The Canadian Safety Management Programme

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Introduction and aim

The new safety programme of the Soaring Association of Canada (SAC) is presented. It was developed as a major initiative in 2005, in a drive to improve safety overall. Why do we need this now? Our major accident rate has not been improving, and there are indications that unless a major effort is made now, we will continue to see unacceptable accident rates and consequently high insurance rates. A majority of the Association's members support this major initiative, the primary goals of which are:

- to reduce flying accidents that cause damage and injury to as low a level as is reasonably achievable,
- to preserve life and equipment, and
- to promote the sport of gliding in the most cost-effective and safe manner.

A major aim in this programme is to identify risk areas and to develop safety and training strategies for club use. With the participation of as many club members as possible, we believe the national accident rate can be reduced.

The national programme is based on Safety Management System (SMS) principles and relies heavily on Transport Canada's initiatives to implement Safety Management Systems (SMS) into Canadian Aviation organisations in 2005/2006. Although there is no legal requirement for gliding clubs and indeed for the Soaring Association to implement SMS, we decided that as a national organisation we would do so voluntarily. The SAC programme now has been developed. It is structured with a safety review and feedback process, an accident and incident reporting system and a recognition system. And the SAC Board of Directors (BoD) is fully committed to the success of the programme.

The overall programme is simple though at the same time comprehensive. It is designed to improve the management of safety by involving the Association and club leaders all of whom are tasked with driving the national programme and the programs at each club. This is a cooperative programme that is designed to involve as many pilot members as possible. *A team approach is considered essential*.

Structure and role

The SAC Safety Management Programme involves the Association BoD and all member clubs. The BoD drives the overall program, and reviews safety and the progress of the programme at each meeting of the BoD, and at all general meetings of the Association. Each autumn the BoD is to appoint (or re-appoint) a *Director of Operations*, with the specific responsibility for overseeing implementation and continuing maintenance of the Association's Safety and Training Programs nationally, and for reporting to the BoD and to all general meetings of the Association. The appointed person normally will be the chairman of the Flight Training and Safety Committee (FTSC).

Figure 1 shows how the programme is managed, with the Board of Directors of the Association responsible for the overall program. They approve the safety and training programme documents that are developed by the FTSC under the Director of Operations. These members also produced the Safety Programme Standard that defines the required club programme to the club leaders, who in turn produce the Safety Programme Manual for their club.

A review and feedback process from and to the member clubs is performed by the FTSC which reports and is responsible to the SAC BoD through the Director of Operations on behalf of the membership. The FTSC consists of a small number of volunteer members from Association clubs who are appointed to represent their regions in Canada, supported by a network of Regional and club Safety Officers and Chief Flying Instructors. The FTSC mandate includes the design and delivery of training and safety programs, materials and information, reviews of training and safety issues, and the making of related recommendations to all clubs through the CFIs, Safety Officers, *Free Flight*, and regional seminars.

Background

Although there was a Safety Programme in place prior to 2006, it did not specifically require safety management activities at the clubs. It was more of an administrative arrangement that included for example appointment of a safety officer, and how to report accidents. The Safety Programme has been largely updated to require the management of a safety through defined activities within all clubs. The national programme was agreed and approved by the BoD early in 2006. The current and future board-of-director members are the ones who now drive the programme within the Association. The programme has a champion to keep it a working system, and this is the Director of Operations. The BoD members recognize that the safety programme must be dynamic and receive their full support. By identifying safety as a core interest of the board and by seeking the full cooperation of all clubs we believe that we will have a good overall national safety program.

The Association and all clubs are tasked within the new programme to define:

- the main risk areas,
- their safety goals, and
- performance objectives.

Other elements may be identified as applicable more to clubs or to the Association, and all pilots and members, of whatever experience level, are being encouraged to discuss these with their club leaders and Association leaders as appropriate. The following section shows the elements of the programme that are applicable equally to the Association and to its member clubs.

Risk areas, safety goals, performance measurement targets and safety performance objectives

Risk areas for safety management in the Association and its clubs

We have identified a number of areas that require further work both at the national and club levels. These are shown in Fig. 2.

Safety management at each club ultimately falls to the CFI and the Safety Officer. The Standard for clubs now requires that a club *Director* take the responsibility for the Safety Programme at the club, so that the financial backing and authority of the board of directors is implicit. This reflects the requirement for large aviation organisations in Canada to appoint a board member as the *accountable executive* who is legally responsible for implementing and maintaining the company's Safety Management System.

