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AVIATION SAFETY ADVISORY CIRCULAR NO: 02 /2014

GUIDELINES FOR COMPLETING SCARS FORM

1 Introduction

Safety Case Assessment and Reporting System (SCARS) form must be used to assess permanent and temporary changes to service level, procedures or equipments, which will affect the performance, functional or technical specification of system, facility or service and for organizational changes affecting safety accountabilities.

This form must be used to determine overall safety magnitude of a project / change and type of safety documentation required to be produced and the associated requirement for sign-off acceptance. **This completed FORM is NOT a safety assessment report** but the first step in the safety analysis of change.

A clear understanding of completing the various steps of the SCARS Form is an absolute necessity for managing the change. This circular gives a detailed description and guidance to complete the SCARS Form.

2 Applicability

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 Reference

- ICAO DOC 9859 Safety Management Manual (2nd edition-2009 and 3rd edition-2013)
- DGCA CAR on Establishment of a Safety Management System (SMS)
- International Standard ISO/IEC 31010 Risk Management–Risk Assessment Techniques
- 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*

4 SCARS Form

4.1 **Filling up of SCARS is the first step in the management of change** and is a tool to identify the safety assessment and documentation requirements for the particular project/change.

This form must be completed by person or persons with specialist knowledge about proposed project / change, along with other group members and then be reviewed and approved by appropriate process owner.

4.2 The first page of the SCARS Form gives details about the project. The various fields are as follows:

- **Project Number:** The Project Manager will allot a number to the project and the number will be entered in this field.
- **File Number:** The file number pertaining to the project will be entered in this field. This number along with the project number will be reference number for all correspondences regarding the project.
- **Project Title:** A short title of the project will be entered in this field.
- **Location:** Name of the airport / site (for off-airport sites) should be entered
- **Unit:** Section to which the process belongs (ATM / CNS / Airside Operations)
- **Brief Description of the Project / Change:** A brief description of the project or change should be entered in this field. The contents should be adequate to describe the project in a nutshell.

4.3 **STEP 1** of SCARS Form helps to assess the size of the change. There are six questions to be answered by the persons participating in the meeting for completing the SCARS Form. The following guidelines are given to help the participants in reaching the correct conclusion regarding the size of the project / change:

- The questions have a 7-point rating scale, with ratings **1** for Extremely Low; **2** for Very Low; **3** for Low; **4** for Moderate; **5** for High; **6** for Very High; and **7** for Extremely High.
- The correct method **is not** to collect participants' individual ratings for each question and then average it out. Each question should be discussed among the participants and a consensus rating reached which is adequately justified. The rating along with the justification should be entered under each question.
- Since SCARS Form will be filled up only once (at the start of the project), each of the six questions should be rated considering all four phases of the project, viz. Concept, Design, Implementation (Execution and Commissioning) and Operation phases. Any dilution in this process by not considering all the phases will certainly affect the final outcome of SCARS.

- **Question 1** is **Assess the significance (scope/scale) of the project/change within AAI.** In order to help the users in answering this question, SCARS asks them to consider the number of work areas affected (ATM, CNS, Airside Operations, ARFF etc.) and also to consider disciplines, systems, locations, business processes and organizational structures. All such work areas, locations and processes that are affected by the proposed change during all four phases of the project should be considered. **More the affected areas, higher the rating.**

For example, installation of ILS at an airport will involve ATM, CNS, Airside Operations, Civil and Electrical personnel at the airport. Additionally when we consider the concept and design phases, personnel from CNS Planning and ATM Airspace Management are also affected.

- **Question 2** is **Assess the significance of the project/change outside AAI.** The clue given is to consider the number of services users and/or stakeholders affected, including the interfaces between these parties, e.g. government departments, customers and other ANSPs. As in the previous question, all stakeholders who are affected by the proposed change during all four phases of the project should be considered.

Similar to Q1, **More the affected areas, higher the rating.**

- **Question 3** is **Assess the level of new functionality introduced, or removed, by the proposed project/change, as opposed to the existing system, facility or service.** Does the new system enhance/reduce existing functionality or provide different functionality? Consider new technology. The different phases of the project do not have much significance here as the question wants the participants to think about the level of new functionality introduced or removed including upgradation (or otherwise) of technology.

Rating should be decided in accordance with the level of new functionality introduced or removed.

An example of this question would be a project where existing ATC Radar is replaced with new state-of-the-art radar. Here the functionality introduced is more or less the same as the existing radar but considering the fact that the new radar incorporates latest technology, rating given will be somewhere in the middle of the scale.

