SAFETY MANAGEMENT SYSTEM (SMS)

Summary Analysis Report 2020

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Table of Contents

Page

ACKNOWLEDGEMENTS

The CSPA Technical and Safety Committee has prepared this report under the authority granted to it by the CSPA Board of Directors.

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1 - INTRODUCTION

The Canadian Sport Parachuting Association (CSPA) integrated the Safety Management System (SMS) into the existing Accident/Incident/Malfunction (AIM) system back in 2014. Since then, the yearly SMS report has provided general statistics gathered from submitted AIM reports with a breakdown into four (4) categories within the skydiving industry:

(1) Tandem Skydives,
(2) Student Skydives,
(3) Experienced Skydives, and
(4) Aircraft.

The CSPA Technical & Safety Committee (T&SC) concluded in 2019 that there were areas of opportunity for a more in-depth SMS Summary Analysis Report provided to the skydiving community each year. The primary goals of the SMS Summary Analysis Report are:

- To assess areas of opportunity gathered from AIM reports that pose potential risk in skydiving;
- Minimize recurrence through education and awareness;
- and utilize trending analysis to modify and/or implement skill development material as needed.

With these goals in mind, the T&SC is hopeful that the skydiving community has another tool in the toolbox to support their long-term development in our sport.

2 – ACCIDENT/INCIDENT/MALFUNCTION (AIM) REPORTING

2.1. Purpose

An AIM report is a formal recording of the facts related to an accident, incident, and/or a malfunction. The report usually relates to an accident (any occurrence resulting in injury requiring medical attention or a fatality), or incident (any occurrence which could have resulted in a situation leading to injury or fatality) that has occurred. It also pertains to any unusual occurrences where a partial or complete malfunction of the equipment may have led to the initiation of emergency procedures. The sole purpose of the AIM report is to enhance safety and assess preventative measures.

2.2. Gathering of Information

Any incident that involves skydiver, staff, and/or customer safety should be recorded, no matter how insignificant it may seem. An investigation of what happened should be undertaken as soon as possible after the incident occurs and after any injured person(s) have been taken care of. The report that is generated as a result should provide a full account of what took place.

Following an occurrence, it is strongly recommended to submit an AIM report to CSPA's National Office. The CSPA Registered Participant involved, CSPA Coach, Instructors, Riggers, or other qualified personnel should submit the report directly to CSPA National Office, and we strongly recommend a copy be given to the involved dropzone for their records. In the event of an accident, injury, fatality and/or 3rd party loss, CSPA requires immediate notification and AIM reports must be filed within ten (10) working days of the occurrence.

2.3. How the AIM is used for analysis

All AIM reports received by the CSPA National Office, are reviewed for completion. Any AIM reports not completed properly will be returned with a request for proper completion. Gathered from the AIM reports are key areas of interest to assist in the SMS analysis, including but not limited to, type of occurrence, total jump numbers, and description of the occurrence. Details pertaining to participant(s) and location are kept confidential and not used for the SMS analysis.

Once AIM report data is entered into the SMS report data, the occurrence is categorized into four (4) categories within the skydiving industry:

(1) Tandem Skydives,
(2) Student Skydives,
(3) Experienced Skydives, and
(4) Aircraft

For each occurrence, the detailed description of the event and the recommendations of the Dropzone Safety Officer (DZSO) are carefully reviewed. A further breakdown of occurrence type and/or trend is applied. This includes such categories as Exit, Deployment, Freefall, Canopy, or Landing and is a general categorization of the main event described. Participant's total jump numbers and months since last jump were added to the SMS report data in 2020. This was in direct response to concerns surrounding the shorted skydive season because of the COVID-19 global pandemic. The T&SC wanted to further assess the impacts of currency and potential skydiving occurrences and trends. CSPA SMS data is also compared to CSPA historical results, and the International Skydiving Committee (ISC) Safety Survey Report to help identify any common trending and/or unique occurrences.