Training Standards have been in place for a number of years and improvements are made from time to time. The OSTIV Training and Safety Panel (TSP) has been a great source of ideas for improvements to the training curriculum. The TSP has held a few flying seminars; these followed regular panel meetings. This flying has allowed comparisons of national methods, and the refining of training techniques. The Canadian training programme has certainly gained from this interaction. This all goes to improving the competence of all trainee pilots and indeed of the instructors who provide the training!

Safety Audits have been used in Canada by clubs for several years, following discussion of the British (BGA) Safety Audit at a TSP meeting. The audit has been invaluable to some clubs that found their operating methods were lacking, for example. The audit now forms a required part of the Safety Programme – it is used to assess the success/progress of the programme at each club.

We recognise that new members to a club are not always given safety training or briefings. This training now must be part of the member's formal training in the club. It is to be supervised by the CFI.

We could discuss the subject of safety culture *ad infinitum*! One of the aims of the Association's Safety Management Programme is to provide quick and useful feedback to clubs when they send in an accident or incident report. Also we try to respond to other requests for assistance in a positive and helpful manner. By responding in this way to how we *do business*, we hope to illustrate to the general club member that it is useful to discuss problems and to try and resolve them in positive ways, without the fear of a penalty or sanction against the individual who may have been involved. In other words we want to provide a *generative* type of safety culture that club members will wish to emulate. We have discussed the different types of culture that may exist in an organisation before, but to remind readers, Fig. 3 shows the differences between the three readily identified types of culture. In the first column, the pathological culture, the first item (are you interested in safety information?) does not apply to any of us. I say this with some assurance because all of us deny we are pathological! I suggest that if a person reacts to the first column with "It does not apply to me" then we do have a problem. At one time or another, all of us have denied that we were responsible for something; "No I did not eat that fruit"! On a more serious note, you may know of someone who tried to tell you or *The Club* that there is a safety concern with some aspect of the operation. The club was not listening to this messenger; the leaders did not want to know about the problem. OK, you – the leader – thought the so-called problem was of little immediate concern so you did not act on the message.

We can follow the columns to the bottom row to show how an organisation views safety, and how decisions are made. Notice how a bureaucratic culture looks at failures in the system, at safety concerns and indeed how the bureaucratic club leaders look at new ideas. Compare this to the generative culture's response. If there is a large enough problem seen by members who have agreed to take action, then the members will act on this, and soon. In this way we can say that the culture in that club is definitely not pathological! No one wishes to be called pathological you say. So my reply is, act. If safety is at issue, is it not worth taking that corrective action?

Returning to Fig. 2, instructor training has been centralized for many years but as you may imagine, the sheer size of Canada presents problems for those wishing to be trained as instructors. I have known pilots travel by car over 2000 km to attend an instructor course! And that did not even cover half the country's width! We continue to offer courses in the East and West in English, moving the location to different clubs within the region so that pilots do not travel far, only the course director! Courses are run in the Quebec region in French. Added to this there are some clubs that run their own courses, with different degrees of success. We have standardized the course content and attempt to get clubs to use the same materials. All candidates write the Association's exam on the theory and practical aspects of flying instruction. In this way we try to maintain standardization of the curriculum and the flying standards that are reached by ab-initio pilots at each club.

The Association's Flight Training and Safety Committee is working on training materials for the standardization of type conversions. By collecting notes from clubs on the different types of glider that pilots will be converting to (from early solo gliders to high-performance 15m and larger types, including motor-gliders), we plan to make comprehensive notes available generally to all clubs, typically through the Association's website. We are of course very grateful also for input from OSTIV TSP delegates, the notes taken at the TSP meetings and flying Seminars are a good source of such material.

In Canada we typically have a six-month period when we are in deep freeze! Some enterprising pilots fly south but the majority of pilots go through mandatory club checkouts at the start of each season. Even then some pilots do not maintain reasonable levels of competency because they do not fly often enough. *I think I can do it*, the pilot says to himself – but the instructor has doubts, and this is based on statistics and knowledge of how little that pilot flew last year! We believe this is a safety concern, just as much as pilots not recognising their own shortcomings are also safety problems.