However if the assessment was for removal of existing radar system, then the level of functionality removed will be high as aircraft will not be provided with surveillance services.

- **Question 4** is **Assess the safety significance of the systems, facilities or services affected by the project/change?** Consider for example radar systems, communication systems, data systems, AFTN, Runways, Taxiways and any organization systems such as safety reporting etc. (People / Procedures / Technology). This question directs the participants to consider the safety impact of the change. The important aspect to be considered here is that whether the project is introducing a facility, procedure or equipment or removing it, safety significance, whether enhanced or reduced, will be indicated in a positive scale.

Rating should be as per the level of Safety significance (either enhanced or reduced)

For example the safety significance of installing an ILS on a non-instrument runway situated in a location of challenging terrain will be high. Similarly, the safety significance of withdrawing an already installed ILS (say for a temporary duration for replacement of equipment) from such a runway would also be high.

- **Question 5** is **Assess the training component associated with implementing the project/change?** Consider type of training required, classroom or simulation, time lines, resources, recency requirements, etc. If the change or project involves significant time, resources and other time-critical elements like recency requirements (e.g. recency of ATC surveillance ratings during a radar replacement project), the associated training component will be high and would invite a higher rating. This question should consider all phases of the project from concept to operation but the significant contribution would be from execution and commissioning stages.

Higher the associated training requirement, higher the rating.

- **Question 6** & last question is **Assess the complexity of the transition from the existing system, facility or service?** Consider resources available, documentation, time lines, approvals, contingency arrangements, organizational changes, multiple locations etc. Transition from an existing system to the new system brought about by the project is a very important activity. If the transition is complex, which involves creation of SOPs (also contingency procedures should something go wrong) or multiple locations transitioning into the new system simultaneously, the rating given should be high.

Higher the transition complexity, higher the rating.

For example, the transition from Conventional Vertical Separation Minimum (CVSM) to Reduced Vertical Separation Minimum (RVSM) was a complex activity. The transition involved a major conceptual change for ATC (reducing vertical separation from 2000 ft to 1000 ft and also change in direction of some flight levels). Moreover, some adjoining Flight Information Regions (FIR) were still maintaining CVSM which required the creation of transition airspace for changing from RVSM back to CVSM before releasing aircraft to such FIRs.

Another example, the integration of newly extended part of Runway in to the operational system. The transition is very complex as it involves many aspects like new visa -a visa old Runway marking, relocated PAPI & Glide path; changes in IAL procedure etc. at the time of changeover. Hence rating will be on higher side.

- The ratings given to the six questions will then be added to obtain the size of the change as **Small** (total between 6 and 18), **Medium** (total between 19 and 30) or **Large** (total between 31 and 42).

4.4 **STEP 2** of SCARS Form leads us to the Safety Outcome of the Change. It is during this process that the assessment team considers the major hazards which are likely to be encountered during the project. This is achieved through a Preliminary Hazard Analysis (PHA).

4.4.1 Preliminary Hazard Analysis (PHA) is different from a full-scale hazard identification process in many ways:

- In PHA, normally only major hazards are identified due to paucity of time. However the hazards identified should be critical ones or a combination of high-consequence and low-consequence ones. Identification of a few low-consequence hazards only and ignoring the high-consequence hazards will lead to a wrong assessment.
- PHA will not assess the risks associated with the consequence of the hazards, in terms of likelihood and severity (this process will be done later when these hazards are transferred to the HAZLOG during the HazID workshop). Instead the effect of the consequences of the identified hazards on safe operations will be rated on a 7-point scale (1-no effect to 7-extremely high effect) after considering the presence of existing controls (defenses). The intention of identifying hazards in PHA is to obtain an idea about the safety outcome of the change which in turn will lead to an assessment of the overall magnitude of the change.
- Risk assessment is not carried out during PHA. Consequently, important actions like prioritizing the risks, deciding on the potential risk control measures and acceptance of risks are not done during the PHA. These steps will be carried out later when HAZLOG is created.

4.4.2 The safety outcome of change is calculated using the equation

$$\text{Safety Outcome} = \frac{\text{Total Score} \times 100}{(7 \times \text{No: of Hazards})}$$

The safety outcome is **MINIMAL** if the value is upto 44%, **REASONABLE** for value between 45% and 72% and **SUBSTANTIAL** for values 73% or above. Decimals should be rounded **UP** to the next higher value.

