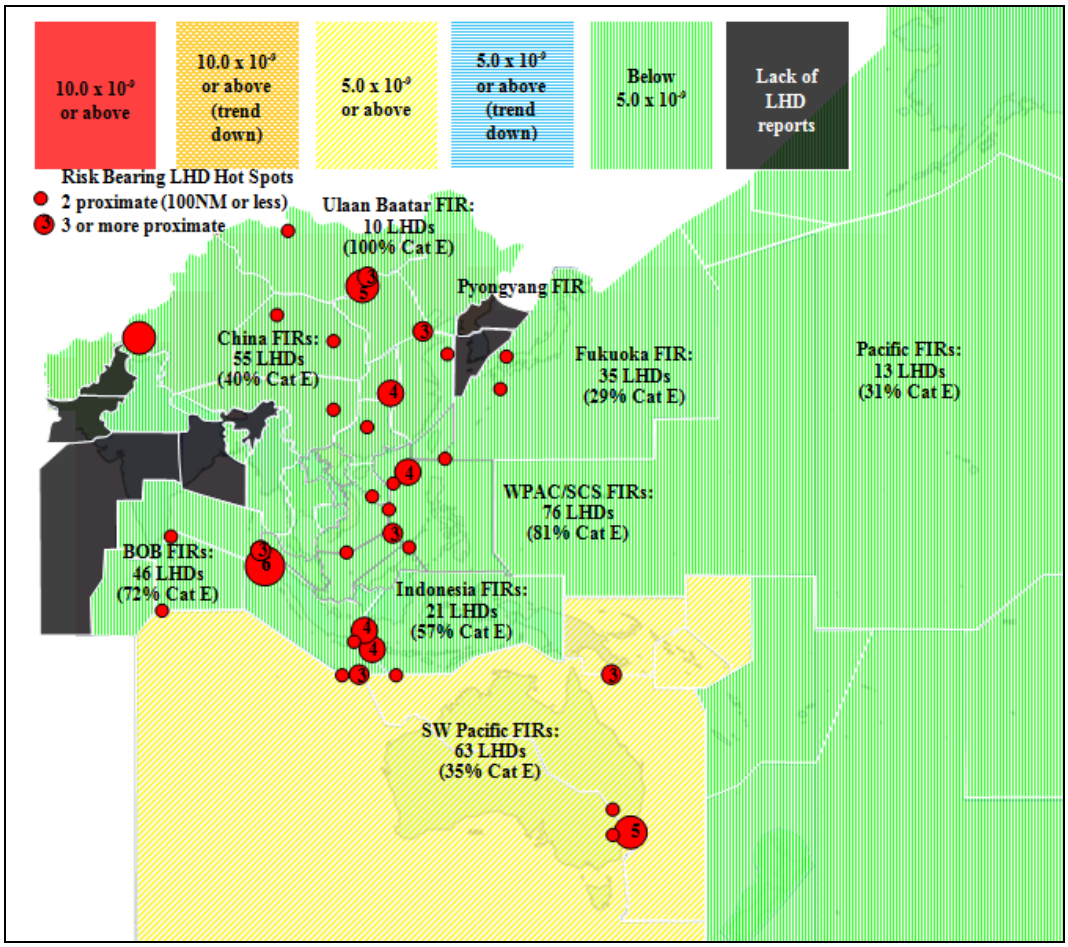

Figure 1: Asia/Pacific TLS compliance reported to RASMAG/18

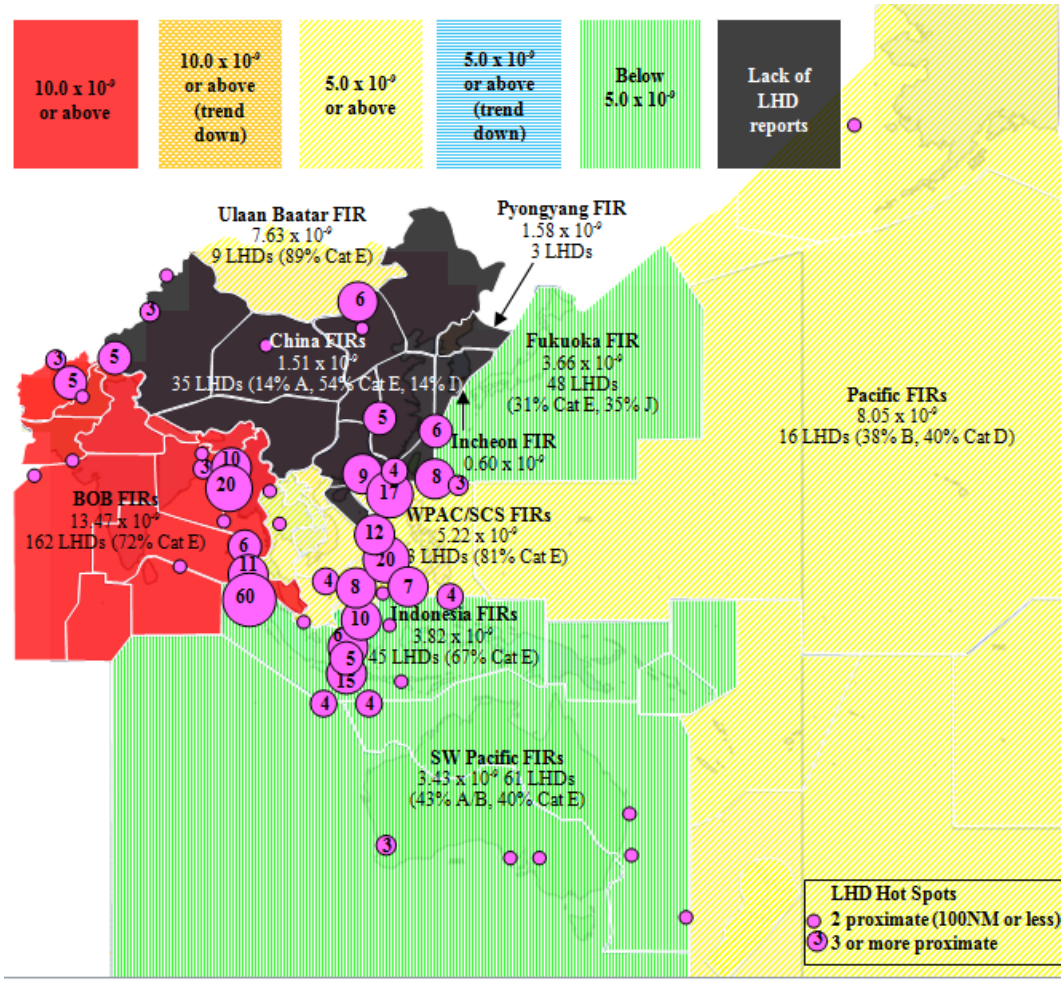

Figure 2: Asia/Pacific TLS compliance reported to RASMAG/19

2.2 **Figures 1 and 2** indicated the following sub-regional regional trends.

- **South Asia** (and in particular India) dramatically increased its reporting rate, resulting in a large increase in estimated risk (reflecting the true nature of risk). This revealed the extent of interface problems between Indian FIRs and Bangladesh, Myanmar, Malaysian and Indonesian FIRs. Apart from the implementation of AIDC between the States concerned, significant urgent action appeared to be necessary to reduce ATC operational errors and to increase communications and ATS surveillance coverage/data exchange. In particular, a Special Coordination Meeting should be considered, involving India, Indonesia, Malaysia, and Myanmar to, *inter alia*, investigate the installation of ADS-B, VHF communications and sharing data from a site on Great Nicobar Island, which was close to the Indian, Indonesian and Malaysian FIR boundaries.

- **Southeast Asia** had not met the TLS, which was largely connected with two major interface problems. The first was between Indonesian airspace and Singapore and Philippines airspace, and continued internal problems within Indonesian airspace between the Jakarta FIR and the Ujung Pandang FIR. The second was between the Philippines airspace and Singapore, Malaysia, Viet Nam, Hong Kong and Japanese airspace. Increased reporting by Indonesia was a positive. The level of continued operational errors involving interfaces with both the Indonesian and the Philippines airspace remained deeply concerning. Greater effort and urgency appeared to be required by both States to investigate and reduce ATC operational errors, and implement full AIDC capability. In the case of AIDC, it may be necessary to form a short-term AIDC Implementation Task Force that focuses on the SCS and BOB.