Having identified this and other safety problems, the Safety Management Program requires us to look at these problems, or risks, and to work on reducing these risks. First though, we are to set goals (Fig. 4).

Safety goals for the Association

Do we need to discuss these goals? They all make sense, but without action being taken they mean nothing! Now all members are given the implicit task of keeping their leaders honest, by asking for safety to be discussed whenever members go to a club or association meeting, or when they have an instructors meeting for example. This has not happened always in the past, and one wonders how widespread this lack of concern for safety really is? Are people in denial (that they have a problem)? Glider pilots are a very opinionated group of individuals and getting them all *singing the same tune* is difficult at the best of times. Hence this first goal is to work more towards a generative type of safety culture within all clubs.

The Clubs are now required to go through the exercise of *Identifying Hazards* and the associated Risks as part of upgrading or implementing their own safety programmes. Similarly the Association will do the same.

A *hazard* is a condition or situation that could lead to a loss or injury; waiting to catch the unwary. It could be a pre-existing (or latent) condition or an immediate situation arising within an activity. A risk is the chance of a loss or injury, described with its probability and severity. Clubs and their members are to assess hazards, giving priority to the situations listed in Fig. 5.

We ran workshops across the country early in 2006, to introduce the programme and to go through a typical hazard evaluation and risk assessment with all pilots who attended. Each workshop produced interesting lists of hazards. The hazards were separated into categories such as administration, supervision (for example at the launch point), the safety programme itself, the airfield and its infrastructure, the pilots, launch point operations, maintenance operations, and so on. As an example, we identified some typical hazards in the category of *supervision and launch point operations*. They are listed in Fig. 6.

The next step in the process is to assign a *severity* to each hazard. There are two components to risk: the severity or consequences of an event if it occurs, and its *probability* or probable *frequency*.

The hazards are assessed using the frequency of occurrence and the levels of severity, as shown in Fig. 7:

A. Catastrophic (Loss of equipment or assets, fatal injuries)
B. Critical (Major damage to equipment or assets, major injury)
C. Marginal (Minor injury, minor damage)
D. Negligible (No injury, no damage)

It is easier to use this matrix to assign a number to each hazard. These numbers are somewhat arbitrary but the overall intent is to identify the major or highest risks. Here a number 1 signifies a bad risk assessment and 8 a good risk assessment. We might want to act immediately on risks that show a 1, 2 and 3. A category 4 risk is undesirable, and will likely require a management decision whether to accept the risk or act to reduce it, i.e. will this risk level be acceptable? A 5 or 6 may require management review. Risks 7 and 8 are probably acceptable and may be dropped off the list.

The result of this assessment is a list of the highest risks that have to be eliminated or at least reduced. We believe that the club's agreement is required for all the unacceptable risks, starting with the most severe risk. Risk control may warrant immediate attention from the Board of Directors before all the analysis is done, then a longer-term solution may be developed to handle that risk. Other risks may require urgent action.

The *Strategies* for reducing these risks was completed next at the workshops. At a club it would be submitted to the club's BoD, with suggested time-frames to fix them. This part of the work might require consultation with those who would be responsible for doing the work to fix the problem. It is important to get their acceptance of the risk level for that hazard, and of the need to eliminate or reduce it.

The club's Director of Safety, as part of his or her *job description*, has to monitor progress with the risk reduction actions taken by the club, and to report on progress to the BoD.

We believe we will achieve a major reduction in the rate of severe accidents by this process, and indeed a reduction in the small but annoying incidents that are of course a precursor for a more severe accident. But how do we measure progress?

Performance measurement targets

Each club and indeed the Association are asked to state their targets for safety improvements in the above categories. Safety performance is a difficult subject to measure! However there are certain activities that can be monitored from one year to the next to measure progress. Others may be considered and added to the lists shown in Figs. 8 and 9.

Safety performance objectives

A number of activities are now being started in the Association and our Clubs to meet our safety performance goals. The main activities are shown in Fig. 10.

It is interesting to note that there are distinct differences between clubs, in part because of the remoteness of some locations and differences in the cultural backgrounds of the population centres across this large expanse called Canada. Some of these activities try to recognise these points and we are now increasingly taking advantage of the Internet to provide materials on the Association's website.

