International Civil Aviation Organization

The Twentieth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/20)

Bangkok, Thailand, 26-29 May 2015

Agenda Item 3: Reports from Asia/Pacific RMAs and EMAs

PARMO VERTICAL SAFETY REPORT

(Presented by United States/PARMO)

SUMMARY

This paper compares actual performance to safety goals that support the continued use of reduced vertical separation minimum (RVSM) in Pacific and North East Asia airspace. This report contains a summary of large height deviation reports received by the Pacific Approvals Registry and Monitoring Organization (PARMO) for the most recent reporting period of 1 January to 31 December 2014. There are a total of 37 reported large height deviations (LHDs) accounting for 88 minutes of operation at incorrect flight level in Pacific RVSM airspace. This report also contains an update of the vertical collision risk. The vertical collision risk estimate for Pacific airspace meets the target level of safety (TLS) value of 5.0 x 10^{-9} fatal accidents per flight hour. The vertical collision risk estimate for a portion of North East Asia airspace meets the TLS value of 5.0 x 10^{-9} fatal accidents per flight hour.

1. INTRODUCTION

1.1 The Pacific Approvals Registry and Monitoring Organization (PARMO) produces a periodic report which is distributed twice annually to Pacific and North East Asia air traffic service (ATS) providers and airspace users. The report presented in this paper fulfills the ICAO emphasis on safety management systems; such reporting for international airspace is a component of safety management systems.

1.2 This working paper contains the PARMO safety monitoring report for the time period 1 January to 31 December 2014. It contains a summary of large height deviation reports, and estimates of vertical risk for Pacific and North East Asia airspace.

2. DISCUSSION

2.1 **Attachment A** contains the PARMO Vertical Safety Monitoring Report for January to December 2014.

Executive Summary

2.2 **Table 1** summarizes Pacific airspace RVSM technical, operational, and total risks. **Figure 1** presents collision risk estimate trends during the period from 1 January 2014 to 31 December 2014.

Pacific RVSM Airspace -estimated annual flying hours = 1,669,658 hours (note: estimated hours based on December 2014 traffic sample data)			
Source of Risk	**Risk Estimation**	**TLS**	**Remarks**
RASMAG 19 Total Risk (Previous RASMAG)	8.05×10^{-9}	5.0×10^{-9}	Above the TLS
Technical Risk	0.18×10^{-9}	2.5×10^{-9}	Below the Technical TLS
Operational Risk	3.68×10^{-9}		
Total Risk	3.86×10^{-9}	5.0×10^{-9}	Below the TLS

Table 1: Pacific Airspace RVSM Risk Estimates

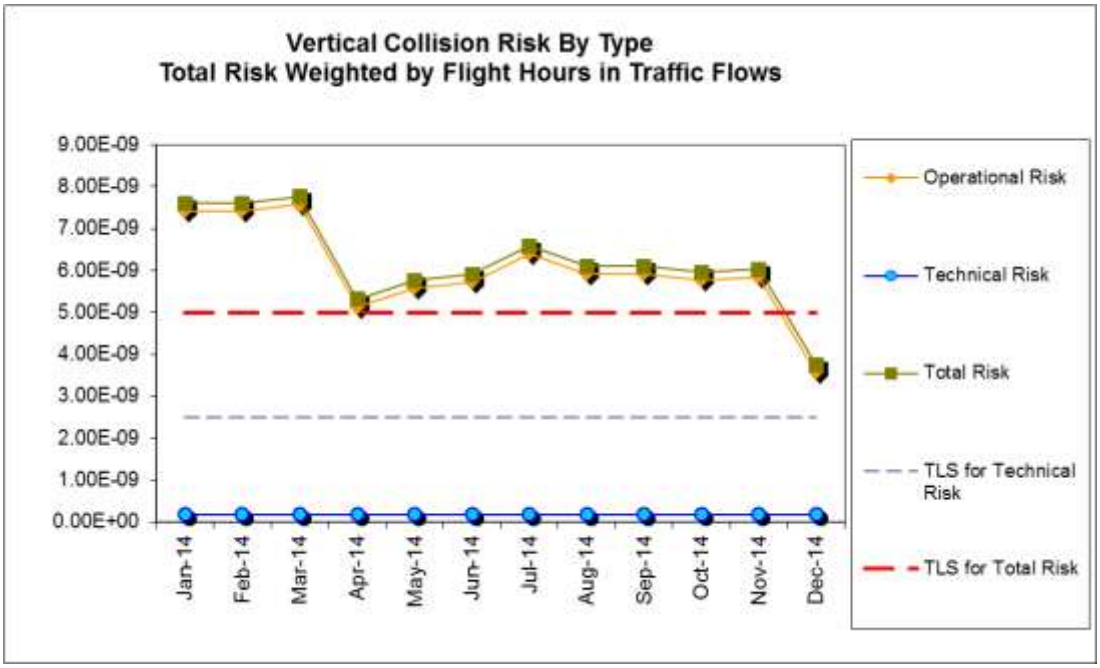

Figure 1: Pacific Airspace RVSM Risk Estimate Trends - 2014

2.3 **Table 2** presents a summary of the 12-month cumulative operational risk and LHD causes within Pacific airspace from 1 January until 31 December 2014.

LHD Category Code	**LHD Category Description**	**No of LHD Occurrences**	**LHD Duration (Min)**	**No. of Flight Levels Transitioned Without Clearance**	**Operational Risk (x 10-9)**
A	Flight crew failing to climb/descend the aircraft as cleared;	3	5	4	0.28
B	Flight crew climbing /descending without ATC clearance;	16	33	16	1.44

LHD Category Code	LHD Category Description	No of LHD Occurrences	LHD Duration (Min)	No. of Flight Levels Transitioned Without Clearance	Operational Risk (x 10-9)
C	Incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearance etc.)	1	3	0	0.12
D	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);	4	7	2	0.46
E	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters);	9	33	0	1.03
F	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues;	0	0	0	0
G	Aircraft contingency event leading to sudden inability to maintain assigned flight level (e.g. pressurization failure, engine failure);	1	0	5	0
H	Airborne equipment failure leading to unintentional or undetected change of flight level (e.g. altimetry errors)	0	0	0	0
I	Turbulence or other weather related causes	1	2	2	0.099
J	TCAS resolution advisory; flight crew correctly following the resolution advisory	1	0	0	0
K	TCAS resolution advisory; flight crew incorrectly following the resolution advisory	0	0	0	0
L	An aircraft being provided with RVSM separation is not RVSM approved (e.g. flight plan indicating RVSM approval but aircraft not approved, ATC misinterpretation of flight plan);	1	5	0	0.25
M	Other	0	0	0	0
	Totals	**37**	**88**	**29**	**3.68**

Table 2. 12-month cumulative operational risk associated with LHD reports by LHD category within Pacific RVSM airspace

2.4 **Figure 2** provides the geographic location of risk bearing LHD reports within Pacific Airspace during the assessment period.