Upon entry and categorization of information of all AIM reports, the designated T&SC members begin to compile the qualitative data to identify trending and areas of opportunity for the skydiving community. As occurrences are identified, proposed action plans are provided. The goal of the proposed action plan(s) is to provide the skydiving community references for prevention, education, and coaching. Reference material often refers to areas within the CSPA Parachute Information Manuals (PIMs), manufacturers guidelines, and other CSPA source documents. Furthermore, each occurrence identifies who the proposed action plan is best suited for, such as but not limited to, the jumper, packer(s), coach(s), and/or instructor(s).

Upon completion of the SMS, the detailed AIM data report and statistics are posted to the CSPA website for reference, including the historical comparisons for the benefit of the skydiving community.

3 – 2020 AIM RESULTS

3.1. Overall AIM Submissions Statistics

In 2020, a total of eighty-two (82) AIM reports were submitted. This is an increase of 32.25% over a submission of sixty-two (62) AIM reports in 2019 (Table 1: Total AIMs Reported). It is important to understand that an increase in AIM reports is not to say specifically that there were significantly more occurrences in 2020, as there are many factors that may have attributed to the increase, including but not limited to, more awareness and use of AIM reports. We know that all occurrences are not reported through an AIM report for a variety of reasons. Most noted from past years, is the lack of AIM reports when an occurrence is not considered significant and/or did not result in an immediate injury. It is our hope that the AIM report is utilized more frequently even in occurrences that may seem less significant such as a low-speed malfunction resulting in emergency procedures being implemented and a successful landing in the designated landing area. Although it may appear it was a non-event because no one was injured, the occurrence itself can be useful in identifying trends and opportunities for further education.

Although we can conclude that not all occurrences may have been reported, we still believe it is important to analyse the data we are supplied with for potential areas of opportunity and preventative action plans to reduce the occurrence rates year after year. It is however observed that AIM reports are more likely to be completed for occurrences with Tandem Skydives, therefore providing us a more accurate reflection of the historical rate of occurrence in this area.

Looking at the overall breakdown, Student occurrences saw the largest increase in 2020 compared to 2019 (50% increase), while Experience occurrences saw an increase of 30.3%, and Tandem occurrences recorded a 28.57% increase (Table 1: Total AIMs Reported). More in-depth review by occurrence categories will be discussed later in this report.

TABLE 1: Total AIMs Reported

	2020	2019	2018	2017	2016	2015	2014
Tandem	27	21	20	28	20	1	10
Student	12	8	36	18	21	7	9
Experience	43	33	36	46	37	15	30
Aircraft	0	0	1	2	4	0	1
Total	**82**	**62**	**93**	**94**	**82**	**23**	**50**

Given that 2020 had unique external factors to the regular skydiving operations across our country and globally, because of the COVID-19 pandemic, the data raises concerns pertaining to the increase of occurrences despite a shortened season, or in some areas complete closures of dropzones for the entire season. Of particular interest to the T&SC is the correlation between increased occurrences and skydiver currency. Although remaining current within our industry is of great value to all skydiving safety, the trends seen as we analyzed further into the 2020 data did not specifically identify lack of currency as the main area of potential risk. As we looked at Student and Experienced categories, only four (4) of the fifty-two (52) AIM reports identified the jumper to have not jumped within the prior three (3) months. It is important to consider that throughout the 2019/2020 winter months (October thru March) in Canada, travel to the USA and other countries was still permitted and therefore remaining current throughout the winter season was not significantly different from previous years. The impact of closures due to the pandemic began in the month of April at the time when many Dropzones in Canada were

preparing to open for the season. Most Dropzones were able to re-open in June resulting in extending the length of time since most individuals would have completed their prior skydive. Additionally, the changing climate of the pandemic resulted in travel restrictions outside of Canada for the 2020/2021 winter months (October thru March). As a result, the T&SC will continue to monitor and assess the potential impacts of currency as it relates specifically to reported occurrences in the 2021 skydiving season.

Reviewing the breakdown of total occurrence types, data indicated that most of the overall increase was seen in reported Malfunctions with an increase of 52.63% in 2020 compared to 2019 (Table 2: Total AIMs Reported by Type). This can be accounted for as we look closer at the occurrence types within each category. We can see a 71.43% increase in Deployment occurrences within the Experience category in 2020 compared to 2019 and Deployment occurrences accounting for 60% of all 2020 AIM report submissions for the Experience category (Table 3: Total AIMs Reported by Category and Occurrence Type).

