



Report of Investigation into

Capsizing

of the Sailing Dingy

Stratos No.9

in Stanley Bay to the west of Bluff Head

on 18 August 2005



MARINE
ACCIDENT

The Hong Kong Special Administrative Region
Marine Department
Marine Accident Investigation Section

Glossary of Terms and Abbreviations

- CPR - Cardiopulmonary Resuscitation
- GRP - Glass Re-enforced
- HKO - Hong Kong Observatory
- HKSF - Hong Kong Sailing Federation
- HKYA - Hong Kong Yachting Association
- LCSD - Leisure and Cultural Services Department
- RHKYC - Royal Hong Kong Yacht Club
- RYA - Royal Yacht Association

Purpose of Investigation

This incident is investigated, and published in accordance with the IMO Code for the Investigation of Marine Casualties and Incidents promulgated under IMO Assembly Resolution A.849(20). The purpose of this investigation conducted by the Marine Accident Investigation and Ship Security Policy Branch (MAISSPB) of Marine Department is to determine the circumstances and the causes of the incident with the aim of improving the safety of life at sea and avoiding similar incidents in the future. The conclusions drawn in this report aim to identify the different factors contributing to the incident. They are not intended to apportion blame or liability towards any particular organization or individual except so far as necessary to achieve the said purpose.

The MAISSPB has no involvement in any prosecution or disciplinary action that may be taken by the Marine Department or others resulting from this accident.

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1. Summary

- 1.1 Sometime after 1145 on 18 August 2005, the sailing dinghy *Stratos No. 9* capsized in Stanley Bay to the west of Bluff Head (Figure 1).



Figure 1 Location of the accident

- 1.2 At the time of the incident, the weather conditions were fair with southwesterly wind of about 16-22 km per hour (8-11 Knots). However, in Stanley Bay, the sea conditions were unusual, with irregular sea swell and waves.
- 1.3 Onboard *Stratos No. 9* were the Assistant Instructor and 3 students. After capsizing, the dinghy rolled over and became totally inverted. One of the students was trapped under the inverted dinghy.

- 1.4 Despite attempts by the Assistant Instructor and a few minutes later by the instructor from the Safety Boat, *M68*, and later again, by passing fishermen, the trapped student could neither be released nor the dinghy righted. He was subsequently rescued by the Marine Police and admitted to hospital. He was certified dead by the attending doctor.
- 1.5 The investigation identifies that the cause of capsizing of the dinghy was a sudden onset of an irregular bigger wave from the starboard quarter of *Stratos No. 9*. The student was drowned after he was trapped under the dinghy for a prolonged period of time.
- 1.6 The investigation also identifies the other likely contributory factors to the incident with recommendations to RHKYC to prevent similar accidents from happening again.

2. Description of *Stratos No. 9*

2.1 Particulars

| | | |
|---------------------------|---|----------------------------|
| Owner | : | Royal Hong Kong Yacht Club |
| Type | : | Sailing Dinghy |
| Built | : | 2001 |
| Construction | : | GRP |
| Length | : | 4.94 m |
| Beam | : | 2.0 m |
| Unladen weight | : | 185 kg |
| Maximum number of persons | : | 6 |
| Maximum load | : | 450 kg |



Figure 2 *Stratos No. 9*

3. **Sources of Evidence**

- 3.1 Assistant Instructor and students of *Stratos No. 9*;
- 3.2 Assistant Instructor and students of *Stratos No. 11*;
- 3.3 Instructor and students of *Sandpiper*;
- 3.4 Instructor and Master of Safety Boat *M68*;
- 3.5 Crew members of fishing vessel *M64468A*;
- 3.6 Royal Hong Kong Yacht Club (RHKYC);
- 3.7 The parents of Master Jonathan Chin, the deceased;
- 3.8 Leisure and Cultural Services Department (LCSD); and
- 3.9 Hong Kong Observatory

