Civil Aviation Department

Safety Management System: An ANSP's Perspective

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Chief, Air Traffic Management Standards
Hong Kong CAD

Civil Aviation Department

ICAO Annex 19

Air Traffic Services Providers are required to implement an SMS

A recap of ICAO SMS framework:

- 4 components
- 12 elements

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ICAO SMS framework

1. **Safety policy and objectives**
   - 1.1 – Management commitment and responsibility
   - 1.2 – Safety accountabilities
   - 1.3 – Appointment of key safety personnel
   - 1.4 – Coordination of emergency response planning
   - 1.5 – SMS documentation
2. **Safety risk management**
   - 2.1 – Hazard identification
   - 2.2 – Safety risk assessment and mitigation
3. **Safety assurance**
   - 3.1 – Safety performance monitoring and measurement
   - 3.2 – The management of change
   - 3.3 – Continuous improvement of the SMS
4. **Safety promotion**
   - 4.1 – Training and education
   - 4.2 – Safety communication

Hong Kong Experience

- ATS implemented SMS since 2009
- With the framework in place and SMS becoming mature, ongoing safety management activities requiring recurrent resources & continuous efforts are:
  - Safety assurance, esp. management of change
  - Safety promotion

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ICAO SMS framework

1. **Safety policy and objectives**
   - 1.1 – Management commitment and responsibility
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ICAO Doc 9859 SMM

3.2 – The management of change

- The service provider shall develop and maintain a **formal process to identify changes** which may affect the level of safety risk associated with its aviation products or services and to **identify and manage the safety risks that may arise** from those changes.

3.2 – The management of change

- Change due to a number of factors including, but not limited to :
  - Organizational expansion or contraction
  - Change to internal systems, processes or procedures
  - Changes to the operating environment

3.2 – The management of change

- Change may :
  - affect the appropriateness or effectiveness of existing safety risk mitigation strategies
  - Introduce new hazards and safety risks into an operation

3.2 – The management of change

- The management of change process should consider :
  - ***Criticality***. Criticality assessments determine the components that are essential to the safe operation of aircraft. Systems, equipment and activities that have higher safety criticality should be reviewed following change to make sure that corrective actions can be taken to control potentially emerging safety risks.

3.2 – The management of change

- The management of change process should consider (cont'd) :
  - ***Stability of systems and operational environments***. **Planned** – organizational growth or contraction, expansion of products or services, introduction of new technologies, etc.

    Unplanned – economics cycles, labour unrest, changes to the political, regulatory or operating environments, etc.

3.2 – The management of change

- The management of change process should consider (cont'd) :
  - ***Past performance***. Past performance of critical systems and **trend analyses** in the safety assurance process should be employed **to anticipate and monitor** safety performance under situation of change.

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Hong Kong ANSP Change Management

Regulatory requirements for ANSP in HK to manage changes

The ANSP should put in place:

- A formal and documented change management procedure…which includes activities of hazard ident, risk analysis, mitigation, and regular evaluation
- Processes to identify, analyze & mitigate any hazard brought about by significant changes to the existing ANS system
- A document management system to record changes in policies, procedures, actions etc.

ANSP Practice

Safety Case Assessment & Reporting System (SCARS)

- The process adopted by ANSP for changes to
  - service levels
  - procedures
  - equipment

which may affect the performance, function or technical specification of a system, facility or service

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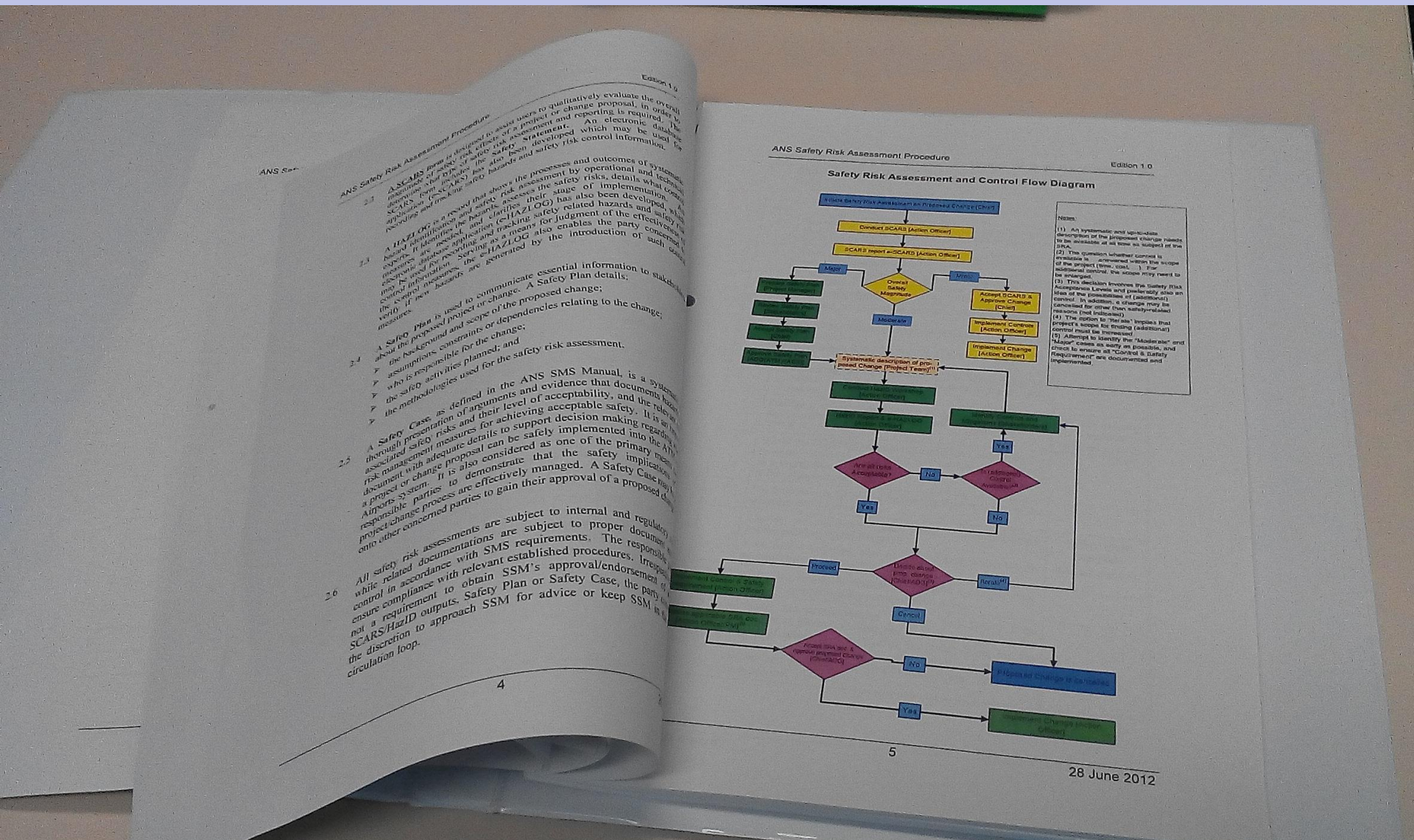
ANS Safety Risk Assessment Procedure