Accidents had a 25.00% increase and Incidents with a 20% increase for 2020 overall occurrence types (Table 2: Total AIMs Reported by Type). A total of two (2) fatalities occurred both within the Experience category. Landing occurrences account for 55.56% of all 2020 AIM report submissions for the Tandem category and 58.33% of all 2020 AIM report submissions for the Student category (Table 3: Total AIMs Reported by Category and Occurrence Type). Whereby we see a decrease of 17.65% in landing occurrences for the Experience category in 2020 compared to 2019.

TABLE 2: Total AIMs Reported by Type

	2020	2019	2018	2017	2016	2015	2014
Accident	45	36	57	54	36	2	19
Incident	6	5	15	10	16	2	10
Malfunction	29	19	20	26	25	18	17
Fatality	2	2	0	2	1	1	3
Total	**82**	**62**	**92**	**92**	**78**	**23**	**49**

*Aircraft occurrence are not reflected in this chart

TABLE 3: Total AIMs Reported by Category and Occurrence Type

	Tandem 2020	Tandem 2019	Student 2020	Student 2019	Experience 2020	Experience 2019
Exit	2	2	2	0	0	0
FreeFall	0	0	0	0	1	0
Deployment	8	5	1	3	24	14
Canopy	0	0	1	0	1	0
Landing	15	14	7	5	14	17
Other	2	0	1	0	2	0

3.2. Tandem Skydive AIM Statistics

Based on the total submitted AIM reports for 2020, accidents accounted for 74.07%, with an increase of 42.86% over 2019 of the Tandem category (*Table 4: Total AIMs Reported for Tandem Occurrences*).

Table 4: Total AIMs Reported for Tandem Occurrences

	2020	2019	2018	2017	2016	2015	2014
Accident	20	14	13	22	12	0	5
Incident	1	2	1	2	3	0	1
Malfunction	6	4	6	4	5	1	4
Fatality	0	1	0	0	0	0	0
Total	**27**	**21**	**20**	**28**	**20**	**1**	**10**

As previously mentioned, landing occurrences account for 55.56% of all 2020 AIM report submissions for the Tandem category (*Table 3: Total AIMs Reported by Category and Occurrence Type*). Looking at all factors that were described in the AIM reports for each occurrence relating to landing, the following information was gathered:

- 40% was related to customers not lifting their legs upon landing
- 25% was related to wind conditions such a turbulence and wind gusts at landing
- 25% was related to an ineffective flare
- 5% was related to a low turn at landing
- 5% was related to obstacles
- 5% was unknown

Malfunctions accounted for 22.22% of all 2020 AIM report submissions in the Tandem category (*Table 4: Total AIMs Reported for Tandem* Occurrences), indicating an increase of 50% over 2019. A breakdown of the occurrence resulting in a partial and/or complete malfunction, the following was identified:

- 50% preformed Emergency Procedures (EPs) successfully due to Line Twists
- 16.67% preformed EPs successfully due to broken lines
- 16.7% preformed EPs successfully due to a line over the canopy
- 16.7% preformed EPs successfully due to a step through

It was also noted that two (2) accidents were recorded due to issues with the canopy (one had a broken line and the other had a rip on the top skin). In these events, emergency procedures were not initiated, and it was recorded as a landing occurrence.

3.3. Student Skydive AIM Statistics

Based on the total submitted AIM reports for 2020, accidents accounted for 75%, with an increase of 80% over 2019 in the Student category (*Table 5: Total AIMs Reported for Student Occurrences*).