- **East Asia** Mongolia had not met the TLS, largely because of the interface between Mongolian and Chinese airspace. This could be discussed at a forthcoming Eurasia Special Coordination Meeting. Japan had met TLS, as had the ROK and China. However, there was concern regarding the lack of LHDs from the DPRK (although their flight hours were very low), ROK and China that may indicate a lack of reporting culture.
- **Southwest Pacific** had maintained an upwards trend from RASMAG/17 to be consistently above the TLS. However, the prime driver for the high risk figure was a single LHD from March 2012 that remained within the data sample used for calculations. The AAMA reported a monthly risk value in an attempt to provide real-time information on actual risk without reliance on historical high-time errors resident within the 12 month data sample. This data shows the monthly risk for the Southwest Pacific airspace was well below the average monthly risk. There were a number of LHD hot spots, including the interface between Australia and Indonesian airspace (particularly Jakarta FIR), and also between Australia and Papua New Guinea airspace.
- **Pacific** airspace had not satisfied the TLS, but this was mainly due to a single long duration LHD event.

2.3 **Table 1** provides a comparison of Asia/Pacific RVSM risk as a measure against the TLS, either by RMA 'sub-region[2]', or by FIRs. There had been significant deterioration in the region meeting the TLS overall, which had been partially caused by an important increase in reporting.

	RASMAG16	**RASMAG17**	**RASMAG18**	**RASMAG19**
RMA 'sub-regions'	67%	78%	89%	22%
FIRs	73%	73%	90%	16%

Table 1: Comparison of Sub-Regional and Regional RVSM TLS Achievement

LHD Reporting

2.4 **Table 2** provides a comparison of the estimated flight hours for airspace analysed by an RMA, divided by the reported LHDs at RASMAG/18 and RASMAG/19, in order to assess reporting.

Airspace	**RASMAG 18 LHDs**	**RASMAG 19 LHDs**	**RASMAG 19 Flight Hours**	**RASMAG 18 Reporting Ratio**	**RASMAG 19 Reporting Ratio**
SW Pacific	63	61	599,990	1: 9,524	1: 9,835
Mongolia	10	9	-3% 108,773	1: 11,230	1: 10,876
India/BOB	46	162	+51% 1,869,508	1: 26,917	1: 11,540
WPAC/SCS	94	133	+34% 1,581,192	1: 12,590	1: 11,889
Indonesia	21	45	+5% 761,390	1: 34,508	1: 18,570
Japan	35	48	1,101,469	1: 24,495	1: 22,947
China	55	35	+100% 4,802,747	1: 43,436	**1:137,221**
ROK	0	3	*492,360	0	**1:164,120**
Pyongyang	0	0	+85% 5,970	0	0
Total	324	496	+54% 11,323,399	1: 22,684	1:22,829
Pacific	13	16	+7% 1,250,084	1: 89,536	1: 78,130

Table 2: Comparison of Estimated Flight Hours and Reported LHDs (*2012 figure)

[2] (1) Melbourne, Brisbane, Nauru, Honiara FIRs (AAMA); (2) Port Moresby FIR (AAMA); (3) Indonesian FIRs (AAMA); (4) Sovereign airspaces of China (China RMA); (5) Fukuoka FIR (JASMA); (6) Bay of Bengal FIRs (MAAR); (7) Western Pacific/South China Sea FIRs (MAAR); (8) Pacific Area (PARMO); and (9) North-East Asia Incheon FIR (PARMO).

2.5 From the comparison in **Table 2** (separating the Pacific portion of airspace because it was largely oceanic in nature and not directly comparable), the average LHD occurred approximately every 22,829 flight hours. The number of reported LHDs has increased in the Indian and Indonesian FIRs. As approximately two-thirds of these were category E ATC errors, this could be largely attributed to a major improvement in reporting. India and Indonesia should be congratulated for their efforts in promoting a higher reporting culture.