4. **Outline of events**

- 4.1 A 5 Day Youth Multi-Watersports Course from 15-19 August 2005 was organized by Royal Hong Kong Yacht Club (RHKYC) for students aged over 9. The course included activities such as sailing, wake boarding, water-skiing, tubing and raft building dependent on available facilities/Instructors (Annex I). It was advertised that “the course is designed to be a fun 5 Day on the water and no experience is required for any of these activities”. The only requirement was for students to be able to swim competently. There were 10 students enrolled in the course. This type of course had been run by the RHKYC throughout the summer since 1999, each of which included the passage sail to Stanley. Prior to 18 August 2005, there had been four trips to Stanley in the same boats during July and early-August 2005.
- 4.2 The course included a previous sailing outing which was uneventful from 15-17 August 2005.
- 4.3 On 18 August 2005, the course was led by 2 Instructors and 2 Assistant Instructors.
- 4.4. Before leaving Middle Island, the RHKYC Sail Training Manager stated that the Senior Instructor, Instructors and himself checked the weather forecast in the Middle Island office. The forecast was much the same as that for the day before (17th August), with winds of Force 3-4 from the southeast going to the southwest later, and a possibility of thunderstorms. Since there had been no thunderstorms experienced the day before, the Sail Training Manager checked the Hong Kong Observatory (HKO) website and established that no lightning strikes had been recorded in the region that morning (18th August). Despite the absence of wind around Middle Island, they all considered that it was suitable for sailing.
- 4.5 At approximately 1015, the Instructors, the Assistant Instructors and the 10 participating students departed from Middle Island

proceeding to Stanley Bay via Deep Water Bay by 3 sailboats, namely one open keelboat (*Sandpiper*), and two sailing dinghies (*Stratos No. 9* and *Stratos No. 11*) escorted by a motor vessel, namely the safety boat *M68* with an Instructor on board (hereinafter named as Alpha).

4.6 The 10 students were split into the following 3 groups:

- 4 students on board *Sandpiper* led by one Instructor (hereinafter named as Bravo)
- 3 students on board *Stratos No. 11* led by one Assistant Instructor (hereinafter named as Charlie)
- 3 students on board *Stratos No. 9* led by one Assistant Instructor (hereinafter named as Delta)

4.7 *M68*, *Sandpiper* and *Stratos No 11* were equipped with a marine VHF radio on board for communication.

4.8 When leaving the Middle Island, the weather conditions were cloudy with a chance of heavy rain. There was little wind. The journey from Middle Island to Stanley Bay was about 3.5 miles and is not too exposed to weather conditions.

4.9 The weather deteriorated about three-quarters of an hour into the passage sail, as the boats were crossing Repulse Bay. A rain squall brought stronger wind for a 10 to 15 minute period but once the rain was past, the wind weakened to 7-10 knots. *Sandpiper* was ahead followed by *Stratos No. 11* and *Stratos No. 9*.

4.10 Sometime about 1100, the Sail Training Manager was in VHF contact with Bravo to establish the status of the group. Bravo advised that all boats were sailing safely in Chung Hom Kok Bay and the wind was dying so there was no apparent reason not to continue on to Stanley. The LCSD Stanley Water Sports Centre was also running courses in St. Stephen's Beach in the same conditions.

- 4.11 However, as the boats got around Chung Hom Kok point into Stanley Bay, the sea became rough with irregular swell of about 1 to 1.5metres high running. The sea state was unusual but not considered by the Instructors to constitute a danger to the boats and crew.
- 4.12 At about 1145, when *Sandpiper* was in the vicinity of Stanley Bay, Instructor Bravo noticed the sea was unusually rough with occasional large swell. Being the boat with the slowest speed, he chose the most direct route sailing towards Stanley.
- 4.13 Upon reaching the entrance of Stanley Bay, *Stratos No. 9* experienced Force 3 wind (7-10 Knots or 13-18 km per hour) coming from the starboard quarter with irregular waves of about 1.3 metres high coming from the same direction as the wind. A larger wave caused *Stratos No. 9* to roll and it accidentally broached to windward and capsized.
- 4.14 The dinghy was lying on its starboard side with all 4 people in the water. Delta stated that a student proceeded to climb over the dinghy causing it to invert completely.
- 4.15 With the dinghy inverted, one of the students reported to Delta that another student had swum or gone down under the dinghy. Delta stated that she went under the dinghy to find him and having located him, she tried to pull him out. She managed to bring his body out but could not get his head above the water.
- 4.16. Charlie stated that when *Stratos No. 11* arrived at about several hundred metres off Bluff Head, he looked back and saw *Stratos No. 9* overturned. He was not feeling concerned as this was a usual happening in sailing. He saw *M68* rushing towards *Stratos No. 9*. *Stratos No. 11* continued its trip to Stanley Bay and arrived there after *Sandpiper*.