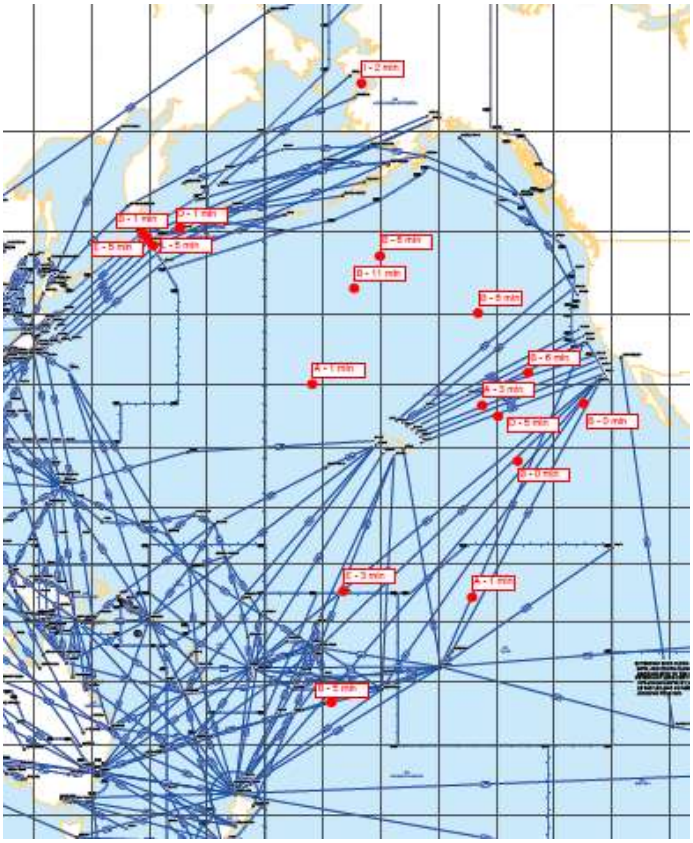

Figure 2. Pacific Airspace – Risk Bearing LHD

2.5 The vertical collision risk estimate in Pacific airspace meets the TLS for calendar year 2014. There were 37 non-nil LHD reports received by the PARMO in 2014, in comparison, there were 16 non-nil LHD reports received in calendar year 2013. Although an increase in the number of non-nil LHD reports was observed from calendar year 2013 to 2014, a significant decrease in the reported time spent at incorrect flight levels was reported. In 2013 there was a total of 239 minutes reported at incorrect flight level, in 2014 there were 88 minutes of flying time spent at an incorrect flight level reported in Pacific airspace.

2.6 The PARMO is in receipt of the monthly LHD reports from all FIRs for which the PARMO is the designated RMA. However, the December TSD has not been received from the Nadi FIR for year 2013 or 2014. This has limited the PARMO's ability to update some of the safety assessment parameters.

2.7 **Table 3** summarizes portions of North East (NE) Asia airspace RVSM technical, operational, and total risks. **Figure 3** presents collision risk estimate trends during the period from 1 January 2014 to 31 December 2014.

North East Asia RVSM Airspace -estimated annual flying hours = 99,984 hours (note: estimated hours based on December 2014 traffic sample data)			
Source of Risk	**Risk Estimation**	**TLS**	**Remarks**
RASMAG 18 Total Risk (Previous RASMAG)	**0.60×10^{-9}**	**5.0×10^{-9}**	**Below the TLS**
Technical Risk	**0.41×10^{-9}**	**2.5×10^{-9}**	**Below the Technical TLS**
Operational Risk	**3.72×10^{-9}**		
Total Risk	**4.13×10^{-9}**	**5.0×10^{-9}**	**Below the TLS**

Table 3: Portions of NE Asia Airspace RVSM Risk Estimates

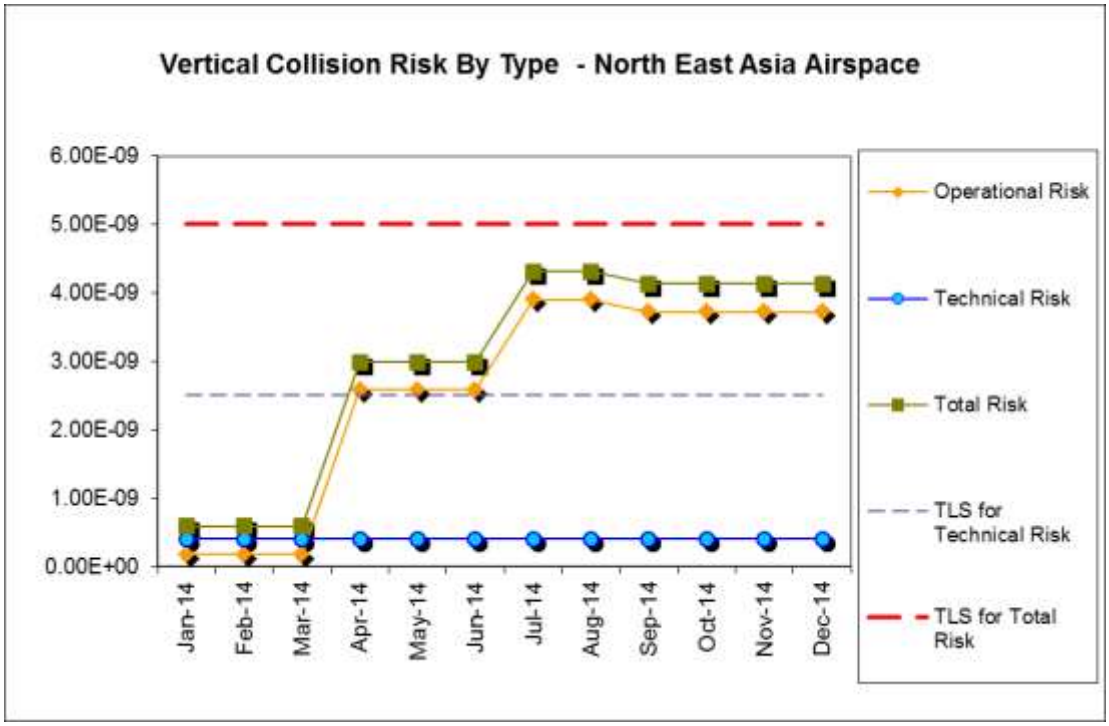

Figure 3: Portion of NE Asia Airspace RVSM Risk Estimate Trends

2.8 **Table 4** presents a summary of the 12-month cumulative operational risk and LHD causes within Pacific airspace from 1 January 2014 until 31 December 2014.

2.9 **Figure 4** provides the geographic location of risk bearing LHD reports within a portion of North East Asia Airspace during the assessment period.

