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AVIATION SAFETY ADVISORY CIRCULAR NO: 01/2014

GUIDELINES FOR SAFETY ASSESSMENT OF NEW PROJECTS AND CHANGE

1 Introduction

Management of change is a key element under the Safety Assurance component of ICAO SMS (Safety Management System) framework. DGCA Civil Aviation Requirements (CAR) on *Establishment of a Safety Management System* also follows a similar framework and directs all concerned aviation organizations to develop and maintain a formal process for the management of change.

Airports Authority of India (AAI) has described its SMS through the Corporate Safety Management System Manual (C-SMS Manual). The latest version of C-SMS Manual (Version 3, Issue 2) which has been prepared in conformance with the DGCA CAR requires all concerned AAI offices to carry out the change management process in a systematic manner.

Although AAI is in the final stages of total SMS implementation, many personnel are not fully familiar with the safety assessment process in vogue in the organization. This circular is intended to throw light into the intricacies of change management in general and safety assessment processes in particular.

2 Scope

The contents of this circular are applicable to all operational personnel of AAI working at AAI owned airports and ANS (Air Navigation Services) locations. This circular is also applicable to contractors working for or on behalf of AAI, who undertake activities, which may directly or indirectly affect the safe operations of air navigation services or airport systems.

3 References

- DGCA CAR on *Establishment of a Safety Management System (SMS)*
- C-SMS Manual –Version 3, Issue 2
- DGCA Aerodrome Advisory Circular AD AC 1 of 2012 -*Process for communicating with the DGCA on the planning, construction and commissioning of changes to airport infrastructure, and major maintenance programs*
- DGCA SSP Division Circular No. 1 of 2012 – *Hazard Log Template*
- ICAO DOC 9859 *Safety Management Manual* (2nd edition-2009 and 3rd edition-2013)
- International Standard ISO/IEC 31010 *Risk Management–Risk Assessment Techniques*

4 Organizational Requirements for Managing Change

- 4.1 All changes that have an impact on the safety of the systems, facilities or services provided by AAI require a formal safety assessment to be conducted, documented and reported, prior to any change implementation.
- 4.2 All changes to ATM (Air Traffic Management), CNS (Communication, Navigation and Surveillance) and Airside Operations of airport service levels, procedures, equipment or organizational structures which will affect the performance, function or technical specification of a system, service or facility or organizational changes affecting safety accountabilities should be assessed to determine the safety magnitude of change.
- Section 7.4.5 of C-SMS Manual provides a detailed list of changes and activities requiring risk assessment
 - Withdrawal of any facility / procedure for a prolonged period is considered as degradation of aerodrome facility for which safety assessment needs to be conducted
- 4.3 SCARS (Safety Case Assessment and Reporting System) is the methodology used by AAI to assess the overall safety magnitude of any change or new project. This is in conformance with DGCA Circular AD AC 1 of 2012.
- Where a proposed change will not result in any change to the items mentioned in section 4.2 (and Section 7.4.5 of C-SMS Manual), or the change is of a routine maintenance or administrative nature, the routine change process may be used in lieu of the SCARS Form

4.4 **Clarification of Terms – Process Owner and Project Manager**

A **Process Owner** is the one who is responsible for managing and overseeing the objectives and performance of a process. He / She has the authority to make required changes related to achieving process objectives. In many cases Process owner is also the proposer / initiator of the change.

- In the airport context, the process owners will be HODs (Head of Department) of ATM, CNS, Engineering and Airside Operations (OPS). Since ARFF (Airport Rescue and Fire Fighting) is technically under OPS section, Head-ARFF is not considered as a separate Process Owner.

A **Project Manager** is the person responsible for leading a project from its inception to execution. This includes planning, execution and managing the people, resources and scope of the project.

- For an Airside Operations project, the Project Manager can be from Civil Engineering (runway extension), Electrical Engineering (Installation of Cat II approach Lights), ARFF (upgradation of RFF category from 7 to 8), Electronics (optical fibre cabling in the operational area), OPS (closure of Runway / Apron) etc.

Same is the case with other Process Owners, viz. ATM (introduction of new ATM procedures) or CNS (upgradation of software/hardware), also, where officials from other Operational Sections can be Project Managers depending on the type of work involved.