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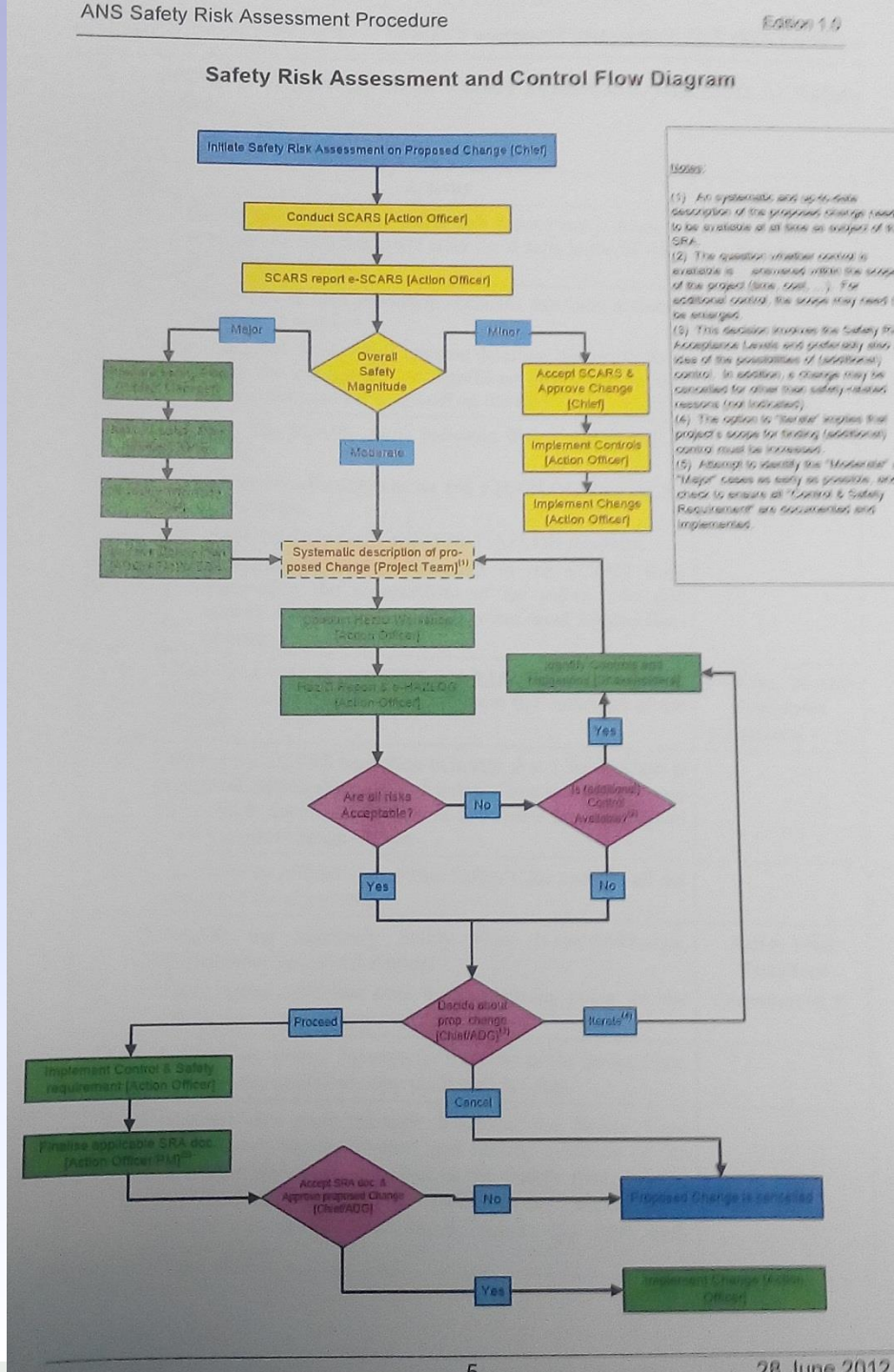
Safety Risk Assessment & Control Flow Diagram

- documented process to conduct safety risk assessment



An Example – Implementation of RNP AR APCH Procedures in Nov 2013

- RNP AR APCH RWY07R, RWY25L via TD/ MIRRS, RWY25L via GUAVA
  - Design completed in January
  - Flight Simulator completed in April
  - Flight Validation completed in May
  - **SCARS workshop on 27 August**
  - Publication on 19 September 2013
  - Implementation on 14 November 2013

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SCARS Workshop

Participants :

- Facilitator
- Project officers
- Airline representatives
- Safety manager
- Air traffic controllers
- Electronic engineers
- Safety & quality officer
- Officers from other relevant Division/Section etc.