LHD Category Code	LHD Category Description	No of LHD Occurrences	LHD Duration (Min)	No. of Flight Levels Transitioned Without Clearance	Operational Risk (x 10^{-9})
A	Flight crew failing to climb/descend the aircraft as cleared;	0	0	0	0
B	Flight crew climbing /descending without ATC clearance;	1	1.33	1	2.4
C	Incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearance etc.)	0	0	0	0
D	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);	0	0	0	0
E	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters);	0	0	0	0

LHD Category Code	LHD Category Description	No of LHD Occurrences	LHD Duration (Min)	No. of Flight Levels Transitioned Without Clearance	Operational Risk (x 10^{-9})
F	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues;	0	0	0	0
G	Aircraft contingency event leading to sudden inability to maintain assigned flight level (e.g. pressurization failure, engine failure);	0	0	0	0
H	Airborne equipment failure leading to unintentional or undetected change of flight level (e.g. altimetry errors)	0	0	0	0
I	Turbulence or other weather related causes	0	0	0	0
J	TCAS resolution advisory; flight crew correctly following the resolution advisory	2	0.73	2	1.32
K	TCAS resolution advisory; flight crew incorrectly following the resolution advisory	0	0	0	0
L	An aircraft being provided with RVSM separation is not RVSM approved (e.g. flight plan indicating RVSM approval but aircraft not approved, ATC misinterpretation of flight plan);	0	0	0	0
M	Other	0	0	0	0
	Totals	**3**	**2.067**	**3**	**3.72**

Table 4: Summary of LHD Causes within a portion of NE Asia Airspace

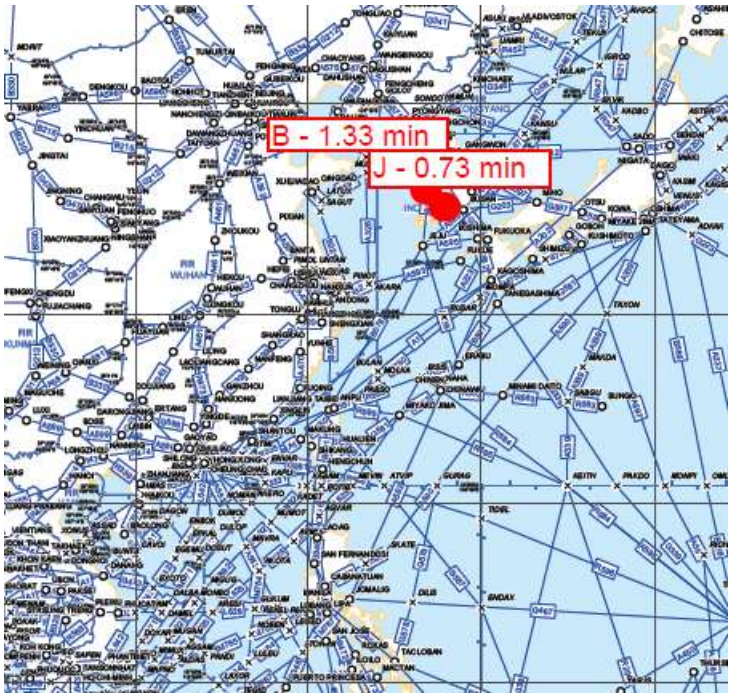

Figure 4. North East Asia Airspace – Risk Bearing LHD

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

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AIRSPACE SAFETY REVIEW OF THE RVSM IMPLEMENTATION IN Pacific and North East Asia AIRSPACE January 2014 TO December 2014

Prepared by
Pacific Approvals and Registry Monitoring Organization (PARMO) – *May 2014*
(An ICAO APANPIRG approved Regional Monitoring Agency)

1. Introduction

1.1 This report provides an airspace safety review of RVSM airspace risk in the Anchorage, Auckland, Incheon, Nadi, Oakland and Tahiti Flight Information Regions (FIRs).

2. Data Sources

2.1 **Traffic Sample Data (TSD).** A TSD covering four weeks of the month of December 2014 for aircraft operations in the Anchorage, Auckland, Incheon, Nadi, Oakland, and Tahiti FIRs was used as required by ICAO Regional agreement. **Table 1** indicates those FIRs which submitted a TSD in time for preparation of this report. The Nadi FIR was not able to provide the December 2014 TSD to the PARMO. It is also noted that the Nadi FIR did not provide a December 2013 TSD to the PARMO.

FIR	December 2014 TSD Submitted to PARMO
Anchorage	X
Auckland	X
Incheon	X
Nadi	
Oakland	X
Tahiti	X

Table 1: December 2014 TSD Submitted to PARMO

2.2 **Large Height Deviation (LHD).** A cumulative 12-month data set of LHD reports was used, covering January to December 2014. **Table 2** indicates those FIRs which submitted LHD reports including nil returns. **Appendix A** provides details of the non-nil LHD reports.

Name of FIR	Anchorage	Auckland	Incheon	Nadi	Oakland	Tahiti
Jan-14	X	X	X	X	X	X
Feb-14	X	X	X	X	X	X
Mar-14	X	X	X	X	X	X
Apr-14	X	X	X	X	X	X
May-14	X	X	X	X	X	X
Jun-14	X	X	X	X	X	X
Jul-14	X	X	X	X	X	X
Aug-14	X	X	X	X	X	X
Sep-14	X	X	X	X	X	X

Name of FIR	Anchorage	Auckland	Incheon	Nadi	Oakland	Tahiti
Oct-14	X	X	X	X	X	X
Nov-14	X	X	X	X	X	X
Dec-14	X	X	X	X	X	X

Table 2: Summary of LHD Reports submitted by FIRs

3. Summary of LHD Occurrences

3.1 Pacific RVSM Airspace

3.2 **Table 3** and **Figure 1** summarize the number of LHD occurrences assessed and associated LHD duration (in minutes) or number of levels crossed by month from 1 January 2014 to 31 December 2014 inclusive for Pacific airspace.