- Project Manager can be the HOD of the Section entrusted with the project execution or a senior officer deputed by him.

In this document, wherever the terms Process Owner and Project Manager are encountered, the terms will have the meanings as given above.

5 Project Lifecycle

- 5.1 C-SMS Manual mentions four distinct phases in any project - **Concept, Design, Implementation and Operation phases**. The manual stipulates that safety assessments should be conducted for each phase of the project lifecycle.
- 5.2 DGCA Circular AD AC 1 of 2012 specifies that normally any change in infrastructure shall be in three stages – i.e. **Stage-I as Design + Concept phases combined, Stage-II as Execution and Stage-III as Commissioning phase**.
- 5.3 **“Implementation Phase”** as defined in C-SMS Manual includes both **“Execution + Commissioning”** phases as prescribed in DGCA circular. **“Operation phase”** is the additional phase defined in C-SMS Manual, which concerns post implementation stage.
- 5.4 Even though there are certain differences regarding the project lifecycle phases (stages) between these two documents, it is advisable to carry out safety assessments for each project stages, as prescribed in DGCA Circular AD AC 1 of 2012, for communicating the change to DGCA.

6 Safety Assessment Processes during project life cycle

6.1 Concept Phase

- 6.1.1 This is the phase when the project is conceived. A project or change is conceived when a need is identified. *For example, a project for installing Instrument Landing System (ILS) is conceived when a need is felt to improve safety, efficiency and access to the airport.*
- 6.1.2 SCARS Form (AAI-SAF-103) is the first step in the safety assessment process. SCARS guides the airport managers in choosing the right steps for managing the change based on the overall safety magnitude of the change.
- 6.1.3 SCARS Form must be completed at the start of a change process i.e. in Concept Phase, to ensure that the safety assessment requirements of the change are identified early in the project lifecycle and the relevant documents are prepared.
- 6.1.4 Where the outcome of the SCARS Form indicates a MINOR change, a Safety Statement must be included in the SCARS form.
- The Safety Statement or justification included in the SCARS must provide AAI management (and the stakeholders including DGCA) with sufficient information to demonstrate that safety has been considered, and the change presents minimal or no safety issues.
 - Airport Director or the Process Owner may require a Safety Case to be developed even though the outcome of the SCARS indicates a MINOR change.

- Although not mandatory, it is recommended to open a Risk Register (or a HAZLOG) even when the magnitude of change is MINOR.

6.1.5 Where the SCARS indicate a MODERATE change, a HAZLOG for this change must be developed in addition to the Safety Statement. The hazards identified during the completion of SCARS (Step-2: Preliminary Hazard Analysis) should be transferred to the HAZLOG and analyzed using the methodology described in Chapter 7 of C-SMS Manual. A HazID workshop should also be organized (either in continuation of SCARS session or separately) to identify other hazards (Low-Level / Low-Consequence hazards also) which should also be analyzed similarly.

6.1.6 Where the SCARS indicate a MAJOR change, the HAZLOG for this change must be developed as mentioned in section 6.1.5 above. Additionally a Safety Case (along with a Safety Plan) should also be prepared.

- Safety Cases can be of three types depending on the phase(s) of the project lifecycle. They are:
 - Design/Concept Phase Safety Case (AAI-SAF-104)
 - Implementation (Execution + Commissioning) Phase Safety Case (AAI-SAF-112)
 - All Phases Safety Case (AAI-SAF-113)

Each of these phases has slightly different emphasis on the objectives for the Safety Case report and the types of issues involved. These phases are not necessarily clear cut and can overlap.

- Guidance for preparation of Safety Plan and Safety Case along with templates is given in Chapter 10 of C-SMS Manual. Additional material is also available as attachments to the Manual.

6.1.7 SCARS Form needs to be completed only once for a change / project. Once the SCARS has indicated the type of safety assessment to be conducted and the required documentation to be done, the managers will have to follow the appropriate path, depending on whether the overall safety magnitude is MINOR, MODERATE or MAJOR.

6.2 **Design Phase**

6.2.1 This is the phase when the concept is given shape and structure in the form of examining the feasibility of the concept, arriving at various options available, develop project / change definition and finally the procurement (of products or services) process.