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SCARS Workshop

A SCARS Session Information Bulletin was sent to participants in advance for their study as background info

4.3 The latter 2 RNP AR APCH procedures, via GUAVA for RWY25L/R (GUAVA approach) are developed to enhance environment and accessibility. In contrast to the current RWY25 approach (ILS or RNP) procedures which commence via TD/ MIRRS, the GUAVA approaches are routing via West Lamma Channel to join the final of RWY25 approximately 5NM from touch down.

4.4 The nominal tracks of GUAVA approach are designed to stay away from residential area to the maximum extend while conducting the approach procedures safely. Therefore, the procedures can minimize the noise impact to the public. At the same time, the GUAVA approach can enhance the accessibility when bad weather condition gathering over Kowloon peninsular which may prohibit aircraft to commence ILS or RNP AR APCH via LOTUS/ RIVER. Also, with the RNP capability to conduct Continuous Descent Operation (CDO), fuel burn and emission may be reduced. Thus, our environment should benefit from these procedures.

4.5 To ensure a smooth implementation, the new procedures will be implemented in 2 phases. First, in this initial phase, the 4 RNP AR APCH procedures will be implemented as backup procedures for ILS approach to allow both ATC and Operators to familiar the procedures and handling. When the industry is getting ready (for example, over 90% of flight is capable to conduct the AR APCH), then CAD may consider employing RNP AR APCH, especially GUAVA approach to enhance our services.

4.6 RNP AR APCH comes with more stringent requirement on airline approval application, ATC operation and procedure design. For AR procedures, special approval from Hong Kong CAD is required. Therefore staging the implementation into 2 phases can pave a smoother way for later full scale implementation of RNP AR APCH.

5 Brief Description of the Proposal Design:

5.1 The nominal track of RNP AR APCH RWY07R and RWY25L via TD/ MIRRS is an overlay of current ILS approach procedures for RWY07R and RWY25L. Handling of these procedures would be the same as the implemented RNP AR APCH RWY07L and RWY25R.

5.2 GUAVA approach (RWY25L/R) is routing via West Lamma Channel then over North East Lantau Island to join the final of RWY25L/R (around 5NM) with RNP0.3NM requirement during Intermediate Approach, Final approach and Missed approach phases (the rest are RNP 1.0NM).

5.3 From ATC operation perspective, the vertical and speed profile of GUAVA approaches are very similar to the ILS approach or RNP AR APCH via TD/ MIRRS in order to allow ATC to familiar with the procedures earlier.

-END-

A powerpoint presentation was arranged at the 1st session of the workshop to brief participants:

- Rundown of the workshop
- CAD safety assessment process
- Description of the project background
- Design proposal

Flight Sim April 2013

- RNP AR APCH RWY25L
  - via GUAVA
  - via TD/ MIRRS
- RNP AR APCH RWY07R
- Worst scenario tested
  - Max crosswind for B777-300ER
  - Max landing weight
  - High temperature (38^0C)

Workshop Outcome

- The whole process of the workshop
- Agreed assessment outcome
- Proposed mitigating measures

are recorded in the SCARS template

Safety Case Assessment and Reporting System (SCARS) Template

The SCARS form shall be used as part of the safety risk assessment process, to identify, analyze and mitigate any hazards arising from significant projects/changes to existing ATM system components, including procedures, equipment/systems, manpower, training or work environment.

This form shall be completed by a person or persons with specialist knowledge about the proposed change along with other stakeholders. It shall be certified by the Project Manager and accepted by the Chief of the Section who initiates the project/change when he/she is satisfied that the SCARS activities have been properly carried out with the safety risks mitigated to an acceptable level. The process is considered complete only after a critical review of the SCARS process and outcomes has been conducted (refer to Step 8 below).

Introduction:
This form shall be used to determine the safety magnitude of a project/change and the type of safety report required to be produced and the associated requirements for decision making.

(Note: Refer to Appendix 1 to this Attachment for guidelines to be followed for the proper conduct of SCARS)

File Number OPS/27/5	c.c. **SMS/4**

Project Title	Implementation of 4 RNP AR APCH	ANSP's SCARS or e-SCARS Reference	
Project Description	***Implementation of 4 RNP AR APCH procedures in November 2013 is to enhance safety, accessibility and environment of Hong Kong International Airport (HKIA). There are 4 procedures to be implemented. For the 2 similar to ILS APCH (RWY07R and RWY25L), the changes should be considered to be minimal. The other 2 approach procedures which are routing via West Lamma Channel for RWY25L/R have major advantage on accessibility and environmental friendly. But it may contribute more workload to ATC if executed during daytime. Thus, procedures are to be implemented in 2 phases to limit the scale of change. First phase is aiming to both controllers and operators for familiar with the RNP AR procedures. Procedures are considered to be "secondary" at this stage. Only those ready (both ATC and operators) can conduct the procedures. When more airlines (e.g.90% of movement) and corresponding ATC procedures are ready, then Hong Kong CAD may consider next phase of implementation.***		

Step 1: Assess the SIZE OF THE CHANGE

Complete the following questions to determine the size of the change. For each question, choose a rating from 1 (Low) to 7 (High) and provide justification.

NOTE: These questions are not definitive and are aimed at providing a generalised framework for the initial assessment of the overall magnitude of the change.

No.	Description	Ratings
1	**Assess the level of *new functionality* being introduced or removed by the proposed project/change, as compared to the existing system, facility or service.** *Will the new system enhance/reduce existing functionality? or provide different functionality? Consider new technology.*	1 **2** 3 4 5 6 7
Justification: Deployment of existing technology equipped on board No new skills or technology required for ATC controllers		

2	**Assess the significance (scope/scale) of the project/change *within* ANSP.** *Consider the number of work areas affected. Also consider disciplines, systems, locations, business processes and organisation structures.*	1 2 **3** 4 5 6 7
Justification: RNP AR APCH which are overlay of existing conventional procedures – low significance. RNP AR APCH via GUAVA – more coordination is required, specific approval to individual flight is required. Addition of new routes to AMAN would be required to facilitate automated calculation of arrival sequence.		