Table 5: Total AIMs Report for Student Occurrences

	2020	2019	2018	2017	2016	2015	2014
Accident	9	5	27	13	16	1	5
Incident	1	1	7	1	2	1	1
Malfunction	2	2	2	3	3	5	3
Fatality	0	0	0	1	0	0	0
Total	**12**	**8**	**36**	**18**	**21**	**7**	**9**

As previously mentioned, landing occurrences account for 58.33% of all 2020 AIM report submissions for the Student category (*Table 3: Total AIMs Reported by Category and Occurrence Type*). Looking at all factors that were described in the AIM reports for each occurrence relating to landing, the following information was gathered:

- 44.44% was related to flaring technique
- 22.22% was related to medical incidents during skydive that resulted in the inability to flare adequately
- 22.22% was related to obstacles in the landing area
- 11.11% was related to lack of response to the Ground Control Instructor (GCI)

Although malfunctions only accounted for 16.67% of all Student occurrences, it was noted that there were two (2) situations in which the Automatic Activation Device (AAD) was fired. In both these situations, the student had stability issues during their freefall. In one (1) situation the student was unable to locate their pilot chute resulting in the student's initiation of the D-Ring (Reserve Handle) to deploy the reserve.

3.4. Experienced Skydive AIM Statistics

Based on the total submitted AIM reports for 2020, malfunctions accounted for 48.84%, with an increase of 61.54% over 2019 for the Experience category (*Table 6: Total AIMs Reported for Experience Occurrences*). Accidents accounted for 37.2%, with a decrease of 5.88% over 2019.

Table 6: Total AIMs Report for Experience Occurrences

	2020	2019	2018	2017	2016	2015	2014
Accident	16	17	17	19	8	1	9
Incident	4	2	7	7	11	1	8
Malfunction	21	13	12	19	17	12	10
Fatality	2	1	0	1	1	1	3
Total	**43**	**33**	**36**	**46**	**37**	**15**	**30**

A closer analysis of the Experience category AIM reports indicated that deployment occurrences accounted for 57.14% of the total submissions (*Table 3: Total AIMs Reported by Category and Occurrence Type*). There was also an increase in Deployment occurrences of 71.43% compared to 2019. In the deployment occurrences, 79.17% initiated Emergency Procedures. Looking at all factors that were described in the AIM reports for each occurrence relating to deployment, the following information was gathered:

- 45.83% was related to line twists
- 16.67% was related to a line over
- 12.5% was related to a hard opening
- 8.33% was related to a step through
- 4.17% was related to the failure to pull the pilot chute
- 4.17% was related to tension knots
- 4.17% was related to a premature deployment of the reserve parachute
- 4.17% was related to unusual canopy flight

In reviewing all the AIM reports submitted for the Experienced category, it was noted that Landing occurrences accounted for 33.33% of reported overall occurrences in 2020 (*Table 3: Total AIMs Reported by Category and Occurrence Type*). Landing occurrences accounted for 86.67% of all reported accidents in the Experience category and 100% of reported fatalities in 2020. Looking at all factors that were described in the AIM reports for each occurrence relating to landing, the following information was gathered:

- 23.81% was related to irregular wind conditions at landing:
    - Downwind landing accounted for 40%
    - Turbulent wind conditions accounted for 40%
    - Crosswind landings accounted for 20%
- 19.05% was related to intentional and/or unintentional low turns
    - Fatality occurred in 50% of the reported low turns
- 14.29% was related to flare technique
- 14.29% was related to landing patterns
- 9.52% was related to obstacles in the landing area
- 9.52% was related to off dropzone landings
- 4.76% was related to inexperience on reserve parachute
- 4.76% was related to equipment

Additionally, it was noted that 11.90% of all AIM reports for the Experienced category was a wingsuit flight. There was one (1) reported occurrence with Canopy Formation, in which a canopy collision occurred.

3.5. Aircraft AIM Statistics

There were no recorded occurrences for Aircraft in 2020.

3.6. Fatality AIM Statistics

A total of two (2) fatalities occurred both within the Experience category. Both fatalities appear to have happened during an intentional fast landing, after the successful deployment of the main parachute.

4 – CONCLUSIONS

Although it is important for case by case occurrences to be reviewed, there are some key common occurrences across both Student and Experience categories that can be addressed. Reviewing existing educational tools can benefit the skydiving community.