6.2.2 The overall safety magnitude of change (MINOR, MODERATE or MAJOR) as decided through SCARS (completed in Concept stage itself) decides on further course of action in the Design Stage.

- Where SCARS has indicated a MINOR change, no further action is needed at this stage. However as mentioned in section 6.1.4, Airport Director or the Process Owner may decide to carry out a HazID exercise to ensure that all potential hazards, however low-level/low-consequence they might be, are identified and managed. Such an action is strongly recommended.

- Where SCARS has indicated a MODERATE or MAJOR change, a HazID workshop shall be organized to identify any further hazards that may be present during the design phase of the project. The hazards so identified should be entered into the HAZLOG (Risk Register) and should be assessed and managed using the methodology described in Chapter 7 of C-SMS Manual.
- When SCARS has indicated a MAJOR change, in addition to the HazID process mentioned above, a Safety Plan and Safety Case need to be prepared. The Safety Case can either be a combined Concept/Design phase Safety Case or an All-Phases Safety Case.

6.2.3 DGCA Circular AD AC 1 of 2012 combines the Concept and Design stages as Stage-I.

6.3 **Execution Phase**

6.3.1 This is the phase of the project which involves installation, or when actual work under the New project / change is undertaken at the airport.

6.3.2 The overall safety magnitude of change (MINOR, MODERATE or MAJOR) as decided through SCARS (completed in Concept stage itself) decides on further course of action in the Execution Stage also.

- Where SCARS has indicated a MINOR change, no further action is needed at this stage. However as mentioned in section 6.1.4, the Airport Director or the Process Owner may decide to carry out a HazID exercise to ensure that all potential hazards, however low-level/low-consequence they might be, are identified and managed. Such an action is strongly recommended.
- Where SCARS has indicated a MODERATE or MAJOR change, a HazID meeting shall be organized to identify any further hazards that may be present during the Execution phase of the project. The hazards so identified should be entered into the HAZLOG (Risk Register) and should be assessed and managed using the methodology described in Chapter 7 of C-SMS Manual.
- When SCARS has indicated a MAJOR change, in addition to the HazID process mentioned above, a Safety Plan and Safety Case need to be prepared. The safety case should be included in an Execution phase Safety Case or an All-Phases Safety Case.

6.4 **Commissioning Phase**

6.4.1 This is the phase of the project which involves integration, transitioning and commissioning.

6.4.2 The overall safety magnitude of change (MINOR, MODERATE or MAJOR) as decided through SCARS (completed in Concept stage itself) decides on further course of action in the Commissioning Stage also.

- Where SCARS has indicated a MINOR change, no further action is needed at this stage. However as mentioned in section 6.1.4, the Airport Director or the Process Owner may decide to carry out a HazID exercise to ensure that all potential

hazards, however low-level/low-consequence they might be, are identified and managed. Such an action is strongly recommended.

- Where SCARS has indicated a MODERATE or MAJOR change, a HazID meeting shall be organized to identify any further hazards that may be present during the Commissioning phase of the project. The hazards so identified should be entered into the HAZLOG (Risk Register) and should be assessed and managed using the methodology described in Chapter 7 of C-SMS Manual.
- When SCARS has indicated a MAJOR change, in addition to the HazID process mentioned above, a Safety Plan and Safety Case need to be prepared. The safety case should be included in a Commissioning phase Safety Case or an All-Phases Safety Case.

6.4.3 DGCA Circular requires separate safety assessments to be carried out for the three stages viz. Concept/Design, Execution and Commissioning. However for small projects Stage-I and Stage-II can be combined but separate HAZLOG should be provided. Safety Assessment for commissioning stage should be carried out separately.

6.4 Operation Phase

6.4.1 This is the stage when the project is commissioned and a post-implementation review is conducted. After the project is commissioned, a HazID exercise should be carried out to find out any new hazards introduced into the system owing to the commissioning of the new project / change. These hazards will then be managed through the AAI methodology.

6.4.2 The hazards remaining in the Project Risk Register should be transferred to the Operational Risk Register of the airport after the project has become fully operational. These risks will then be monitored by the Safety Manager. However the responsibility of mitigation of the remaining risks will be with the Process Owner.