2.6 An analysis of the United States' database revealed that in one of the world's busiest environments (11.1 million flight hours in 2012) utilising the most sophisticated ATC operating tools designed to reduce human error and risk, the ratio of LHDs to flight hours was 1:31,267 in 2012. Thus in comparison, it was unlikely that the Asia/Pacific would have ratios greater than this and the true rate of LHDs in Chinese and ROK airspace were probably much more than was currently being reported. In particular, the reports for Beijing, Incheon, Sanya, and Shenyang FIRs appear to be well below what might be expected, given the very busy traffic in those airspaces. After the very significant increases in reporting of LHDs in Indonesian (214%) and BOB (352%) airspace, China and the ROK were encouraged to take similar action to improve reporting if it was deficient, particularly by implementation of a 'just culture' environment.

Regional Horizontal TLS Compliance

2.7 The following Asia/Pacific En-Route Monitoring Agency (EMAs) reported horizontal risk assessments as follows, which all met the TLS of 5.0×10^{-9} (**Table 3**):

Separation Standard	EMA	Estimated Risk
50NM Lateral Risk	BOBASMA	0.76×10^{-9}
	JASMA	0.000006×10^{-9}
	PARMO	0.97×10^{-9}
	SEASMA	0.055×10^{-9}
30NM Lateral Risk	PARMO	0.26×10^{-9}
50NM Longitudinal Risk	BOBASMA	4.02×10^{-9}
	PARMO	2.32×10^{-9}
	SEASMA	1.18×10^{-9}
30NM Longitudinal Risk	JASMA	0.13×10^{-9}
	PARMO	3.74×10^{-9}

Table 3: Comparison of Horizontal Risk Assessments

2.8 The application of these horizontal standards met the TLS. The lateral risk for 50NM separation as calculated by JASMA was notably lower than other implementations.

Non-RVSM Approved Aircraft

2.9 **Table 4** provides a regional overview of the States of Registry of non-RVSM approved aircraft that were noted within the RVSM stratum by RMAs:

State of Registry	AAMA	China RMA	JASMA	MAAR	PARMO
Albania					1
Australia	4			1	
Brunei Darussalam			1		
Canada					
Cayman Islands	2		3		
Cambodia			2	1	
China	4	1	7	10	
Czech Republic				1	
Ethiopia		1			
Fiji					1

France				2	
Gambia				1	
Germany		1		1	
Guyana					2
India	20	4	3	38	
Indonesia	2			**12**	
Hong Kong, China		1			1
I. R. Iran				1	
Italy		1			
Japan		1			
Kazakhstan				4	
Lao PDR				2	
Luxembourg				1	
Malaysia	4	2	1	1	
Mexico			1		
Moldova				2	
Netherlands				1	
Nigeria				1	
Pakistan				21	
Papua New Guinea			1		
Peru					1
Philippines	19	4	9	7	
Republic of Korea	2	[+]2	5	1	
Russian Federation		5	2	3	5
South Africa					2
Switzerland					1
Sri Lanka				1	
Taiwan		3			
Tajikistan		3			
Tonga				1	
Thailand	6	*3		2	
Ukraine				1	
United Arab Emirates				1	1
United Kingdom	5	1	2		
United States	**13**		9	3	2
Uzbekistan					1
Vanuatu					1
Viet Nam			1	5	

Table 4: Regional Overview of Non-RVSM States of Registry (non APAC in grey)

*One operator (Orient Thai) conducted 401 flights in China RVSM airspace

[+]One operator (Asiana Airlines) conducted 211 flights within China RVSM airspace

2.10 The Asia/Pacific States with the majority of non-RVSM airframes noted by the Asia/Pacific RMAs were: China, India, Indonesia, Pakistan and the Philippines.