3	**Assess the significance (scope/scale) of the project/change *outside* ANSP.** *Consider the number of services, users and/or stakeholders affected, including the interfaces between these parties, e.g. government departments, customers and other ANSPs.*	1 2 3 **4** 5 6 7
Justification: Affect airlines, people on the ground, regulatory body.		

4	**Assess the safety significance of the systems, facilities or services affected by the project/change.** *Consider for example surveillance and communications systems, data systems, AFTN, Runways, Taxiways and any organisation systems such as safety reporting etc (People/Procedures/Technology)*	1 **2** 3 4 5 6 7
Justification: Minimal changes to existing procedures, facilities and services. Compliance on requirements from regulatory authority.		

5	**Assess the *training components and needs* associated with implementing the project/change?** *Consider type of training required (e.g. classroom or simulation), duration, resources, person involved, competency requirements, etc.*	1 2 **3** 4 5 6 7
Justification: ATC – training not required for this phase of implementation, briefing has been provided during the trial phase. Operators – In this phase of implementation, the new procedures are not mandatory. Training need is minimal.		

6	**Assess the complexity of the *transition* from the existing system, facility or service *(only in relation to this project/change)*** *Consider resources available, planning, documentation, timelines, duration, approvals, contingency arrangements, organisational changes, multiple locations, etc.*	1 **2** 3 4 5 6 7
Justification: As far as prior notice is sufficient, transition should be simple. Low complexity expected as the trial operation commenced since Jun 2012.		

7	**Size of Project/Change Rating.** Total the scores from questions 1 to 6 above and compare to the values below.		**TOTAL = 17**
	Select the resultant size.		Small
	Small = 1 to 18	**Medium = 19 to 30**	**Large = 31 to 42**

Step 2: Assess the SAFETY OUTCOME OF THE CHANGE

Project Title: Implementation of 4 RNP AR APCH

To assess the safety outcome of the project/change, conduct a preliminary hazard analysis to determine the likely hazards that may result from the project/change and complete the table below. Give consideration to scale of the potential for severe effects, choose a rating from 1 (Low) to 7 (High) for each hazard identified.

Hazard Description & Existing / Planned Controls

Hazard 1 Description

Loss of RNP (e.g. GNSS signal) during any phase of approach

Existing Controls

1 *Radar vectors and advisory to be provided by ATC as far as practicable*
2
3

Planned Controls *[those planned on the basis of the identified hazard(s)]*

1 *Operators' SOPs*
2
3

Effect on work units:	APP/TMC/ AREA	ADC	AIC	RCC	ANC	Others:	
(Please tick ✓)	✓	✓	✓				
Effect on End Users:	**Aircrew**	**Pax**	**Ops**	**Eng.**	**Maint.**	**Others:** (e.g. AAHK, AEC, Apron, AMO, etc)	
(Please tick ✓)	✓		✓				
Overall Rating	1	2	3	4	5	6	7
(Please tick ✓)		✓					

Hazard 2 Description

Late ATC approval / notification for RNP AR APCH may increase crew workload

Existing Controls

1
2
3

Planned Controls *[those planned on the basis of the identified hazard(s)]*

1 *Should nominate the latest point/time that ATC is recommended not to change the expected approach procedure*
2
3

Effect on work units:	APP/TMC/ AREA	ADC	AIC	RCC	ANC	Others:	
(Please tick ✓)	✓	✓					
Effect on End Users:	**Aircrew**	**Pax**	**Ops**	**Eng.**	**Maint.**	**Others:**	
(Please tick ✓)	✓						
Overall Rating	1	2	3	4	5	6	7
(Please tick ✓)		✓					

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Hazard 3 Description

Integration of GUAVA APCH with straight-in APCH for RWY 25

Existing Controls

1 *Recommended spacing and ATC handling between flights joining from different approaches has been promulgated to controllers during trial phase of GUAVA approach*

2

3

Planned Controls *[those planned on the basis of the identified hazard(s)]*

1 *Review recommended spacing by means of radar simulation*

2

3

Effect on work units:	APP/TMC/ AREA	ADC	AIC	RCC	ANC	Others:	
(Please tick ✓)	✓						
Effect on End Users:	Aircrew	Pax	Ops	Eng.	Maint.	Others:	
(Please tick ✓)	✓						
Overall Rating	1	2	3	4	5	6	7
(Please tick ✓)			✓				

Hazard 4 Description

Existing Controls

1

2

3

Planned Controls *[those planned on the basis of the identified hazard(s)]*

1

2

3

Effect on work units:	APP/TMC/ AREA	ADC	AIC	RCC	ANC	Others:	
(Please tick ✓)							
Effect on End Users:	Aircrew	Pax	Ops	Eng.	Maint.	Others:	
(Please tick ✓)							
Overall Rating	1	2	3	4	5	6	7
(Please tick ✓)							

(Note: Use separate paper to document as above other hazards identified, if any)

Hazards Rating Calculation	Rating
Hazard 1	*1.6*
Hazard 2	*1.2*
Hazard 3	*2.3*
Hazard 4	
Hazard 5	
Total Score	**6**

(Note: In case there is/are individual hazard(s) with rating "5" or above, such hazard(s) should be highlighted explicitly to the Project Manager/Chief of the Section concerned recommending a critical review on the hazard(s) and implementation of necessary mitigation.)