Emergency Response Plans

All clubs are required to prepare an emergency response plan, and to include this in the club's Standard Operating Procedures (SOPs) manual. The plan must contain immediate actions to be started as soon as possible under an *Emergency Coordinator* (senior club member who is present). The plan is to include further sections on: Follow-up Actions, Notification of Authorities and any other tasks such as handling of the media.

Analyses

We believe it is important that all members in a club, particularly those involved with the safety program, understand the basic safety process. It is accomplished in several steps shown Fig. 11. Two important steps are included, the first being that the initial report must be acknowledged to the individual. If the report was written anonymously then the acknowledgement can be made for example in the club's newsletter or e-group. If this step is omitted and no action is taken, the reporter will be less likely to report next time! Following analysis and resolution of the problem a document should be prepared so that a record of the activity is available for future reference. The next important step is to provide feedback to the initial reporter. It does not end there. The report now must be used in the club's on-going safety improvement activities!

Data from clubs, Transport Canada, the Aero Club of Canada, FAI, OSTIV and others are analyzed annually/biannually to determine international trends and to alert our clubs to safety concerns and areas of operations that might require some form of action.

We are increasingly analyzing our incidents and accidents to learn from the mistakes of others. The Canadian Transportation Safety Board is required to investigate all accidents, and will produce a factual report on the fatal and more severe gliding accidents. The Association is beginning to also investigate to try and determine the human and other factors, which may have been involved. The process is designed to provide data that can be turned into *lessons learned* that will be passed on to all clubs.

Documentation

After an amendment to the club Safety Programme Manual is approved by the BoD, it is important that updated pages be made available to all manual holders to ensure updated manuals only are used by members.

The Safety Programme Standard requires records be kept of activities within the Club Safety Programme as shown in Fig. 12.

Reporting

Information is provided to the Association's FTSC through incident and accident reports submitted by individual members and club safety officers. Club safety officers also are required to report annually and to include their incident analysis summaries. The FTSC meets annually to discuss safety issues and analyze data, review the training manuals and associated procedures, and to plan the future work of the committee. Information is disseminated in the annual report to the membership at the Association Annual General Meeting and in the national magazine *Free Flight*, together with articles in *Free Flight*, in letters and notices to clubs, and at flying courses and clinics. Electronic information is available through the Internet on the SAC website, and current issues are discussed on the round table electronic bulletin board.

And we are now contributing to the Transport Canada Aviation Safety Newsletter, to reach all pilots in Canada!

Recognition at the national and club levels

Individual efforts towards safety and the promotion of flight training to high standards are critical parts of any Safety Programme. The club safety culture, the attitude of leadership and their professionalism in approaching safety issues within their club, also are principal elements of any club safety programme. In this context and at the national level SAC recognizes the effort required, and annually awards trophies to the Top Instructor (the Walter Piercy trophy), and for the best contribution to safety by an individual, group or club (the Hank Janzen trophy). Annually SAC clubs are invited to submit suitable candidates, but also are encouraged to recognise similar achievements at the local level through their own rewards and awards programmes.

Discussion

Our Association is facing serious challenges to improve safety. At the end of 2005 we had an unacceptable number of accidents each year. Looking at numbers of fatalities, used for international comparisons, the Canadian situation might appear to be acceptable. Many would say that one fatality is one too many however. Analysis of the fatal accident statistics over a 19-year period and comparing the results to many other gliding countries showed Canada to be near the bottom of the list overall. The numbers of pilots per accident, gliders per accident or launches per fatal accident showed us to lag behind. Canada typically had about 34,000 launches per fatality. The average for the 12 countries analysed was approximately 74,500 launches per fatality. A total of 59 million launches were recorded. Canada recorded an average of one fatal accident per 1,508 members in the period, or approximately one fatality per year. Best performer was

Norway with one fatal accident in 23 years per 9,081 members. Accident trends in Canadian soaring show approximately 1.5 fatal accidents per year in the past 5 years.

The challenge for the Association and its member clubs is to find ways to lower the accident rate immediately, and to maintain a lowering rate for the next several years, in an attempt to reduce substantially the number of fatal accidents.

Conclusions

The Association leadership does not believe that there is any magic solution to reducing accidents; we all have to be involved. For example, we recognise that many of the international members of OSTIV have excellent safety programs. Given the challenges we face with our geography, the short flying season, and lack of resources, we believe a simple though comprehensive programme to improve the management of safety by the Association and Club leaders will offer substantial benefits when all members are involved.