- 4.17 *M68* arrived at *Stratos No. 9* shortly after it capsized. On being told about the trapped student, Alpha jumped into the water to help Delta to rescue him. Alpha found the student did not have a buoyancy aid on at that point of time.
- 4.18 Alpha and Delta failed to pull the student up from underneath of the inverted dinghy. He sent the other 2 students to *M68* and then tried to right *Stratos No. 9* but failed due to the action of the waves and the dinghy being too heavy for him.
- 4.19 At Alpha's shouted request, a passing fishing vessel *M64468A* stopped and rendered assistance. A fisherman from *M64468A* jumped into the sea to assist. He was aware that one of the legs of the student was entangled.
- 4.20 During the rescue attempts made by Alpha and the fisherman, a police launch arrived and 5-6 crew members of the police launch jumped into the water to take over the rescue. After considerable effort they managed to release the trapped boy by cutting a rope at the end of the starboard trapeze wire. They then pulled the student out from the dinghy.
- 4.21 The police officers immediately conducted Cardiopulmonary Resuscitation (CPR) to the student. A police patrol boat then conveyed the student to Marine Police South Division Base and sent him to the hospital.
- 4.22 The student was certified dead by the attending doctor.
- 4.23 *M68* later arrived at Stanley Bay to disembark the two young students from *Stratos No 9* and for Alpha to check that all was well with the other boats students.
- 4.24 After the accident, the planned activity on the fifth day of the 5 Day Youth Multi-Water Sports Course was cancelled.

5. Analysis of Evidence

5.1. Certification and experience of the Instructors

- 5.1.1 Alpha held a certificate of RYA Dinghy Instructor issued by Royal Yacht Association (RYA) on 22 July 2005. The certificate is valid for five years from date of issue. He was a certified Assistant Instructor in 2001. He had about 7 years of sailing experience by attending sailing course at the RHKYC. He had been employed by RHKYC as a part-time Assistant Instructor for 4 years. At the time of the accident, he was a part-time sailing Instructor of RHKYC.
- 5.1.2 Bravo held a certificate of level I Instructor issued by Canadian Yachting Association (CYA) on 31 July 2003. He was also a part-time Instructor of RHKYC.
- 5.1.3 Charlie held a certificate of Assistant Dinghy Instructor issued by the Hong Kong Yachting Association (HKYA) on 1 November 2002. The certificate is valid for 3 years. He was also awarded a Level 5 training of Sailing Course by Hong Kong Sailing Federation (HKSF) in March 2005. Since November 2002, he has been employed by RHKYC as a part-time Assistant Instructor.
- 5.1.4 Delta successfully passed the HKSF Level 3 dinghy course and received the HKSF certificate on the 8th March 2005. As a result of her attainment, she was qualified to be on the 'approved helms list' which is a prerequisite to hire Stratos Dinghies. This qualification also provided her with the entry requirement for the HKSF Assistant Instructors course. In June – July 2005 she successfully completed the HKSF Assistant Dinghy Instructor course run by the RHKYC under the HKSF syllabus and examined by an HKSF Senior Instructor. Pending application to the HKSF for her

certificate, she was awarded with a RHKYC Assistant Dinghy Instructors certificate in accordance with the Club's normal practice. As an RHKYC Assistant Instructor Delta was qualified to assist on RHKYC Courses. The Multi-Water Sports Course was the first time for her to be employed as a part-time Assistant Instructor by RHKYC.