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Enter the estimated Safety Outcome of the change.		
Result: *(Please tick ✓)*		
Substantial:		*73% or more*
Reasonable:		*45% - 72%*
Minimal:	✓	*Up to 44%*

Equation for Percentage:

$$\frac{\text{Total score (S)}}{\text{7 x No. of Hazards (3)}} \times 100 = 23\%$$

(divided by)

Safety Outcome Result:

Substantial:	73% or more
Reasonable:	45% - 72%
Minimal:	Up to 44%

(Note: In case of estimated Safety Outcome being 60% or more, the PM will need to be consulted in determining the level of safety report to be prepared (Step 4 refers) for the change.)

List all persons assisting in the analysis process:

Include representatives from all significant stakeholder groups as appropriate

Name	Position
	CAD – ATMD : SEVO
	CAD – ATMD : EVO
	CAD – ATMD : EVO
	CAD – ATMD : SSM
	CAD – ATMD : SQO
	CAD – ATMD : ATCO
	CAD – ATMD : ATCO
	CAD – FSAD : FOI
	CAD – FSAD : SAO
	CAD – FSAD : SO
	CAD – APSD : SOO (Environment)
	CAD – APSD : OO
	CAD – AESD : SEE
	CAD-AESD : EE
	Cathay Pacific : Pilot
	Cathay Pacific: Pilot
	Cathay Pacific : Engineer
	Dragonair : Pilot
	Dragonair : Engineer

SCARS/PHA workshop	Date	Time
Implementation of 4 RNP AR APCH	27th Aug 2013	0900- 1330

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Step 3: Assess the OVERALL SAFETY MAGNITUDE OF THE CHANGE
The Overall Safety Magnitude of the Change is a combination of the size of the change **and** the safety outcome of the change. Apply the results obtained from Steps 1 and 2 to the matrix below and tick the appropriate box to determine the Overall Safety Magnitude of the Change.

Overall Safety Magnitude of the Change			
Overall Change Magnitude	Safety Outcome of the Change		
Size of the Change	Substantial	Reasonable	Minimal
Large	Major ☐	Major ☐	Moderate ☐
Medium	Major ☐	Moderate ☐	Minor ☐
Small	Moderate ☐	Moderate ☐	Minor ☑

Step 4: Safety Reporting Determination
Tick the box in the table below to indicate the type of safety report to be prepared for the change.

Overall Safety Magnitude of Project/Change		To be reported as.....
Major	☐	Safety Case + Safety Plan + HAZLOG
Moderate	☐	Safety Statement + HAZLOG
Minor	☑	Safety Statement

Step 5: Safety Statement (For Minor or Moderate Change) (to be completed by the Facilitator)

Name:	Position:	Signature/Date:
Joe Lam	EVO(6)	25th Sept., 2013

Statement:

*I/We confirm that application of the processes described above resulted in the classification that the proposed project/change is of a **Minor** safety magnitude. The safety implications of the proposed change have been identified and documented above. The planned/existing controls will be maintained, reviewed and updated via SCARS or e-SCARS system.*

*I/We confirm that application of the processes described above resulted in the classification that the proposed project/change is of a **Moderate** safety magnitude. The safety implications of the proposed change have been identified and the hazards will be addressed through HazID workshop. The safety risk controls will be maintained, reviewed and updated via HAZLOG or e-HAZLOG system.*

(Note: For "Moderate" safety magnitude project/change, a HAZLOG report is required)

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Step 6: Certification and Recommendation (to be completed by the Project Manager)

(Note: In case the Project Manager considers certification of the SCARS session is not in order, he/she should take appropriate action(s), including the conduct of another SCARS session, to clarify issues and/or acquire more information or data, so as to enable him/her to properly carry out the certification.)

I certify that the SCARS session was conducted in accordance with prescribed procedures to assure safety of the project/change, and recommend for your (Section Chief) consideration acceptance of the result of the SCARS session.

Name:	Position:	Signature/Date:

Step 7: Acceptance (to be completed by Chief of the Section who initiates the proposed change/project)

I accept the result of the SCARS session. The planned/existing controls identified, subject to approval, shall be reviewed, maintained and updated via SCARS/e-SCARS and HAZLOG/e-HAZLOG systems. This SCARS and, if applicable, associated HAZLOG shall be reviewed prior to issue of tender/procedures to ensure that relevant safety requirements are incorporated.

Name:	Position:	Signature/Date:

Step 8: Review (to be completed by Project Manager or an officer deemed suitable by the Section Chief who initiated the project/change)

(Note: <u>Before</u> actual implementation of the proposed change/project, the Section Chief who initiated the proposed change/project shall ensure that a critical review on the SCARS process and outcome derived, despite the overall safety magnitude being minor, moderate or major, is carried out and that the outcome of the review is documented. In addition it needs to be verified that controls have been implemented and that safety requirements have been met.)

I have reviewed the evidence/proof as enclosed and I am satisfied that all the controls identified in SCARS have been or are being put in place before actual implementation according to the design intent and that the safety requirements have been met.

Name:	Position:	Signature/Date:

Workshop Outcome

The completed SCARS template fulfills the requirement : *"A document management system to record changes in policies, procedures, actions etc."*

Hong Kong Experience

- ATS implemented SMS since 2009
- With the framework in place and SMS becoming mature, ongoing safety management activities requiring recurrent resources & continuous efforts are:
  - Safety assurance, esp. management of change
  - Safety promotion

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ICAO SMS framework

1. **Safety policy and objectives**
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Regulatory Requirement

The ANSP shall :

- develop & promulgate procedures for communication of safety-related issues
- Ensure that personnel are adequately trained to the prescribed standards
- Provide appropriate training to staff before the implementation of
  - Newly designed safety-critical procedures
  - Newly procured or modified ATM systems

Safety Training

Topics incorporated into ATC training courses:

- SMS briefing
- Human factors
- Threat & error management
- Unusual situation & emergency training (USET)

Safety Training

Regular refresher training are also arranged for ATCO:

- Threat & error management
- Unusual situation & emergency training (USET)

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ICAO SMS framework

1. **Safety policy and objectives**
   - 1.1 – Management commitment and responsibility
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Regulatory Requirement

The ANSP shall :

- develop & maintain formal means for safety communication
- Ensure that all personnel are fully aware of the SMS
- Convey safety critical information

Safety Communication

Various means to communicate safety info:

- Team briefings are conducted on Day 1 of each cycle to promulgate important info
- Lessons Learnt are issued after incident investigation
- ANSP Staff Suggestion Scheme to encourage safety reporting
- Safety Flashes issued periodically on specific topic

Examples of Safety Flashes

Unstable Approaches - ATC Involvement

Unstable Approaches – ATC Involvement

Unstable/de-stabilised approaches

By ATMSO – February 14, 2012

This article is extracted from UK CAA Safety Notice SN-2012/001.