Acknowledgments

I would be remiss if I did not acknowledge the considerable help we received in setting out our programme from the excellent materials produced by Transport Canada in their Safety Management System documents. The one of particular interest is their guide for small operators.[1] Also Jeppeson's materials are great resources[2], as are Reason's[3] and more recently Wiegman's and Shappell's[4] all of which to a greater or lesser degree influenced our work.

References

[1]TP 14135 - *Safety Management Systems for Small Aviation Operations* - A Practical Guide to Implementation.. Transport Canada publications.

[2]Richard H. Wood. (2001) *Aviation Safety Programs: A Management Handbook*. Englewood, Colorado. Jeppesen Sandersen Inc., ISBN 0-88487-329-3.

[3] Reason, J.(1997) *Managing the Risks of Organizational Accidents*. New York: Ashgate.

[4]Wiegmann, DA., and Shappell, SA. (2003). *A Human Error Approach to Aviation Accident Analysis*, Ashgate Publishing, Aldershot, UK and Burlington, VT.,USA.

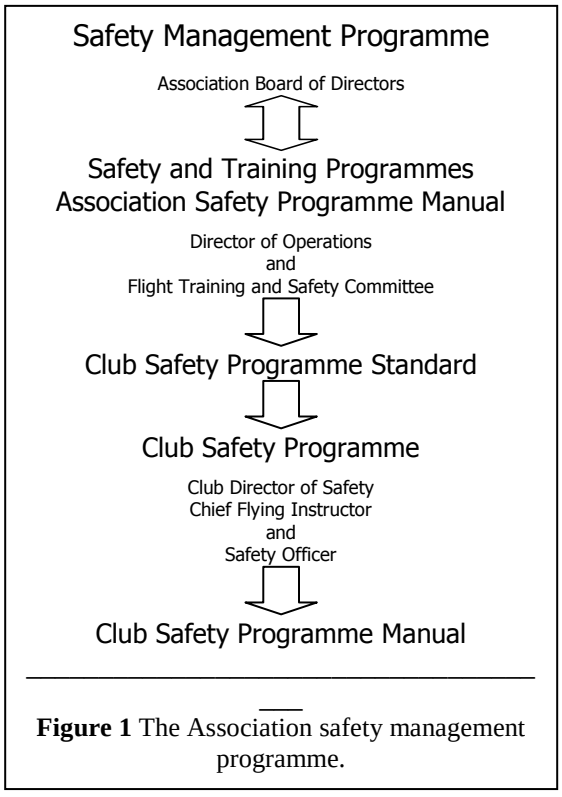

Figure 1 The Association safety management programme.

* Safety - Chief Flying Instructor and Safety Officer Roles
* Training Standards – updating of standards/curriculum for ab-initio training within all clubs
* Safety Audits
* Safety Training – all pilots to get standardized training
* Safety Culture – is culture anti-authority, authoritarian or generative?
* Instructor Training and Currency
* Type-conversion training – are common standards available?
* Pilot flight time/annual currency each season
* Pilot skill levels self-recognized?

Figure 2 Safety management risks.

Pathological Culture	Bureaucratic Culture	Generative Culture
Don't want to know	May not find out	Actively seeks it
Messengers (whistle blowers) are shot	Messengers are listened to, if they arrive	Messengers are trained and rewarded
Responsibility is shirked	Responsibility is compartmentalized	Responsibility is shared
Failure is punished or concealed	Failures lead to local repairs	Failures lead to far-reaching reforms
New ideas are actively discouraged	New ideas often present problems	New ideas are welcomed

Figure 3 How different organisational cultures handle safety information.

* Safety issues are to be on the agenda of all (SAC, Provincial and Club) annual and regular meetings, BoD meetings, seminars & courses, etc.
* Identify Hazards and Risks at the Association and club levels
* Develop strategies and take action to reduce identified risks
* Reduce severity and frequency of preventable accidents

Figure 4 Safety goals for the Association.

* When major operational changes are introduced
* During implementation of changes or upgrades to the club's safety programme
* If the club is undergoing major changes such as rapid growth or decline, introducing new equipment or changed procedures
* When changes occur to the club leaders, such as appointment of a new CFI or SO, and after elections of new directors
* If financial difficulties start to affect decisions

Figure 5 Hazardous conditions to assess first by clubs.