Month-Year	No. of Non-NIL LHD	LHD Duration (min)	No. Levels Crossed
2014			
January	1	5	0
February	1	2	2
March	2	5	1
April	2	6	6
May	5	18	1
June	7	21	12
July	6	20	4
August	3	2	7
September	2	0	0
October	0	0	0
November	2	2	0
December	6	7	6
Total	37	88	39

Table 3: Summary of non-NIL LHD occurrences and duration for Pacific RVSM airspace – Calendar Year 2014

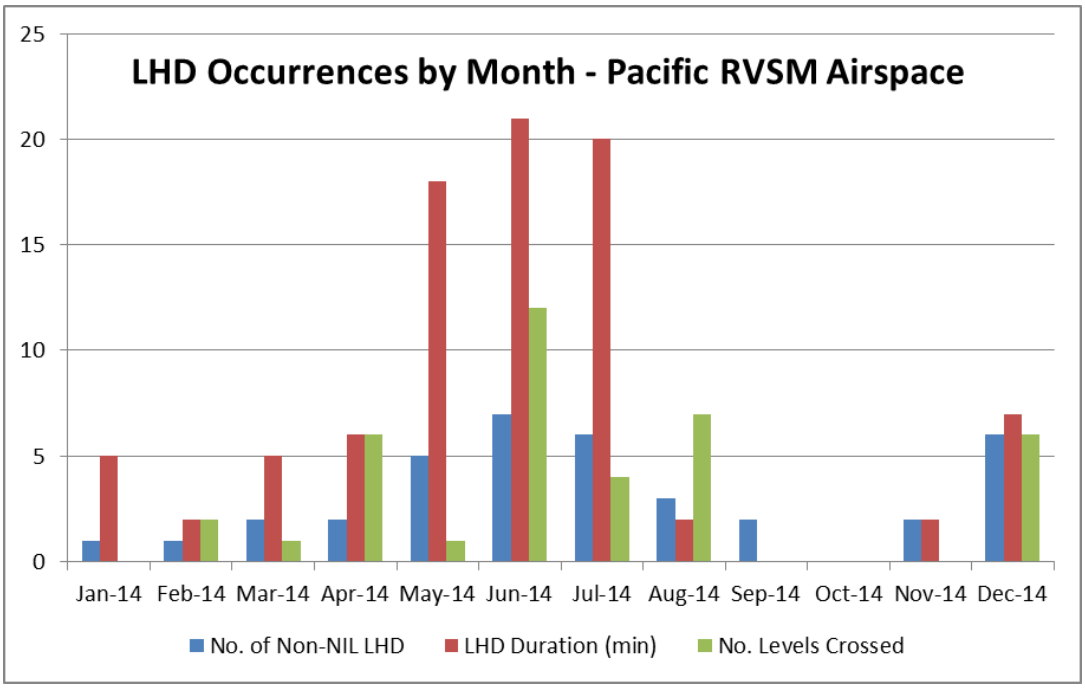

Figure 1: Summary of LHD occurrences by month for Pacific RVSM airspace – calendar year 2014

3.3 The LHD reports provided to the PARMO indicated there were 88 minutes of operation at incorrect flight level. For comparison, during calendar year 2013, the LHD reports received by the PARMO included more than 239 minutes of operation at incorrect flight level. There were more than double the number of non-nil LHD reports received by the PARMO during calendar year 2014 compared to 2013, e.g. 37 non-nil LHD reports in calendar year 2014 versus 16 in 2013.

3.4 **Table 4** and **Figure 2** summarize the number of LHD occurrences, the associated LHD duration (in minutes) and number of flight levels crossed without clearance, by LHD category from 1 January 2014 to 31 December 2014 inclusive for Pacific RVSM airspace. **Figure 3** provides a chart with the estimated locations of the non-nil LHD reports.

LHD Category Code	LHD Category Description	No of LHD Occurrences	LHD Duration (Min)	No. of Flight Levels Transitioned Without Clearance	Operational Risk (x 10-9)
A	Flight crew failing to climb/descend the aircraft as cleared;	3	5	4	0.28
B	Flight crew climbing /descending without ATC clearance;	16	33	16	1.44
C	Incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearance etc.)	1	3	0	0.12

LHD Category Code	LHD Category Description	No of LHD Occurrences	LHD Duration (Min)	No. of Flight Levels Transitioned Without Clearance	Operational Risk (x 10-9)
D	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);	4	7	2	0.46
E	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters);	9	33	0	1.03
F	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues;	0	0	0	0
G	Aircraft contingency event leading to sudden inability to maintain assigned flight level (e.g. pressurization failure, engine failure);	1	0	5	0
H	Airborne equipment failure leading to unintentional or undetected change of flight level (e.g. altimetry errors)	0	0	0	0
I	Turbulence or other weather related causes	1	2	2	0.099
J	TCAS resolution advisory; flight crew correctly following the resolution advisory	1	0	0	0
K	TCAS resolution advisory; flight crew incorrectly following the resolution advisory	0	0	0	0
L	An aircraft being provided with RVSM separation is not RVSM approved (e.g. flight plan indicating RVSM approval but aircraft not approved, ATC misinterpretation of flight plan);	1	5	0	0.25
M	Other	0	0	0	0
	Totals	**37**	**88**	**29**	**3.68**

Table 4: 12-month cumulative operational risk associated with LHD reports by LHD category for Pacific RVSM airspace - 2014