Modern turbo-jet and turbo-prop aircraft are designed to have highly efficient low drag aerodynamic characteristics which helps reduce fuel consumption but result in such aircraft needing longer distances for descent and deceleration.

Aircraft must meet certain criteria on approach to be able to land safely, and managing an aircraft during the descent and approach phases essentially becomes a task of energy management.

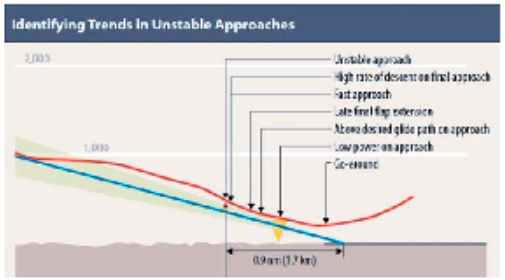
What does this mean?

Landing long or landing at excessive speeds can result in an over-run and excessive sink rates or failure to capture the correct vertical profile can contribute to hard landings or controlled flight into terrain (CFIT).

In a de-stabilised approach, the rapidly changing and abnormal condition of the aircraft may lead to loss of control.

For each performance criterion, such as speed or rate of descent, aircraft must be within a tolerable 'window' in order for it to be classified as 'stabilised' and continue to land.

Typically operators require the aircraft to be established on the glide path in the landing configuration at the correct speed at a specified height between 1,500 ft and 500 ft above ground level.



Inappropriate ATC actions can contribute to a stable approach becoming unstable due to the following:

- Distance (time) provision where insufficient track miles are provided for the flight crew to achieve the correct vertical profile and/or aircraft energy during descent.
- Changes of runway can increase flight deck workload and can significantly affect track mileage to touchdown and may not allow sufficient time for the crew to re-plan the approach.
- Changes in the type of approach particularly from precision to non-precision can affect the planned descent profile.
- Inappropriate vectoring that does not allow the correct descent profile to be flown in relation to the ILS, and vectoring can causes the aircraft to intercept the glide path before the localiser. Most aircraft will not lock into the glide path in this condition, causing the aircraft to 'fly through' the glide path.
- Incorrect track distance to touchdown resulting in flight crew being unable to calculate their descent and speed profile.
- Inappropriate use of speed control which adversely affects the crew's capability to manage the aircraft's energy and its descent profile.

"It is therefore important that ATC staff should take note of the above to minimise the likelihood of ATC contributing to unstable approaches."

Source: www.caa.co.uk/docs/33/SafetyNotice2012001.pdf

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Examples of Safety Flashes

ATMSO Safety Promotion

ATC Communications to Aircraft Flight Crew during Missed Approach

European Aviation Safety Agency (EASA) recently issued a Safety Information Bulletin (SIB) based on a study of *'Aeroplane State Awareness during Go Around'*. The study emphasized the risk associated with the issuance of instructions by air traffic controllers to flight crew, in case of go around, which in practice are not in accordance with the published missed approach procedure. The study also highlighted the following:

- High workload experienced by flight crew during such delicate phase of flight.
- Automated system in modern aircraft supports the performance of published missed approach procedure.
- A change in the published missed approach procedure communicated to the flight crew at the initiation of go around will result in an increase of the workload for flight crew and have adverse impact on safety.
- The level of safety risk increases due to additional workload for the flight crew.
- Providing appropriate training to air traffic controllers on the correct application of published missed approach procedures constitutes an adequate safety barrier.

Based on the above findings, EASA recommends the following that are applicable to ANSP:

- ANSP should instruct air traffic controllers to limit, to the maximum extent, the issuance of instructions to flight crews that would modify the published missed approach procedures in case of go around.

Conclusion

To summarize:

- Safety assurance & safety promotion are ongoing safety management activities
- requires management to commit appropriate resources & efforts to undertake such tasks

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Thank You

Safety Case Assessment and Reporting System (SCARS) Template

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This form shall be used to determine the safety magnitude of a project/change and the type of safety report required to be produced and the associated requirements for decision making.

(Note: Refer to Appendix 1 to this Attachment for guidelines to be followed for the proper conduct of SCARS)

File Number OPS/27/5	c.c. **SMS/4**

Project Title	**Implementation of 4 RNP AR APCH**	ANSP's SCARS or e-SCARS Reference	
Project Description	***Implementation of 4 RNP AR APCH procedures in November 2013 is to enhance safety, accessibility and environment of Hong Kong International Airport (HKIA).*** ***There are 4 procedures to be implemented. For the 2 similar to ILS APCH (RWY07R and RWY25L), the changes should be considered to be minimal. The other 2 approach procedures which are routing via West Lamma Channel for RWY25L/R have major advantage on accessibility and environmental friendly. But it may contribute more workload to ATC if executed during daytime.*** ***Thus, procedures are to be implemented in 2 phases to limit the scale of change. First phase is aiming to both controllers and operators for familiar with the RNP AR procedures. Procedures are considered to be 'secondary" at this stage. Only those ready (both ATC and operators) can conduct the procedures. When more airlines (e.g.90% of movement) and corresponding ATC procedures are ready, then Hong Kong CAD may consider next phase of implementation.***		

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Step 1: Assess the SIZE OF THE CHANGE

Complete the following questions to determine the size of the change. For each question, choose a rating from 1 (Low) to 7 (High) and provide justification.