* High workload for flight-line personnel during multiple towplane operations
* Poor communication between pilots, ground crew and towpilots/winch operators
* Pilots rushing through pre-launch checks
* Feeling fatigued and being pressured into "taking one more flight"
* Vehicles left close to runways and aircraft, or in unauthorized areas
* Launching incorrectly ballasted glider (e.g. overweight or very light-weight passenger)
* Failing to maintain good control of flight operations by *duty pilot* or other club leaders
* Poorly designed or unused flight cards by instructors
* Inadequate checklists (e.g. for rigging, cross-country flights)
* Lack of emergency equipment, procedures and training
* Poor communication for maintenance requirements (flying with minor snags)
* Difficulty obtaining parts
* Confusing signs (access control for members of public to active runway areas)

Figure 6 Some hazards for supervision and launch point operations.

Frequency of Occurrence	Hazard Categories			
	A. Catastrophic	B. Critical	C. Marginal	D. Negligible
Frequent	1	2	3	4
Probable	2	3	4	5
Occasional	3	4	5	6
Remote	4	5	6	7
Improbable	5	6	7	8

Figure 7 Risk assessment table.

* Reporting within clubs and to the Association
* Feedback within the Association and to clubs by the Association
* Participation by members of clubs to perform Safety Audits
* Acknowledgement of reporting by individuals and clubs
* Numbers of fatal and write-off accidents

Figure 8 Performance measurement categories.

* Set goals and targets for completion of tasks to reduce high-risk hazards [Clubs and Association]
* Increase incident/accident reporting [Clubs and Association]
* Increase/improve safety feedback/communication within the Clubs and Association
* Improve analysis of incidents and feedback to members

Figure 9 Performance measurement goals.

* Produce safety materials and publish on Association website
* Encourage clubs to increase seasonal flying activity and currency through promotional and financial incentives
* CFI to sign off on safety training
* Association representatives to visit clubs to assist with safety audits, and conversion training with CFIs
* Safety Audit reporting to be on a 2-year cycle, and CFI audits (internal to clubs) available for annual checks
* Update training materials for students and instructors – and publish as PDF files on website
* Safety Culture to be driven by Association and club management teams, and by pilot behaviour

Figure 10 Safety related activities.

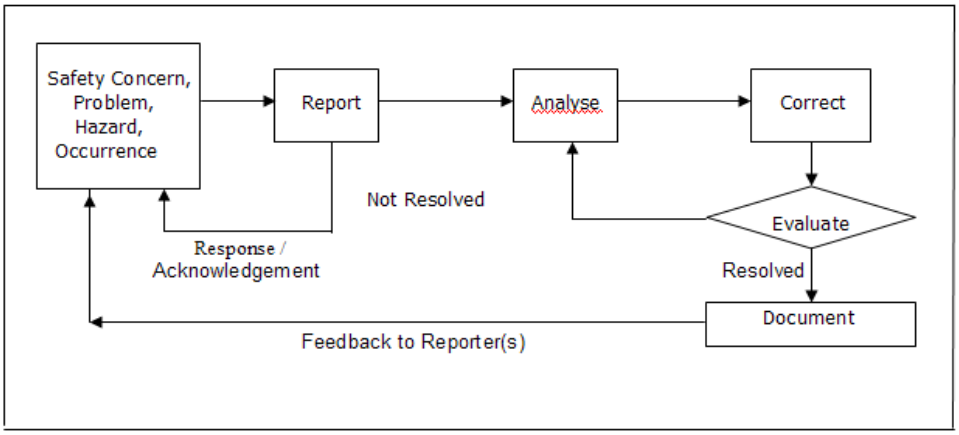

Figure 11 The basic safety process.

* All activities related to identification of hazards, risk assessments, and actions taken
* Results of all investigations of accidents and incidents, including analyses and actions taken
* All safety reports that are issued or received, and actions taken
* Any safety recommendations and *safety alerts* issued to club members (by e-mail, club newsletter, posting on notice boards, etc)
* Reports of the Emergency Coordinator and any follow-up documentation following an emergency event
* Findings of internal club audits, assessments and programme reviews, and
* Actions of the club board of directors regarding the club's Safety Programme

Figure 12 Record keeping requirements under the Club Safety Programme.