6.5 Harmonizing AAI Processes with DGCA Requirements

6.5.1 C-SMS Manual and DGCA Circular AD AC 1 of 2012 require SCARS Form to be completed at the start of the project itself, i.e. during the concept/Design phase itself.

6.5.2 There is a mismatch between the project phases of C-SMS Manual and the project stages (for safety assessment purposes) described in the DGCA Circular. In order to harmonize the two slightly varying requirements, the following procedure may be adopted:

- **The first safety assessment meeting should be a combined Concept/Design phase assessment**, in which one of the primary activities should be to complete the SCARS Form. The course of action for managing the safety risks associated with the project /change will be based on the overall safety magnitude of change (MINOR, MODERATE or MAJOR). A HazID workshop is desirable for a MINOR change but mandatory for MODERATE and MAJOR changes.
- **The second safety assessment should be conducted before commencement of work execution.** Another HazID workshop should be conducted to identify more hazards with special emphasis on Execution stage (while work in progress) i.e. new hazards may get introduced while work in progress.

Although not mandatory when the SCARS Form has indicated a MINOR change, but a HazID process is strongly recommended for safety assurance.

- **The third safety assessment should be conducted before commissioning of the project**, after completion of project execution. Another HazID workshop should be conducted to identify additional hazards, which may likely to be get infused in the operational system on Commissioning stage.
- **The fourth and last assessment will be a post-implementation review after the project has been commissioned** and has reached full operational status. The outcome of this assessment need not be communicated to DGCA.

Note: SCARS form shall be completed only once at the start i.e. during Concept & Design Phase and need not be repeated in other subsequent phases.

7 Responsibility of Various Directorates in Change Management

- 7.1 Refer sections 7.4.8 and 10.3.3 of C-SMS Manual, It is the responsibility of appropriate service Delivery Directorate (Process owner) or Project Manager to initiate and resource the necessary safety assessments (as prescribed above) in coordination with Safety Manager and get approval of the change / new project.

The appropriate Process Owner / Project Manager is responsible for:

- Compliance with safety requirements
- Integrity and quality of safety documents
- Ensuring required approvals prior to any implementation
- Ensuring that Risk controls detailed in the documentation are appropriate and in place, reviewed / updated following the project / change implementation.

8 Communicating with DGCA

- 8.1 The following documents should also be attached with the SCARS form while communicating the change to DGCA (refer DGCA Circular AD AC 1 of 2012):
- Annexure I of the DGCA Circular duly filled
 - System Description of the project, including charts and drawings, if any
 - Safety risk mitigation plan (as a part of HAZLOG)
 - Minutes of the meeting with the stakeholders with attendance sheet along with the details of the objection/comments by the members and the action taken on the said objections/comments
 - Draft AIRAC AIP Supplement (if required) – Concept/Design stage assessment
 - Work schedule (execution plan with timelines) – Execution level assessment
 - Details of the training/ familiarization given to the contractors/workers/drivers etc. - Execution level assessment
 - CAR Compliance checklist - Commissioning level assessment
 - Certificates (e.g. for frangibility requirements) - Commissioning level assessment

All communications with DGCA in the subsequent stages of the project should be sent along with a copy of the original SCARS Form. Additional documents pertaining to a particular stage of the project (copy of HAZLOG, work schedule, CAR compliance checklist, certificates etc.) should also be attached.

- 8.2 AAI airports normally communicate with DGCA through CHQ, unless specifically directed by DGCA. Concerned ED of applicable service delivery directorate at CHQ to whom the work is related with (Process owner) shall be liaising with DGCA for obtaining necessary approval of the change i.e. Airport operational infrastructure related change / new project will be through ED (OPS); ATM related change will be through concerned ED (ATM); CNS related change will be through concerned ED (CNS).

Safety assessment documents are normally routed through the respective departments in CHQ for DGCA approval. All communications in respect of safety assessments of projects / changes including the SCARS Form and subsequent HAZLOGs should be sent to the following offices by the Process Owner in coordination with the Project Manager:

- Original set Concerned ED at CHQ – ATM / CNS / OPS (for DGCA approval)
- Copies ED (Aerodrome Licensing)
ED (Aviation Safety)
ED (Engineering)
RED of the Region (attention Jt.GM (AVS))
Concerned GM (Region)
- Internal Safety Manager of the airport

- 8.3 Many airports have sought clarification whether approval from DGCA is required before commencement of the project (execution). This section intends to throw some light into this important aspect of regulatory compliance.