NOTE: These questions are not definitive and are aimed at providing a generalised framework for the initial assessment of the overall magnitude of the change.

No.	Description	Ratings
1	**Assess the level of *new functionality* being introduced or removed by the proposed project/change, as compared to the existing system, facility or service.** *Will the new system enhance/reduce existing functionality? or provide different functionality? Consider new technology.*	1 **2** 3 4 5 6 7
Justification: Deployment of existing technology equipped on board No new skills or technology required for ATC controllers		

2	**Assess the significance (scope/scale) of the project/change *within* ANSP.** *Consider the number of work areas affected. Also consider disciplines, systems, locations, business processes and organisation structures.*	1 2 **3** 4 5 6 7
Justification: RNP AR APCH which are overlay of existing conventional procedures – low significance. RNP AR APCH via GUAVA – more coordination is required, specific approval to individual flight is required. Addition of new routes to AMAN would be required to facilitate automated calculation of arrival sequence.		

3	**Assess the significance (scope/scale) of the project/change *outside* ANSP.** *Consider the number of services, users and/or stakeholders affected, including the interfaces between these parties, e.g. government departments, customers and other ANSPs.*	1 2 3 **4** 5 6 7
Justification: Affect airlines, people on the ground, regulatory body.		

4	**Assess the safety significance of the systems, facilities or services affected by the project/change.** *Consider for example surveillance and communications systems, data systems, AFTN, Runways, Taxiways and any organisation systems such as safety reporting etc (People/Procedures/Technology)*	1 **2** 3 4 5 6 7
Justification: Minimal changes to existing procedures, facilities and services. Compliance on requirements from regulatory authority.		

5	**Assess the *training components and needs* associated with implementing the project/change?** *Consider type of training required (e.g. classroom or simulation), duration, resources, person involved, competency requirements, etc.*	1 2 **3** 4 5 6 7
Justification: ATC – training not required for this phase of implementation, briefing has been provided during the trial phase. Operators – In this phase of implementation, the new procedures are not mandatory. Training need is minimal.		

6	**Assess the complexity of the *transition* from the existing system, facility or service *(only in relation to this project/change)*** *Consider resources available, planning, documentation, timelines, duration, approvals, contingency arrangements, organisational changes, multiple locations, etc.*	1 **2** 3 4 5 6 7
Justification: As far as prior notice is sufficient, transition should be simple. Low complexity expected as the trial operation commenced since Jun 2012.		

7	**Size of Project/Change Rating.** Total the scores from questions 1 to 6 above and compare to the values below.	**TOTAL = 17**
	Select the resultant size.	Small
Small = 1 to 18	**Medium = 19 to 30**	**Large = 31 to 42**

Step 2: Assess the SAFETY OUTCOME OF THE CHANGE

Project Title: Implementation of 4 RNP AR APCH

To assess the safety outcome of the project/change, conduct a preliminary hazard analysis to determine the likely hazards that may result from the project/change and complete the table below. Give consideration to scale of the potential for severe effects, choose a rating from 1 (Low) to 7 (High) for each hazard identified.

Hazard Description & Existing / Planned Controls

Hazard 1 Description

Loss of RNP (e.g. GNSS signal) during any phase of approach

Existing Controls

1 *Radar vectors and advisory to be provided by ATC as far as practicable*

2

3

Planned Controls [***those planned on the basis of the identified hazard(s)***]

1 *Operators' SOPs*

2

3

Effect on work units:	APP/TMC/ AREA	ADC	AIC	RCC	ANC	Others:	
(Please tick ✓)	✓	✓	✓				
Effect on End Users:	Aircrew	Pax	Ops	Eng.	Maint.	Others: (e.g. AAHK, AEC, Apron, AMO, etc)	
(Please tick ✓)	✓		✓				
Overall Rating	1	2	3	4	5	6	7
(Please tick ✓)		✓					

Hazard 2 Description

Late ATC approval / notification for RNP AR APCH may increase crew workload

Existing Controls

1

2

3

Planned Controls [***those planned on the basis of the identified hazard(s)***]

1 *Should nominate the latest point/time that ATC is recommended not to change the expected approach procedure*

2

3

Effect on work units:	APP/TMC/ AREA	ADC	AIC	RCC	ANC	Others:	
(Please tick ✓)	✓	✓					
Effect on End Users:	Aircrew	Pax	Ops	Eng.	Maint.	Others:	
(Please tick ✓)	✓						
Overall Rating	1	2	3	4	5	6	7
(Please tick ✓)		✓					

Hazard 3 Description

Integration of GUAVA APCH with straight-in APCH for RWY 25

Existing Controls

1 *Recommended spacing and ATC handling between flights joining from different approaches has been promulgated to controllers during trial phase of GUAVA approach*

2

3

Planned Controls [***those planned on the basis of the identified hazard(s)***]

1 *Review recommended spacing by means of radar simulation*

2

3

Effect on work units:	APP/TMC/ AREA	ADC	AIC	RCC	ANC	Others:	
(Please tick ✓)	✓						
Effect on End Users:	Aircrew	Pax	Ops	Eng.	Maint.	Others:	
(Please tick ✓)	✓						
Overall Rating	1	2	3	4	5	6	7
(Please tick ✓)			✓				

Hazard 4 Description

Existing Controls

1

2

3

Planned Controls [***those planned on the basis of the identified hazard(s)***]

1

2

3

Effect on work units:	APP/TMC/ AREA	ADC	AIC	RCC	ANC	Others:	
(Please tick ✓)							
Effect on End Users:	Aircrew	Pax	Ops	Eng.	Maint.	Others:	
(Please tick ✓)							
Overall Rating	1	2	3	4	5	6	7
(Please tick ✓)							

(Note: Use separate paper to document as above other hazards identified, if any)

Hazards Rating Calculation	**Rating**
Hazard 1	*1.6*
Hazard 2	*1.2*
Hazard 3	*2.3*
Hazard 4	
Hazard 5	
Total Score	***6***

(Note: In case there is/are individual hazard(s) with rating "5" or above, such hazard(s) should be highlighted explicitly to the Project Manager/Chief of the Section concerned recommending a critical review on the hazard(s) and implementation of necessary mitigation.)