- 5.1.5 The Sail Training Manager stated that as a result of the accident, the application for Delta was not made until September 2005, resulting in the certificate not being received from the HKSF until December 2005

5.2 Certification of *Stratos No. 9*

- 5.2.1 As for all dinghies without a fitted engine *Stratos No. 9* is not required by Hong Kong statutory regulations to be licensed. Furthermore, there are no requirements for the dinghy to be surveyed periodically and maintained at regular interval. RHKYC stated that before and after using a dinghy, the Instructor would inspect it to make sure that it was in good condition.
- 5.2.2 Two certificates were issued by Irish Sailing Association and Royal Yachting Association respectively (Annexes II and III) to certify this type of dinghy was assessed to conform with the requirements of the EU Recreational Craft Directive 94/25/EC and the stability is found to conform with the relevant parts of ISO 12217.
- 5.2.3 *Stratos No. 9* was inspected by a Marine Department surveyor on 24 August 2005 and its hull was found intact except a fracture damage of 12.7 cm x 1.27 cm was observed on the port side shell amidship just above the chine line (Figure 3). The vessel was equipped with

necessary fittings for sailing and no unusual features or modifications to the vessel were observed.



Figure 3 Fracture damage of 12.7 cm x 1.27 cm on the port side shell amidship just above the chine line

5.3 Weather conditions

5.3.1 According to the Hong Kong Observatory, the weather conditions at Bluff Head on the morning of the incident were showery with southwesterly wind at a speed of about 20 km per hour (10 Knots) gusting to about 30 km per hour (15 Knots).

5.3.2 The Poor Weather Procedures of RHKYC stipulate that :

- If the Red/Black Rainstorm or No. 3 (or higher) Typhoon Signal is hoisted, all courses will be cancelled.
- If Thunderstorm Signal is hoisted, all water activities close to Middle Island can continue unless thunder is heard or lightning seen.

- If Strong Monsoon Signal is hoisted, water activities for higher level courses can continue.

5.3.3 According to the instructors, there had been a rain squall for 10-15 minutes with wind gusting to about 27-36 km per hour (13-19 Knots) but this subsided at the time of the incident. However, the sea conditions in Stanley Bay were unusual with irregular sea swell and waves.

5.4 Safety Boat *M68*

5.4.1 According to the Senior Instructor of RHKYC, *M68* was equipped with the following items:

- (1) a licence
- (2) navigational lights
- (3) a tool kit
- (4) a pair of wire cutter (Figure 4)
- (5) 3 buoyancy towlines
- (6) first aid supplies
- (7) a VHF radio set at channel 72
- (8) a fire extinguisher
- (9) a deadman's switch
- (10) petrol reserve
- (11) lifejackets



Figure 4 Wire cutter carried on board M68

5.4.2 The items were more or less the same as those carried on the Leisure and Cultural Services Department (LCSD) safety boat except the wire cutter carried by LCSD safety boat is very handy and can be operated with only one hand (Figure 5).



Figure 5 Wire cutter carried on board LCSD safety boat

5.5 Buoyancy Aids

5.5.1 The buoyancy aids provided by RHKYC for all course participants on the day of the incident were manufactured by “Crewsaver” which is a leading British company in the field of sailing safety gear. The model worn by the deceased was EN393 standard which is suitable for sheltered inshore use where help is nearby (Figure 6). This model does not self-right the wearer face up in water. It is the zip type, colour-coded green which is certified for a small/medium body size of 40-70 kg. It is considered that the colour-coded green buoyancy aid was adequate for the deceased. Other than colour-coded green, there are also colour-coded purple, red and blue for a child/junior of 30-40 kg, medium/large body size over 70 kg and extra large size over 70 kg respectively.



Figure 6 Small/Medium body size of 40-70 kg buoyancy aid

5.5.2 Alpha stated that all Instructors and himself had checked that all students had put on buoyancy aids while some of the students stated that the Instructors had not checked their buoyancy aids. The

instructors point out that the students had been wearing the buoyancy aids on all days during the course and by the fourth day, checking to ensure that the aids were being worn and of the correct size may have been visual only.

- 5.5.3 Alpha stated he saw a colour-coded green buoyancy aid floating on the sea nearby *Stratos No. 9* when he was trying to rescue the deceased. It is believed that the buoyancy aid belonged to the deceased. It is assumed that when the Assistant Instructor tried to pull the deceased's head out of the water by grabbing his buoyancy aid, the buoyancy aid became dislodged and came off from him.