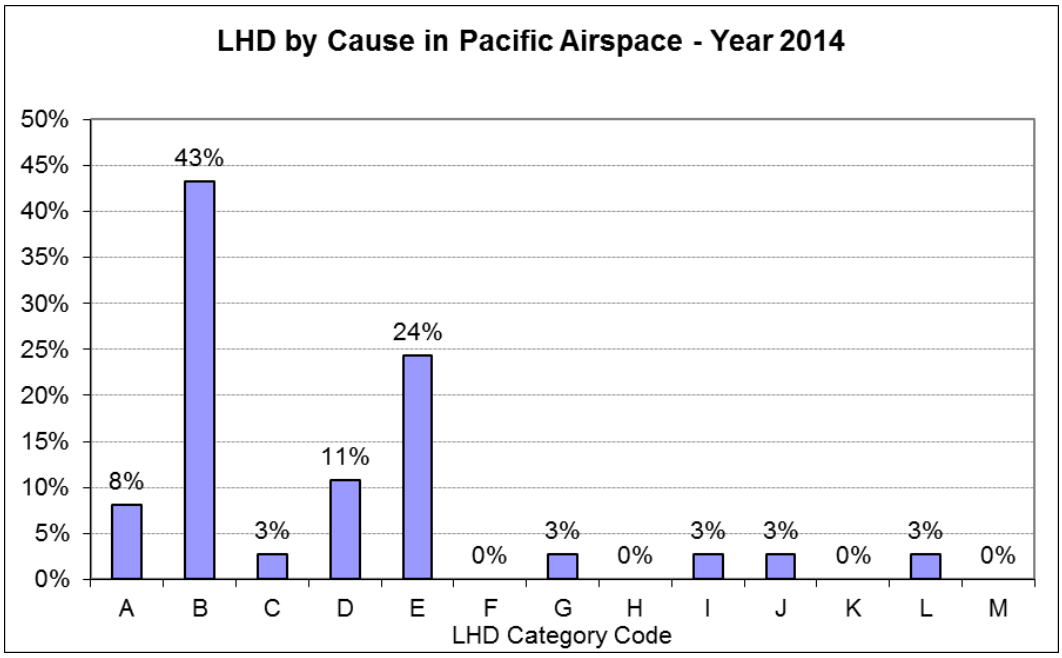

Figure 2: Summary of LHD causes for Pacific RVSM airspace

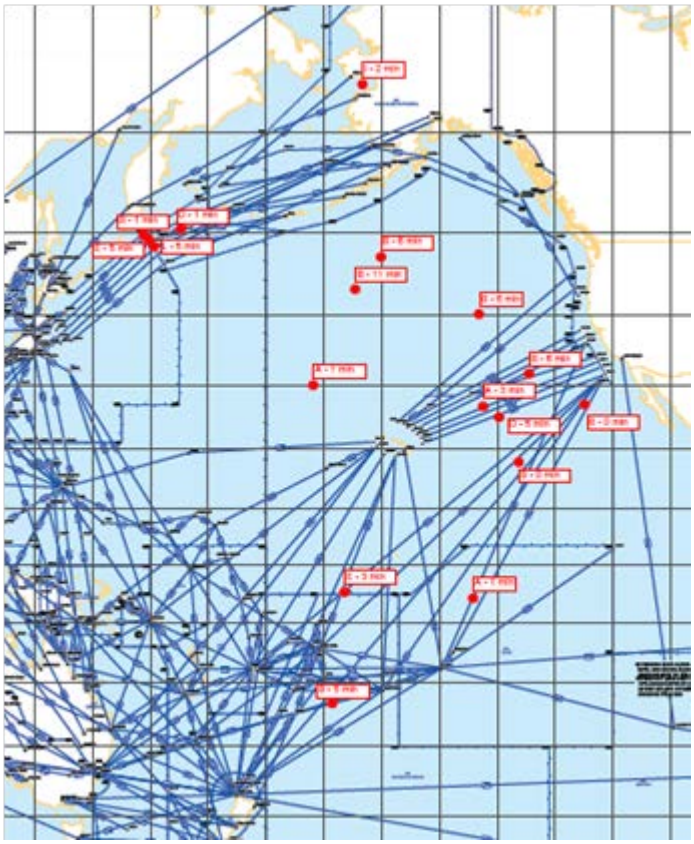

Figure 3: Pacific RVSM airspace LHD locations - 2014

3.5 **Figure 4** presents a summary of 12-month cumulative operational risk associated with Large Height Deviation (LHD) reports by LHD category within Pacific airspace for the reporting period.

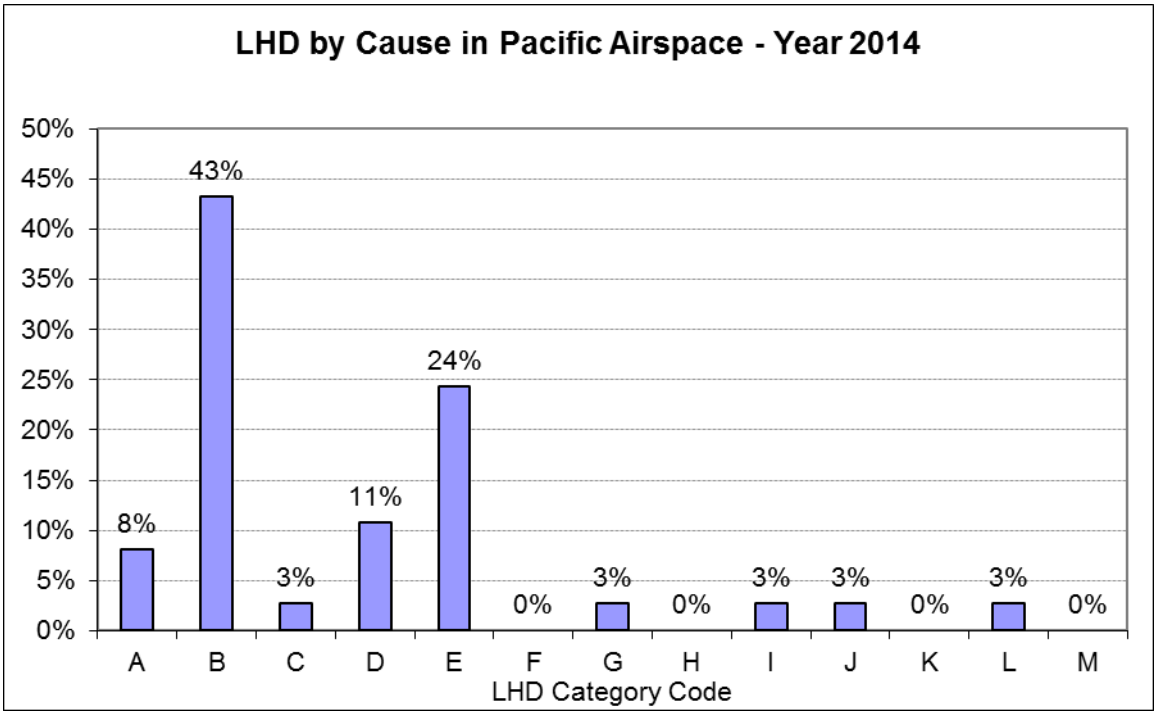

Figure 4: Operational risk composition and trend for Pacific RVSM airspace - 2014

3.6 North East Asia RVSM Airspace

3.7 **Table 5** and **Figure 5** summarize the number of LHD occurrences assessed and associated LHD duration (in minutes) or number of levels crossed by month from 1 January 2014 to 31 December 2014 inclusive for North East Asia airspace.

Month-Year	No. of Non-NIL LHD	LHD Duration (min)	No. Levels Crossed
2014			
January	0	0	0
February	0	0	0
March	0	0	0
April	1	1.33	1
May	0	0	0
June	0	0	0
July	2	0.73	2
August	0	0	0
September	0	0	0
October	0	0	0

November	0	0	0
December	0	0	0
Total	3	2.067	3

Table 5: Summary of non-NIL LHD occurrences and duration for North East Asia RVSM airspace