- Reviewing malfunctions often will help jumpers deal with most situations that can occur at opening (PIM2B; Section 6.1.1 *Canopy Malfunctions Review*, p156-161)
- Review and practice of Emergency Procedures should be conducted regularly (CSPA PIM2A-2009; Section 3.3 *Activation of Reserve (Emergency Procedures*), p24-31).
- Review educational material on *Landing Techniques* (CSPA PIM2A-2009; Section 6.7, p112-113), *Landing Pattern* (CSPA PIM2A-2009; Section 6.9, p114-117), and *Landing Problems and Solutions* (CSPA PIM2A-2009; Section 6.17.5, p141-143)
- Review and practice the Parachute Landing Fall (PLF)
- Review the CSPA Sport Canopy Endorsements document and practice appropriate canopy skill(s) related to areas of performance opportunity
- Review proper body position during deployment, (CSPA PIM2A-2009; Section 5.4 *Activation*, p66)

Additionally, it is important to consider the following:

- Review of equipment specific packing procedures should be completed and consult with a Rigger if necessary
- Assess, flag, and/or repair potential obstacles and hazard areas in landing area, such as uneven ground, animal holes, drainage, and so forth to minimize potential injury
- Anticipatory skills can be improved if you learn and practice skydiving skills in the sequence in which they occur, and mentally and physically rehearse the skydive and your emergency procedures, therefore a focused review on *Section 2 Preparation: Mental and Physical* (CSPA PIM2A-2009; p10-22)

Of key importance for skydiving instructors and coaches, the following should be considered:

- Instructors should review unusual situations and assess personal currency prior to jumping with students. Progressive Freefall Instructor (PFFI) Course reference manuals are a good resource for unusual situations review.
- GCI should ensure accurate coaching and personal currency
- Instructors should ensure detailed information pertaining to individual skydive performance is recorded accurately in students logbook (CSPA PIM2A-2009; Section 2.5 *Logging,* p21-22).

5 – SUMMARY

According to the 2019 International Skydiving Commission (ISC) Safety Survey Report, it was concluded that human error on the part of the skydiver accounted for 80% of all reported fatalities in 2019 (based on data supplied by 46 countries). The ISC Technical & Safety Committee also reported that this percentage was consistently high over many years. Therefore, pointing to the constant need to reinforce training and safety procedures at all levels in skydiving.

It is important to recognize your limitations, including but not limited to, currency, skill level, external inputs, and personal inputs. Review of CSPA PIM2B; Section 6.3.1 *Factors Affecting Human Performance* (p162-163) will assist in recognizing possible performance inhibiting factors. Additionally, jumpers should regularly review the CSPA Sport Canopy Endorsement document to ensure a safe transition during training and to assist in their overall skills development and awareness. Exercising caution, common sense, self-discipline, control, alertness, and better judgment is highly recommended to help ensure continued safety. Never attempt anything beyond your skill level, or without first consulting a certified coach experienced in that discipline.

6 – REFERENCES AND RESOURCES

- CSPA PIM 1: Basic Safety Rules and Recommendations
  https://www.cspa.ca/sites/default/files/PIM%201%20March%202020.pdf

- CSPA PIM 2A: Basic Skydiving Skills https://www.cspa.ca/sites/default/files/PIM2A_0.pdf

- CSPA PIM 2B: Recreational Skydiving Skills
  https://www.cspa.ca/sites/default/files/PIM%202B%20May%202016.pdf

- CSPA PIM 2C: Advanced Skydiving Skills https://www.cspa.ca/sites/default/files/PIM2C_0.pdf

- Long Term Development (LTD) Flight Plan
  https://www.cspa.ca/sites/default/files/LTAD_SpreadsWeb_FNL_EN.pdf

- Sport Canopy Endorsements
  https://www.cspa.ca/sites/default/files/Sport%20Canopy%20Endorsements%202020.pdf

- Safety Day
  https://www.cspa.ca/en/safety/safety-day

- Technical Recommendations
  https://www.cspa.ca/en/safety/technical-recommendations

- Equipment Technical Bulletins
  https://www.cspa.ca/en/safety/equipment-technical-bulletins

- Safety Management System
  https://www.cspa.ca/en/safety-managment-system

- AIM Report
  https://www.cspa.ca/en/aim-reports