8.3.1 DGCA Circular AD AC 1 of 2012 states that *“as part of the licensing arrangements, a licensed airport is required by Rule 83(2) of Aircraft Rules, 1937 and as a condition of the license, to seek the prior approval of the safety regulator, i.e. the Director General of Civil Aviation (DGCA) for aerodrome projects that change/add facilities, structures, hereafter referred to collectively as infrastructure, that may affect the safety of aircraft operation”*.

8.3.2 **As a general rule, for all licensed AAI managed airports, prior approval from DGCA is required for commencement of any work and also for commissioning any project, except for emergency work or minor repair work of short duration.** From the airport’s point of view, airport operator should fulfill the required formalities well in advance and forward the required documents to all concerned as specified in section 7.1. Under no circumstances should the airport commence the execution of work or commission the new project without approval from DGCA (and CHQ) irrespective of whether the safety magnitude of change is MINOR, MODERATE or MAJOR.

8.3.3 **For all other unlicensed AAI managed airports, all process & procedures as detailed in this circular and also prescribed in Chapter 10 of C-SMS Manual shall be followed.** However, **there is no need to seek prior approval from DGCA before making change.** All related documents must be prepared and made available for DGCA examination, if at a later date, the airport decides to obtain Aerodrome License.

9 Scheduling of Safety Assessment Activities

- 9.1 It has been noticed that due to lack of proper coordination between various offices involved, safety assessment processes are often not managed systematically. The safety management processes relating to a new project / change should commence well in advance so as to ensure timely receipt of approvals from CHQ/DGCA and also to assure proper notification of the project activities through AIS. No project should be delayed for want of safety approvals or due to mandatory notification time.
- 9.2 Safety assessment process should start from the concept stage itself. The concept is normally given shape at CHQ planning level for medium and large-scale projects. Thus it is ideal to conduct concept / Design level safety assessments at CHQ, although CHQ may authorize airports to conduct Concept/Design level assessments at the airport on their behalf. SCARS Form will be completed during this stage. The following aspects should be considered while planning the assessment:
- Concept / Design stage safety assessment should be conducted before finalizing the scope of the project for procurement or work tender. This would allow changes to be made in the scope depending on the hazards identified and potential mitigation strategies.
 - Representatives of the RHQ /airport/user should be invited to participate in the Concept / Design stage safety assessment, if it is being conducted at CHQ. In the case of a multi-location project, at least representatives from a few sample stations should be invited. If the airport is conducting the assessment, representatives from concerned departments of CHQ/RHQ should attend the meeting.
 - Approval of the concept/design stage safety assessment from DGCA is required before planning the execution level assessment (except for small projects where these stages can be combined). Thus the process of concept/design stage assessment should start sufficiently in advance for avoiding project delays.
- 9.3 Execution of the project is normally associated with notification of information through AIS. For major and complex projects affecting aircraft operations, AIRAC AIP supplement should be issued. This would require at least 42 days advance notice (56 days advance notice recommended) after the AIP Supplement is issued. Another aspect to be considered is that information through AIS can be published only after the execution stage assessment is approved by DGCA. Thus, execution stage assessment should be completed at least 2 to 3 months ahead of the planned commencement of work.
- 9.4 Commissioning of the project would also entail the same processes as mentioned in section 9.3 above. Additional documents like CAR compliance checklist and reports of operational trials can only be generated only on satisfactory completion of the work. Notification of the new facility/installation/procedure through AIRAC methodology, if required, will take additional time. However DGCA Circular AD AC 1 of 2012 allows airports to take action in advance for notification of commissioning of a change / project (page 9, item (vi)). Thus the project should consider a time gap of around 2 months for actual commissioning of the project after completion of commissioning level safety assessment.
- 9.5 Some activities mentioned in sections 9.3 and 9.4 may run parallel thereby reducing the time requirements for the approval and notification processes.