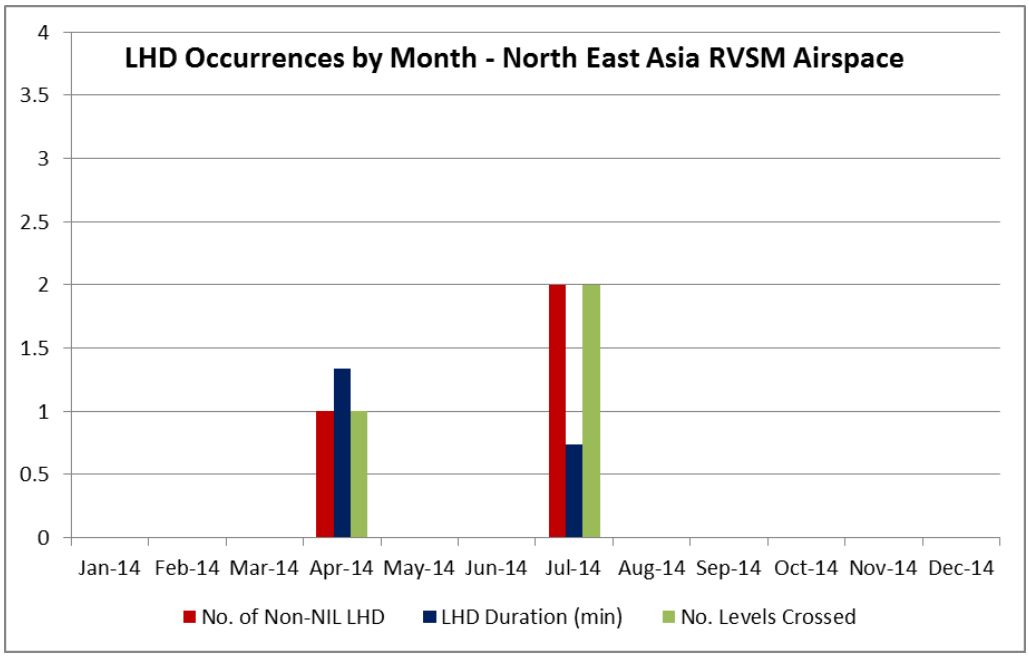

Figure 5: Summary of LHD occurrences (by month) for North East Asia RVSM airspace

3.8 **Table 6** and **Figure 6** summarize the number of LHD occurrences, the associated LHD duration (in minutes) and number of flight levels crossed without clearance, by LHD category from 1 January 2014 to 31 December 2014 inclusive for North East Asia RVSM airspace.

LHD Category Code	LHD Category Description	No of LHD Occurrences	LHD Duration (Min)	No. of Flight Levels Transitioned Without Clearance	Operational Risk (x 10^{-9})
A	Flight crew failing to climb/descend the aircraft as cleared;	0	0	0	0
B	Flight crew climbing /descending without ATC clearance;	1	1.33	1	2.4
C	Incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearance etc.)	0	0	0	0

LHD Category Code	LHD Category Description	No of LHD Occurrences	LHD Duration (Min)	No. of Flight Levels Transitioned Without Clearance	Operational Risk (x 10^{-9})
D	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message);	0	0	0	0
E	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters);	0	0	0	0
F	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues;	0	0	0	0
G	Aircraft contingency event leading to sudden inability to maintain assigned flight level (e.g. pressurization failure, engine failure);	0	0	0	0
H	Airborne equipment failure leading to unintentional or undetected change of flight level (e.g. altimetry errors)	0	0	0	0
I	Turbulence or other weather related causes	0	0	0	0
J	TCAS resolution advisory; flight crew correctly following the resolution advisory	2	0.73	2	1.32
K	TCAS resolution advisory; flight crew incorrectly following the resolution advisory	0	0	0	0
L	An aircraft being provided with RVSM separation is not RVSM approved (e.g. flight plan indicating RVSM approval but aircraft not approved, ATC misinterpretation of flight plan);	0	0	0	0
M	Other	0	0	0	0
	Totals	**3**	**2.067**	**3**	**3.72**

Table 6: Summary of LHD occurrences and duration by LHD category for North East Asia RVSM airspace

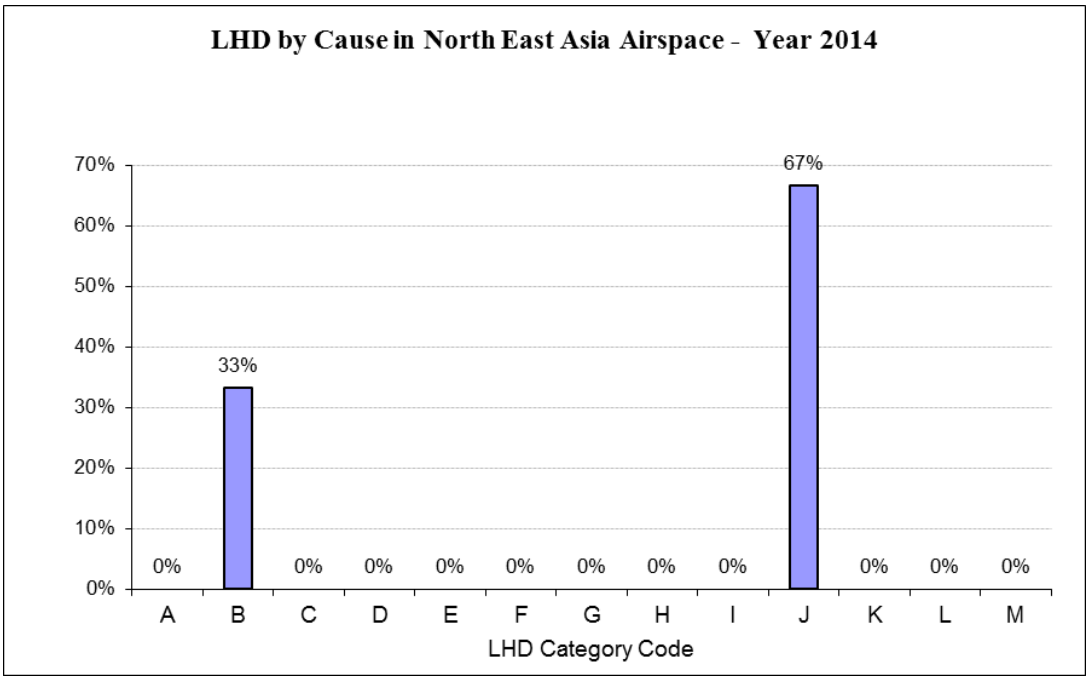

Figure 6: Summary of LHD causes for North East Asia RVSM airspace

4. Risk Assessment and Safety Oversight

4.1 Pacific RVSM airspace

4.2 Collision Risk Model (CRM) Parameters

4.3 The value of the parameters in the CRM used to estimate risk in Pacific RVSM airspace, are summarized in **Table 7**.

Parameter	Description	Value
$\overline{\lvert\Delta V\rvert}$	Average relative same-direction speed	13 Knots
$\overline{\lvert V\rvert}$	Average aircraft speed	480 knots
$\overline{\lvert\dot{y}\rvert}$	Average relative cross-track speed	5 knots
$\overline{\lvert\dot{z}\rvert}$	Average relative vertical speed during loss of vertical separation	1.5 knots
$P_z(0)$	Probability two aircraft at the same nominal level are in vertical overlap	0.538

Table 7: Estimates of the parameters in the CRM for Pacific RVSM airspace

4.4 **Risk Estimation Results.** The results for the technical, operational, and total risk for the RVSM implementation are detailed in **Table 8**. The technical risk meets the agreed TLS value of no more than 2.5×10^{-9} fatal accidents per flight hour due to the loss of a correctly established vertical separation standard of 1,000 ft and to all causes. **The operational and weighted total risk meets the specified TLS value** for these components of 5.0×10^{-9} fapfh.