Enter the estimated Safety Outcome of the change.		
Result: *(Please tick✓)*		
Substantial:		*73% or more*
Reasonable:		*45% - 72%*
Minimal:	✓	*Up to 44%*

Equation for Percentage:

$$\frac{\text{Total score (6)}}{\text{7 x No. of Hazards (3)}} \text{ x 100 = 29\%}$$

(divided by)

Safety Outcome Result:

Substantial:	73% or more
Reasonable:	45% - 72%
Minimal:	Up to 44%

(Note: In case of estimated Safety Outcome being 60% or more, the PM will need to be consulted in determining the level of safety report to be prepared (Step 4 refers) for the change.)

List all persons assisting in the analysis process:

Include representatives from all significant stakeholder groups as appropriate

Name	Position
Tommy AuYeung	CAD – ATMD : SEVO
Samuel Ng	CAD – ATMD : EVO
Joe Lam	CAD – ATMD : EVO
Sansom Lau	CAD – ATMD : SSM
TM Shum	CAD – ATMD : SQO
Henry Leung	CAD – ATMD : ATCO
Barry Debenham	CAD – ATMD : ATCO
Gabriele Ascenzo	CAD – FSAD : FOI
CM Fok	CAD – FSAD : SAO
Allen Kwong	CAD – FSAD : SO
Matthew Ip	CAD – APSD : SOO (Environment)
YY Wong	CAD – APSD : OO
Stanley Lau	CAD – AESD : SEE
Derek How	CAD-AESD : EE
Mark Hoey	Cathay Pacific : Pilot
Bill Seymour	Cathay Pacific: Pilot
Cartney Sum	Cathay Pacific : Engineer
Jim Ashby	Dragonair : Pilot
Cuthbert Lo	Dragonair : Engineer

SCARS/PHA workshop	**Date**	**Time**
Implementation of 4 RNP AR APCH	**27th Aug 2013**	**0900- 1330**

Step 3: Assess the OVERALL SAFETY MAGNITUDE OF THE CHANGE

The Overall Safety Magnitude of the Change is a combination of the size of the change **and** the safety outcome of the change. Apply the results obtained from Steps 1 and 2 to the matrix below and tick the appropriate box to determine the Overall Safety Magnitude of the Change.

Overall Safety Magnitude of the Change			
Overall Change Magnitude	**Safety Outcome of the Change**		
Size of the Change	**Substantial**	**Reasonable**	**Minimal**
Large	Major ☐	Major ☐	Moderate ☐
Medium	Major ☐	Moderate ☐	Minor ☐
Small	Moderate ☐	Moderate ☐	Minor ☑

Step 4: Safety Reporting Determination

Tick the box in the table below to indicate the type of safety report to be prepared for the change.

Overall Safety Magnitude of Project/Change	**To be reported as…..**
Major ☐	Safety Case + Safety Plan + HAZLOG
Moderate ☐	Safety Statement + HAZLOG
Minor ☑	Safety Statement

Step 5: Safety Statement **(For Minor or Moderate Change)** (to be completed by the Facilitator)

Name: **Joe Lam**	**Position:** **EVO(6)**	**Signature/Date:** **25th Sept., 2013**
Statement:		
*I/We confirm that application of the processes described above resulted in the classification that the proposed project/change is of a **Minor** safety magnitude. The safety implications of the proposed change have been identified and documented above. The planned/existing controls will be maintained, reviewed and updated via SCARS or e-SCARS system.*		
*I/We confirm that application of the processes described above resulted in the classification that the proposed project/change is of a **Moderate** safety magnitude. The safety implications of the proposed change have been identified and the hazards will be addressed through HazID workshop. The safety risk controls will be maintained, reviewed and updated via HAZLOG or e-HAZLOG system.*		

(Note: For "Moderate" safety magnitude project/change, a HAZLOG report is required)

Step 6: Certification and Recommendation (to be completed by the Project Manager)

(Note: In case the Project Manager considers certification of the SCARS session is not in order, he/she should take appropriate action(s), including the conduct of another SCARS session, to clarify issues and/or acquire more information or data, so as to enable him/her to properly carry out the certification.)

I certify that the SCARS session was conducted in accordance with prescribed procedures to assure safety of the project/change, and recommend for your (Section Chief) consideration acceptance of the result of the SCARS session.

Name:	**Position:**	**Signature/Date:**

Step 7: Acceptance (to be completed by Chief of the Section who initiates the proposed change/project)

I accept the result of the SCARS session. The planned/existing controls identified, subject to approval, shall be reviewed, maintained and updated via SCARS/e-SCARS and HAZLOG/e-HAZLOG systems. This SCARS and, if applicable, associated HAZLOG shall be reviewed prior to issue of tender/procedures to ensure that relevant safety requirements are incorporated.

Name:	**Position:**	**Signature/Date:**

Step 8: Review (to be completed by Project Manager or an officer deemed suitable by the Section Chief who initiated the project/change)

(Note: <u>Before</u> actual implementation of the proposed change/project, the Section Chief who initiated the proposed change/project shall ensure that a critical review on the SCARS process and outcome derived, despite the overall safety magnitude being minor, moderate or major, is carried out and that the outcome of the review is documented. In addition it needs to be verified that controls have been implemented and that safety requirements have been met.)

I have reviewed the evidence/proof as enclosed and I am satisfied that all the controls identified in SCARS have been or are being put in place before actual implementation according to the design intent and that the safety requirements have been met.

Name:	**Position:**	**Signature/Date:**