4.4.3 From the equation given in section 4.4.2, it is clear that if the identified hazards are of low-consequence, the total score will be less, for the same value of the denominator. Consequently the safety outcome will be a lower value.

This does not mean that only high-consequence hazards should be identified during PHA. The endeavor should be:

- not to omit any obvious high-consequence hazards; and
- to identify as many hazards as possible within the available time.

4.4.4 The ratings assigned to the consequences of the identified hazards should be based on their estimated effects on safe aircraft operations. The hazards can be detrimental to safe operations but if the **existing** controls (defenses) in the form of training, technology, procedures or regulations can reduce the ill-effects of the hazards, a lower rating can be assigned.

4.4.5 It was opined by many that during the process of carrying out the PHA, the decision whether a control is an existing defense or a potential mitigation strategy poses some difficulties.

A typical example is that of a NOTAM action to inform the pilots about the presence of men and material near the runway during a proposed runway extension work. During the

conduct of PHA (SCARS Form being completed), the NOTAM is not existing, thus make NOTAM a potential mitigation strategy rather than an existing defense.

The effect of the consequences of the hazard & its rating should be assessed based on existing controls only and not potential ones, even though such potential controls are common and very obvious.

- 4.4.6 SCARS Form has limited space for recording hazards identified during the PHA. If the number of hazards is more, separate sheets may be attached as Annexure.
- 4.4.7 Step 2 of SCARS Form has also a limited space for the names, positions and signatures of stakeholders assisting in the PHA (Completion of SCARS Form). If the number of stakeholders present in the meeting is more, a separate attendance sheet may be provided, which should later be attached with the completed SCARS Form.
- 4.4.8 *There exists a **mismatch between the PHA formats given in DGCA Circular AD AC 1 of 2012 and C-SMS Manual**. The contents and information provided are more or less same in both the formats. It is felt that since DGCA has approved AAI's C-SMS Manual, the **PHA format provided in C-SMS Manual should be followed by stations**.*
- 4.5 **STEP 3** of the SCARS Form is to find out the overall safety magnitude of the change. The results of steps 1 and 2 should be plotted in the matrix provided in page 5 of the Form to obtain the value of overall safety magnitude of the change as MINOR, MODERATE or MAJOR.
- 4.6 **STEP 4** of the SCARS Form helps to determine the method of safety reporting to be adopted based on the overall safety magnitude of the change.
- MINOR Change Safety Statement
 - MODERATE Change Safety Statement + HAZLOG
 - MAJOR Change Safety Plan + Safety Case + HAZLOG
- 4.7 **STEP 5** of SCARS Form is for recording the Safety Statement. Safety Statement needs to be written if the overall safety magnitude of the change is either MINOR or MODERATE.
- 4.7.1 The Safety Statement should provide an explicit statement that the proposed change is safe and should also provide justifications for the claim that the change is safe. It must provide the stakeholders including DGCA and AAI management with sufficient information to demonstrate that safety has been considered and with the justification that the change presents minimal or no safety issues.
- A sample Safety Statement is given below:
- “I confirm that using the processes described above that I am satisfied that the proposed change is of minor (or moderate) safety magnitude. I am satisfied that the safety implications of the proposed change will be identified and adequately addressed via AAI's safety management and project management procedures.”*
- 4.7.2 Safety Statement can be signed either by the Process Owner or the Airport Director. However, it would be appropriate if the Airport Director, being the Accountable Executive of the airport, signs the Safety Statement.

4.8 **STEP 6** of the SCARS Form is to provide details of the HAZLOG (Risk Register) created for the new project. The details to be entered in the SCARS Form are:

- HAZLOG Title Name of the HAZLOG
- Date Date of opening the HAZLOG
- Location Airport / Location of the facility
- Unit Name of the unit of the Project Manager

Illustration

- *HAZLOG Title* *HAZLOG – Widening of Runway Turning Pad RWY 32*
- *Date* *15 April 2014*
- *Location* *XXX International Airport, Thiruvananthapuram*
- *Unit* *Civil Engineering (Maintenance)*

4.8.1 The responsibility of creating the HAZLOG and maintaining it will be the responsibility of the Project Manager (*Jt.GM (Engg.-Civil), in the above illustration*). The owner of the HAZLOG will also conduct periodic review of the hazards and will forward the residual risks to the appropriate authority (ED / GM / APD) for signing-off through proper channel.