Pacific RVSM Airspace -estimated annual flying hours = 1,669,658 hours (note: estimated hours based on December 2014 traffic sample data)			
Source of Risk	**Risk Estimation**	**TLS**	**Remarks**
RASMAG 19 Total Risk (Previous RASMAG)	**8.05×10^{-9}**	**5.0×10^{-9}**	**Above the TLS**
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Total Risk	**3.86×10^{-9}**	**5.0×10^{-9}**	**Below the TLS**

Table 8: Pacific Airspace Risk Estimates

4.5 **Figure 7** presents the trends of collision risk estimates for each month using the appropriate cumulative 12-month data set of LHD reports.

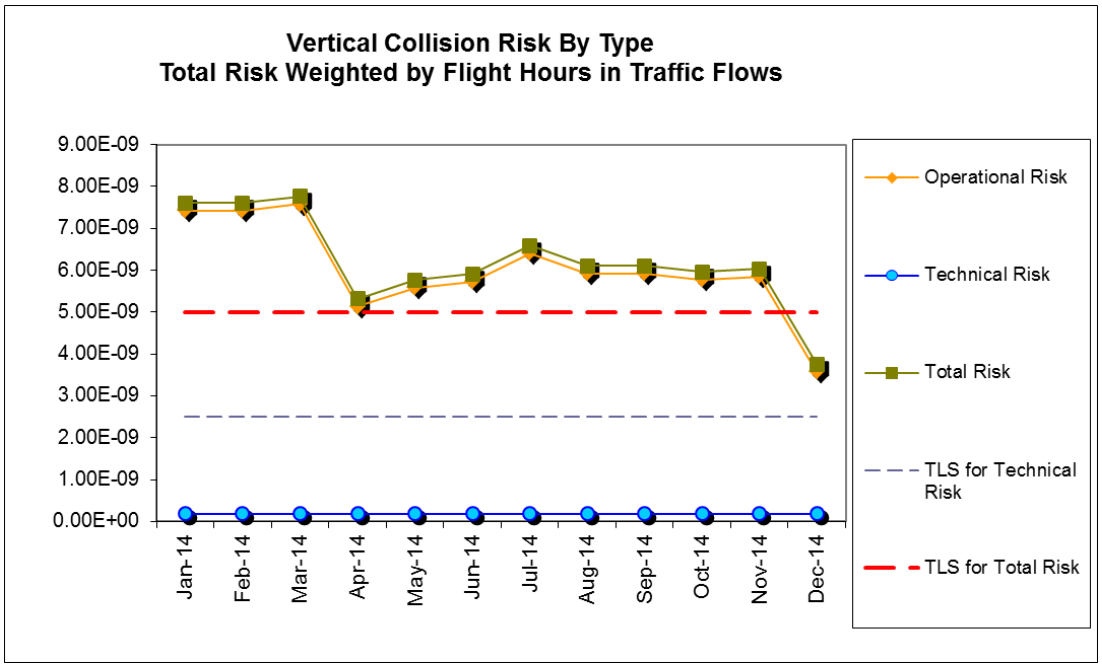

Figure 7: Trends of Risk Estimates for Pacific RVSM Airspace

4.6 North East Asia RVSM airspace

4.7 Collision Risk Model (CRM) Parameters

4.8 The value of the parameters in the CRM used to estimate risk in North East Asia RVSM airspace, are summarized in **Table 9**.

Parameter	Description	Value
λ_x	Average aircraft length	0.028 NM
λ_y	Average aircraft wingspan	0.025 NM
λ_z	Average aircraft height	0.008 NM

Parameter	Description	Value
$\overline{\lvert\Delta V\rvert}$	Average relative same-direction speed	38.3 Knots
$\overline{\lvert V\rvert}$	Average aircraft speed	480 knots
$\overline{\lvert\dot{y}\rvert}$	Average relative cross-track speed	5 knots
$\overline{\lvert\dot{z}\rvert}$	Average relative vertical speed during loss of vertical separation	1.5 knots
$P_z(0)$	Probability two aircraft at the same nominal level are in vertical overlap	0.538

Table 9: Estimates of the parameters in the CRM for North East Asia RVSM airspace

4.9 **Risk Estimation Results.** The results for the technical, operational, and total risk for the RVSM implementation are detailed in **Table 10**. The technical risk meets the agreed TLS value of no more than 2.5×10^{-9} fatal accidents per flight hour due to the loss of a correctly established vertical separation standard of 1,000 ft and to all causes. **The operational and weighted total risk meets the specified TLS value** for these components of 5.0×10^{-9}.

North East Asia RVSM Airspace -estimated annual flying hours = 99,984 hours (note: estimated hours based on December 2014 traffic sample data)			
Source of Risk	**Risk Estimation**	**TLS**	**Remarks**
RASMAG 18 Total Risk (Previous RASMAG)	**0.60×10^{-9}**	**5.0×10^{-9}**	**Below the TLS**
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Operational Risk	**3.72×10^{-9}**		
Total Risk	**4.13×10^{-9}**	**5.0×10^{-9}**	**Below the TLS**

Table 10: North East Asia RVSM Airspace Risk Estimates

4.10 **Figure 8** presents the trends of collision risk estimates for each month using the appropriate cumulative 12-month data set of LHD reports.