2.11 **Table 5** compared the number of non-RVSM airframes reported by each RMA:

Report	**AAMA**	**China RMA**	**JASMA**	**MAAR**	**PARMO**
RASMAG/18	98	43	47	118	15
RASMAG/19	90	33	40	130	19

Table 5: Trend of Non-RVSM airframes Observed by Asia/Pacific RMAs

2.12 Overall, the number of non-RVSM aircraft had marginally reduced by 3% in the past year. This indicated that there was considerable work to do and APANPIRG Conclusion 24/6 (*Repetitive Non-RVSM Approved Aircraft Operating as RVSM Approved Flights* which encouraged States to deny entry to operate within RVSM airspace for aircraft that have been confirmed as non-RVSM approved over a significant length of time, or by intensive checking, except where a specific non-RVSM operation was authorized), had not yet been effective.

RMA Monitoring Burden

2.13 **Table 6** compares the outstanding monitoring burden reported by each RMA:

Report	AAMA	China RMA	JASMA	MAAR	PARMO
RASMAG/18	102	141	29	189	118
RASMAG/19	79	87	16	200	37

Table 6: Outstanding Monitoring Burden of Asia/Pacific RMAs

2.14 **Table 6** indicates that all the RMAs have managed to reduce their monitoring burden, except for MAAR, which may require collaborative assistance from other RMAs. The overall total remaining Asia/Pacific regional monitoring burden had decreased from 579 as reported to RASMAG/18 to 419 as reported to RASMAG/19, a 38% reduction, which followed a 32% reduction since 2009.

APANPIRG Metrics

2.15 APANPIRG/20 agreed to the following regional performance metrics Conclusions:

Conclusion 20/4 − Asia/Pacific Performance Metrics

That the following metrics be adopted as a part of Asia/Pacific regional performance monitoring and measurement:

APAC Metric 1 *Percentage of RMA sub-regions achieving the regional Target Level of Safety (TLS) for RVSM operations, referenced as of April each year.*

APAC Metric 2 *Percentage of instrument runway ends with an approach procedure with vertical guidance.*

APAC Metric 3 *Percentage of en-route and terminal PBN routes implemented on a sub-regional basis in accordance with the regional PBN plan.*

APAC Metric 4 *Average delays for departures at State's primary international airports for the busiest hour on a weekly basis.*

Conclusion 20/5 − Data Collection for Regional Metrics

That States, organizations and stakeholders collect and process data to support the regional metrics adopted by APANPIRG, leveraging to the extent possible all existing data and ongoing efforts, and provide a progress report to APANPIRG/21.

2.16 While the division of Asia/Pacific airspace in terms of RMA responsibilities into nine 'RMA sub-regions' made assessment of risk compliance easier, this measurement was too coarse to provide a meaningful regional performance overview. Moreover, reference to flight information regions provides an opportunity for RMAs to conduct more detailed analysis of individual FIR performance when it is considered that safety risk performance is consistently near or above the TLS, instead of that specific detail being 'hidden' among a much larger group of FIRs. This has been problematic in the past within the South China Sea and West Pacific airspace, where some FIRs have performed well, and others less so, but only an overall assessment was provided.

2.17 The specific reference to the month of April should be deleted as the TSD is normally taken in December. Thus the meeting is invited to discuss an amendment for APAC Metric 1 as per the following Draft Conclusion:

RASMAG Draft Conclusion 19/XX – APAC Vertical Safety Metric

APAC Metric 1: Percentage of Flight Information Regions achieving the regional Target Level of Safety (TLS) for RVSM operations.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) discuss the need for Special Coordination Meetings and/or AIDC Implementation Task Force involving-

i) India, Indonesia, Malaysia, and Myanmar;

ii) the Philippines, Singapore, Malaysia, Viet Nam, Hong Kong, China and Japan;

iii) Mongolia and China (Paragraph 2.2);

c) discuss the possible lack of reporting noted in Table 2;

d) discuss the continued incidence of non-RVSM aircraft operating within the RVSM stratum (Table 5);

e) note the RMA monitoring burden for MAAR (Table 6);

f) discuss Draft Conclusion 19/XX – APAC Vertical Safety Metric (Paragraph 2.14); and

g) discuss any relevant matters as appropriate.

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