4.8.2 After the project has been commissioned or the change implemented, the risks remaining in the Project HAZLOG will be transferred to the Operational Risk Assessment Register of the airport. The Operational Risk Assessment Register will be maintained by the Safety Manager of the airport; however the responsibility of managing the remaining risks will be transferred from Project Manager to the Process Owner.

4.9 **STEP 7 TO 11** of the SCARS Form involve obtaining the details of the officials involved in the process of completing the Form.

- **STEP 7** Indicate whether Safety Case is required to be prepared (put a tick). If a Safety Case is required (overall safety magnitude is MAJOR), provide the name, designation and signature with date of the person who has been assigned the task of preparing the safety case
- **STEP 8** Enter the name, designation and signature with date of the Project Manager
- **STEP 9** Enter the name, designation and signature with date of the official who facilitated the change (Safety Expert). The Safety Expert is required to certify that *the Safety Assessment was conducted, fulfilling the requirements of the SMS*.
- **STEP 10** Enter the name, designation and signature with date of the official who approves the change and accepts the safety assessment. For projects conducted at the airport level, this should be signed by the Airport Director. For other locations, the respective official who is accountable for the change should be the signing authority.
- **STEP 11** Enter the name, designation and signature with date of the official who reviews the SCARS. This could be the appropriate

departmental heads at CHQ level and / or ED (AVS)-CHQ for MAJOR changes. This step need not be completed at the airport level.

4.10 The completed SCARS Form should contain the following attachments:

- Attendance Sheet (refer section 4.4.7)
- Copy of the Project HAZLOG (Risk Register) – mandatory for MAJOR and MODERATE changes, desirable for MINOR change
- Safety Plan for MAJOR change (either attached with SCARS or separate)
- Safety Case for MAJOR change (either attached with SCARS or separate)

In addition to these attachments, other documents as required by DGCA AD AC 01/2012 should be provided for communicating with DGCA.

4.11 As mentioned earlier in this document, SCARS is the first step in the safety assessment process. SCARS Form will be completed only once for a particular project, at the concept stage itself. Safety assessments in the form of hazard identification and risk assessment should continue for each of the following phases of project lifecycle (refer Aviation Safety Advisory circular 01/2014). The hazards so identified should be entered in the relevant HAZLOG, copies of which should be forwarded to all concerned along with a copy of the original SCARS Form.

5 Organizing Safety Assessment Meetings

5.1 Preparation of System Description

System Description is a detailed description of the system affected by the proposed project /change.

5.1.1 Section 8.3 of the DGCA CAR on *Establishment of an SMS* gives guidance for preparing a general system description for an aviation organization. The system description for safety risk management process can be prepared in a similar manner.

The system description should consider the following:

- a) the system interactions with other systems in the air transportation system
- b) the system functions
- c) required human performance considerations of the system operation
- d) hardware components of the system
- e) software components of the system
- f) related procedures that define guidance for the operation and use of the system
- g) operational environment; and
- h) contracted, subcontracted and purchased products and/or services.

5.1.2 ICAO DOC 9859 (2nd edition) Section 9.3.1 gives guidance to what a good system description should be:

Safety risk management starts with a description of the system's functions as the basis for hazard identification. In the system description, the system components and their interfaces with the system's operational environment are analyzed for the presence of

hazards, as well as to identify those safety risk controls already existing in the system or the absence thereof. Hazards are analyzed within the context of the described system, their potentially damaging consequences identified, and such consequences assessed in terms of safety risks (the probability and resulting severity of the damaging potential of the identified consequences). Where the safety risks of the consequences of hazards are assessed to be too high to be acceptable, additional safety risk controls must be built into the system. Assessment of system design and verification that it adequately controls the consequences of hazards is, therefore, a fundamental element of safety management.

- 5.1.3 System description should be prepared by the Project Manager, which should be approved by the Process Owner and the Safety Manager before distribution.

5.2 Attendance

Meetings for completing SCARS Form and HazID workshops should be attended by representatives of stakeholders. The persons attending these meetings should be qualified, competent and experienced in their own domains. AAI Safety assessments are qualitative assessments (as opposed to quantitative assessments based on statistical data) which rely heavily on the expert opinions of the participants. The outcomes of the SCARS exercise and the depth of identification of hazards will be in direct relation to the contributions by the participants.

In order to ensure quality participation, the airport should impress upon the stakeholders about the need for deputing the right persons to attend safety assessment meetings.