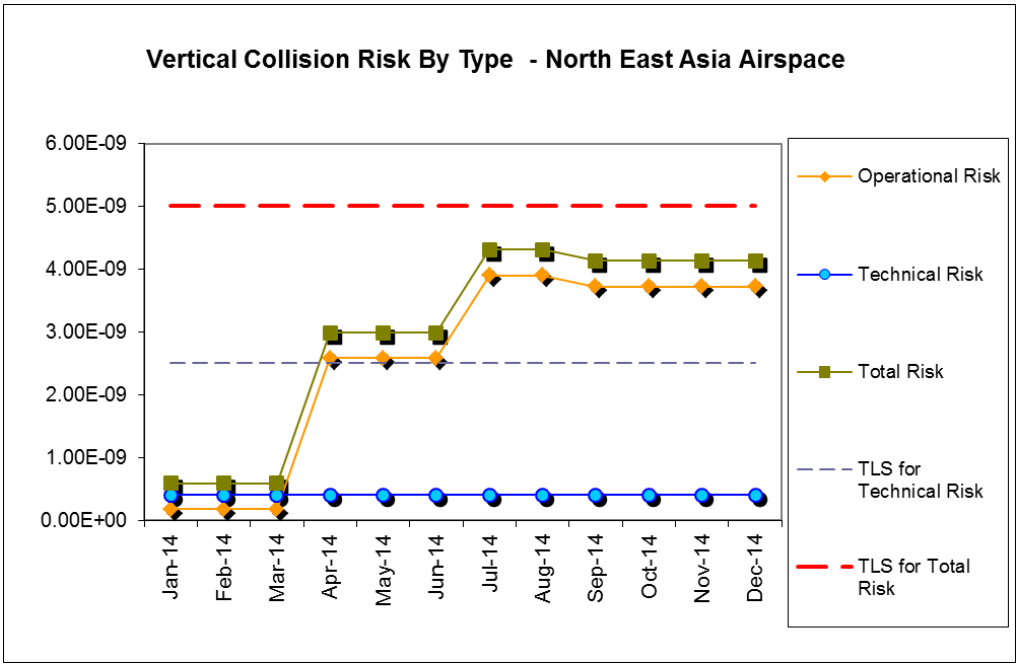

Figure 8: Trends of Risk Estimates for North East Asia RVSM Airspace

Appendix A to AIRSPACE SAFETY REVIEW

Details of the Reported LHD Events

Event date	Assigned FL	Observed / Reported FL	Duration at incorrect FL	Levels Crossed	Cause	Location	Airspace	Category
1-Jan-14	FL340BFL350	FL360	Unknown	0	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters);	SOPAC	Pacific	E
12-Feb-14	FL350	Between FL330 and FL340	2 minutes	2	Turbulence or other weather related causes	Alaska	Pacific	I
27-Feb-14	FL340	FL320	47 minutes	0	Flight crew failing to climb/descend the aircraft as cleared;	Arctic	Pacific	A/D
9-Mar-14	FL340	FL350	5 minutes	1	ARINC issued incorrect climb clearance - was supposed to be to FL340, but ac was told to go to FL350	CEP	Pacific	D
11-Mar-14	FL380	FL377	0 minutes	0	Operator requested weather deviation and descended 300 ft without clearance	CEP	Pacific	B
2-Apr-14	FL301	FL309	80 seconds	1	Flight crew climbing /descending without ATC clearance;	NE Asia	NE Asia	B
12-Apr-14	FL340	FL327	0 minutes	5	emergency descend - did not have time to offset	CEP	Pacific	G
20-Apr-14	FL340	FL350	6 minutes	0	Climb without clearance	CENPAC	Pacific	B
2-May-14	FL360	FL330	Unknown	0	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters); mix up with similar callsigns	SOPAC	Pacific	E/D

Event date	Assigned FL	Observed / Reported FL	Duration at incorrect FL	Levels Crossed	Cause	Location	Airspace	Category
2-May-14	FL330	FL370	Unknown	0	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters); mix up with similar callsigns	SOPAC	Pacific	E/D
14-May-14	FL390	FL400	3 minutes	0	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters);	SOPAC	Pacific	E
15-May-14	FL320	FL340	Unknown	0	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters);	SOPAC	Pacific	E
20-May-14	FL380	FL377	0 minutes	1	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message)	AUZ NZ Japan	Pacific	D
3-Jun-14	FL350	FL370	Unknown	1	Flight crew climbing /descending without ATC clearance;	CENPAC	Pacific	B
7-Jun-14	FL330	FL300	Unknown	0	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters)	SOPAC	Pacific	E
12-Jun-14	FL350	FL360	3 minutes	0	check CEDAR for description - pilot was given conditional clearance and climbed early	CEP	Pacific	A
12-Jun-14	FL350	FL360	1 minute	0	conditional clearance error - flight crew climb/descending without ATC clearance ?	CEP	Pacific	B
24-Jun-14	FL340	FL350	6 minutes	0	Flight crew climbing /descending without ATC clearance;	CENPAC	Pacific	B
25-Jun-14	FL400	FL220	0	11	Flight crew climbing /descending without ATC clearance;	CEP	Pacific	B

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29-Jun-14	FL360	FL360	1 minute	0	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message)	CENPAC	Pacific	D
6-Jul-14	FL320	FL313	22 seconds	1	TCAS resolution advisory; flight crew correctly following the resolution advisory	NE Asia	NE Asia	J
6-Jul-14	FL310	FL305	22 seconds	1	TCAS resolution advisory; flight crew correctly following the resolution advisory	NE Asia	NE Asia	J
12-Jul-14	FL400	FL400B410	3 minutes	0	Incorrect operation or interpretation of airborne equipment (e.g. incorrect operation of fully functional FMS, incorrect transcription of ATC clearance or re-clearance, flight plan followed rather than ATC clearance, original clearance followed instead of re-clearance etc.)	CENPAC	Pacific	C
17-Jul-14	FL410	FL410	Unknown	0	An aircraft being provided with RVSM separation is not RVSM approved (e.g. flight plan indicating RVSM approval but aircraft not approved, ATC misinterpretation of flight plan);	NOPAC	Pacific	L
19-Jul-14	FL380	FL370	Unknown	1	Flight crew climbing /descending without ATC clearance;	SOPAC	Pacific	B
27-Jul-14	-	FL370	Unknown	0	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters);	NOPAC	Pacific	E
31-Jul-14	FL380	FL400	1 minute	1	Flight crew failing to climb/descend the aircraft as cleared;	AUZ NZ Japan	Pacific	A
4-Aug-14	FL350	FL370	1 minute	3	Flight crew failing to climb/descend the aircraft as cleared;	Hawaii/Japan	Pacific	A
6-Aug-14	FL340	FL300	0 minutes	4	Flight crew climbing /descending without ATC clearance;	SOPAC	Pacific	B
16-Aug-14	FL370	FL370	1 minute	0	ATC system loop error; (e.g. ATC issues incorrect clearance or flight crew misunderstands clearance message)	NOPAC	Pacific	D

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17-Aug-14	FL360	FL370	1 minute	0	Flight crew climbing /descending without ATC clearance;	CENPAC	Pacific	B
16-Sep-14	FL390	FL400	0 minutes	0	Flight crew climbing /descending without ATC clearance;	CENPAC	Pacific	B
28-Sep-14	FL320	FL340	0 minutes	0	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters)	NOPAC	Pacific	E
8-Nov-14	FL340	FL350	2 minutes	0	Flight crew climbing /descending without ATC clearance;	CENPAC	Pacific	B
25-Nov-14	None	FL350	0 minutes	0	Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters)	NOPAC	Pacific	E
6-Dec-14	Unknown	FL340	1 minute	1	Flight crew climbing /descending without ATC clearance;	CENPAC	Pacific	B
11-Dec-14	FL290	FL320	0 minutes	3	Flight crew climbing /descending without ATC clearance;	SOPAC	Pacific	B
12-Dec-14	FL290	FL319	5 minutes	2	Flight crew climbing /descending without ATC clearance;	CEP	Pacific	B
17-Dec-14	FL360	FL350	1 minutes	0	Flight crew climbing /descending without ATC clearance;	NOPAC	Pacific	B
24-Dec-14	FL330	FL333	0 minutes	0	Flight crew climbing /descending without ATC clearance;	CENPAC	Pacific	B
31-Dec-14	FL330	FL333	0 minutes	0	TCAS resolution advisory; flight crew correctly following the resolution advisory	NOPAC	Pacific	J