10 Project Risk Register / ORA Register / HAZLOG

HAZLOG is the backbone of an SMS. A well-maintained HAZLOG can act as a repository of hazards pertaining to one single project or as a master database pertaining to the airport. It is a real-time indication of the safety health of an airport as well as a safety library for future reference.

- 10.1 The HazID format (HAZLOG Form) is given along with Safety Risk Assessment Practices Attachment (page 30 of AAI-SAF-105) to C-SMS Manual. Each identified Hazard-consequence combination should be recorded in a different HAZLOG form. The HAZLOG will thus be a collection of a number of such forms filed as a single document.
- 10.2 An airport will have many sub-systems, each of which will be having many processes. Thus the number of hazards identified would run into hundreds. Maintaining a HAZLOG in physical form (printed in paper) will be a tedious task and will consume a lot of stationery.

It is recommended to maintain HAZLOG in an electronic format. The various options available are:

1. Create an MS Excel worksheet following the HAZLOG format given in C-SMS Manual
2. Create an MS Access database, which would be easier to manage compared to Excel
3. Create a stand-alone customized software for the purpose
4. Create a web-based SMS software, which can be accessed from multiple locations

Options 1 and 2 are simple solutions which can be implemented at airport level itself.

DGCA SSP Division Circular 1 of 2012 presents the format of a HAZLOG. Station-level HAZLOG may also be designed based on the template suggested by DGCA.

- 10.3 An important issue pointed out by stations was regarding assigning numbers to hazards. HazID Form (attachment to AAI-SAF-105) has a field to enter hazard number. A single hazard can have many consequences and the risk assessments of each of these consequences would be different. So ideally, each consequence of an identified hazard should be recorded in a different HAZLOG form. If this is so, then for the same hazard different pages would exist in the HAZLOG.

HAZLOG template given in DGCA SSP Circular 1 of 2012 has devoted only one row for each hazard. The worst credible effect (consequence) of the hazard should be entered against the identified hazard along with the reason (justification) which will then be assessed based on the existing controls. Thus for each hazard only one consequence is identified, which is the worst credible one, ignoring less important consequences.

However ICAO DOC 9859 promulgates the general concept that each consequence of a specific hazard should be assessed in terms of severity and likelihood.

It is suggested that HAZLOG template of DGCA SSP Division circular 01/2012 may be modified to accommodate different consequences of a specific hazard and these each consequences should be assessed and recorded in the DGCA format.

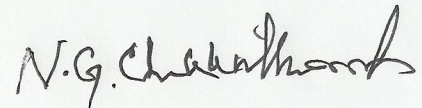
Each hazard-consequence combination should be given a separate index number, so that tracking of specific risks will be easier. The hazard numbering format suggested below is based on this philosophy, which may be followed at stations:

- Hazards should be allotted a Unique Hazard ID number in the format **HAZ/VXXX/SSS/HHHHH-CC**. For example, a hazard identified at Guwahati airport pertaining to a CNS process should be numbered as *HAZ/VEGT/CNS/000001-01*. If the same hazard is having a second consequence, whose risk is to be managed separately, the same hazard will again be recorded as *HAZ/VEGT/CNS/000001-02*, but the consequence will be different.
- The abbreviations to be used for the various departments in the hazard number format (SSS) are ATM, CNS and OPS (Airside Operations).
- The hazard numbers will be allotted by the custodian of the Operational Risk Assessment Register. Normally Safety Manager manages the ORA Register.
- Project HAZLOGs are managed by Project Managers (HODs or officials deputed by them). Thus for a particular project, a series of hazard numbers will be allotted by the Safety Manager. These hazards will be transferred into the ORA Register on completion of the project.
- Hazards which are removed from the active HAZLOG, either on elimination or mitigation to ALARP region, should be retained in the safety library of the airport. These hazards, although fully managed, should be revisited at a lesser frequency (say once every year) to confirm whether the risks are still under control. Thus, index numbers of such hazards removed from the active HAZLOG, should NOT be allotted to another hazard.

11 Clarifications

Requests for clarifications to this circular may be addressed to Executive Director (Aviation Safety) at edas@aai.aero or forwarded to following address:

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LIFE CYCLE OF PROJECT / CHANGE

AS PER DGCA AD AC 01/2012

AS PER C-SMS MANUAL