5.3 Intimation to Stakeholders

- 5.3.1 Information about the proposed safety assessment meeting viz. date, time, venue and agenda, should be sent to all stakeholders well in advance. The intimation should reach the stakeholders at least 15 days before the date of the meeting. It should be sent through email and/or a printed letter with a reminder email sent 5 days before the meeting date. The intimation should also contain (as attachments) specific details about the project in the form of a system description (see section 8.1) and a brief note on the SCARS methodology followed in AAI. If the safety assessment requires the presence of an expert with specialized knowledge (e.g. *Aircraft Maintenance Engineer with B777-200 license*), the mail / letter should reflect this need.

- 5.3.2 The responsibility of sending intimation to stakeholders lies with the Project Manager. Project Manager should coordinate with the Process Owner and the Safety Manager (Facilitator of the assessment) before finalizing the date, time, venue and agenda of the assessment.

5.4 Arrangements

Safety assessment meetings should be conducted in a room with basic conference facilities. Computer, overhead projector, white board with markers, writing sheets, and pencils should be provided. Copies of system description, SCARS Form, appropriate drawings and procedures should also be made available to the participants. Tea / Coffee and drinking water should be provided. If the exercise is expected to last more than 2 hours, light snacks should also be arranged.

The environment should be conducive for brainstorming activity, where decisions will be taken after discussions. The participants should be facing one another, with the facilitator controlling the proceedings.

5.5 Role of Project Manager

The Project Manager is the domain expert of the project. She/he should be able clarify any doubts raised by the participants. The meeting should start with a presentation by the Project Manager, preferably using the overhead projector, about the project being assessed, even though the participants might be having prior knowledge about the project having read the system description mailed to them in advance.

5.6 Role of Facilitator

The facilitator's task is to:

- guide the meeting through the different steps of the SCARS and/or risk assessment process. The facilitator should make a brief presentation about the methodology adopted in AAI immediately after the presentation by the Project Manager.
- assist in stimulating a thorough and systematic search for hazards
- keep the discussion focused on the subject under discussion
- assist the Project Manager in:
 - filling up the SCARS Form
 - obtain the necessary signatures in the SCARS Form
 - collect proof of attendance from all participants
 - preparation of HAZLOG
 - preparation of final set of documents to be send to CHQ etc.
 - periodic review of the proposed mitigation measures
 - transferring risks to Operational Risk Assessment Register on completion of the project

A recorder for recording the proceedings may be employed. Alternately, the facilitator himself can record the proceedings.

5.7 Role of Stakeholders

Stakeholders should nominate the right persons for attending the safety assessment meetings. The nominees should be asked to study the system description and SCARS methodology before attending the meeting. They should be able to contribute to achieving the objectives of the meeting from the stakeholder's perspective.

5.8 HazID Workshop

If the SCARS Form indicates a MODERATE or MAJOR change, preparation of HAZLOG is mandatory for which a HazID workshop needs to be conducted. However it is strongly recommended to conduct the HazID workshop even when the magnitude of change is MINOR, so that those hazards identified in the PHA can be effectively managed.

The HazID workshop may be conducted in continuation of the SCARS meeting. The hazards identified in the PHA can be assessed first, followed by identification and assessment of more hazards. The participants can also be asked to identify hazards in

consultation with their colleagues and mail them to the Process Owner / Facilitator within a specified deadline.

HazID workshops primarily employ brainstorming technique to identify hazards. Other methods like Failure Mode and Effects Analysis (FMEA) may be used for specific cases (assessment of equipments, etc.).

- Section 3.3 of Safety Risk Assessment Practices Attachment (AAI-SAF-105) to C-SMS Manual provides details of HazID and FMEA techniques.
- *International Standard ISO/IEC 31010 on Risk Management-Risk Assessment Techniques describes various tools and techniques available for risk assessment process, many of which can be applied in the aviation context.*

5.9 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.

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. These collection of Hazards may be transferred into a MS Excel worksheet of Hazard log template provided in **DGCA SSP Division Circular 1 of 2012**.

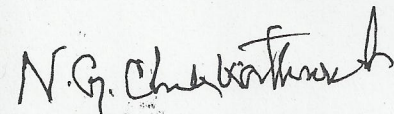
5.10 Feedback

It is recommended to keep stakeholders informed about the progress of the project. Important milestones like approvals from DGCA, commencement of work, date of commissioning etc. should be informed during interface meetings with stakeholders.

6 **Clarifications**

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

Directorate of Aviation Safety
Airports Authority of India
Rajiv Gandhi Bhavan, Block – C
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