5.6 Water Sports Safety Guidelines

- 5.6.1 RHKYC provides Instructor Guidelines to the Instructors (Annex IV). The guidelines do not appear to instruct the Instructors in details the safety procedures before sailing. RHKYC states that the safety procedures are engrained in instructors during the rigorous training to gain their instructor qualifications.
- 5.6.2 LCSD provides Water Sports Centre Safety Guidelines for water sports centre which cover the general conditions that arise frequently in water activities (Annex V). These LCSD Safety Guidelines include some safety measures to be taken when entangled in rope and trapped inside a capsized dinghy.
- 5.6.3 The manufacturer's rigging manual of Stratos dinghy has a chapter covering the capsize technique (Annex VI). The contents describe the recommended capsize technique, which is the standard method adopted by RHKYC for capsize recovery of all types of dinghy. A copy of the Manual is kept by the Senior Instructor at Middle Island.

5.7 Safety measures

- 5.7.1 The HKSF's guidelines stipulate the Instructor to participant ratio for sailing is 1 to 6. Therefore 4 Instructors looking after 10 students are considered adequate.
- 5.7.2 The RHKYC's Sail Training Guidelines stipulate that all students under 9 years old shall wear helmets at all times when undertake Step Courses. Beyond these courses, it is at the Instructor's discretion whether to impose the requirement dependent on weather conditions and/or the students' abilities. The Instructors considered helmets were not necessary for the prevailing conditions.
- 5.7.3 The RHKYC Sail Training Manager of RHKYC stated that students were not given a practical capsized drill before either of the two sailing days of the course (on 17 and 18 August) because this Multi-Watersports Course was an accompanied sailing outing with either an instructor or an assistant instructor on board each boat. The accompanying instructor or the assistant instructor would verbally brief the students before setting sail on what to do in the event of a capsized. The Sail Training Manager stated that from the past records of RHKYC, it was known that some of the students had previously undertaken a capsized drill in the other training courses. In the subject Course's pre-Course briefing, only two participants had indicated that they had no previous sailing experience. Neither of these two students was onboard *Stratos No 9*. However, it is considered that a practical capsized drill would be more appropriate than just a verbal briefing.
- 5.7.4 At the time of the incident, the RHKYC's entire fleet of *Stratos* dinghies was equipped with mainsails in-built flotation panel at the head of the sail designed and supplied by the *Stratos* manufacturer, to reduce the risk of the capsized dinghy from totally inverting. This flotation system had served the purpose in the 4-5 years of use at RHKYC, with no serious inversion problems being experienced in

training courses and during hiring for racing or casual sailing.

5.7.5 RHKYC stated that it had no reason to consider adopting any other form of masthead buoyancy for the boats, particularly in view of the lack of alternative suitable systems being available on the market. However, as a result of the accident and in recognition that the mainsail flotation panel failed to resist inversion in the conditions prevailing on the day, additional masthead flotation devices have now been fitted to the boats. These have been designed by the Club and made locally by a sailmaker. Figure 7 illustrates the type of additional mast head flotation device consisting of a fully inflated tube.



Figure 7 Inflated Tubes type Additional Mast Head Flotation Device

5.7.6 The Stratos dinghies are fitted with trapeze wires. The trapezes are provided for crew with sailing experience to use to help keep the dinghy sailing flat under good wind conditions. With less wetted surface when sailing flat, the dinghy sails faster through the water. When using the trapezes, the crew wears a body harness with a device to hook onto the wire's adjustable rope tail and stands up on the boat's edge leaning out to windward (Figure 8).



Figure 8 Students use the trapeze wire to balance the dinghy under strong wind.

5.7.7 There is no requirement to remove the trapeze wires if not being used and these are stowed in a standard arrangement at the front of the boat's cockpit. However if the trapeze wires are stowed in such position, the danger of entanglement exists.

5.7.8 It is reported that *Stratos No 11* had put a spinnaker sail up whilst crossing Stanley Bay and was sailing at a speed faster than *Stratos No 9* which preferred to sail under a jib and mainsail only, but was still going at a speed faster than *Sandpiper*. RHKYC states that to stop to wait for boats to catch up is less stable than keeping the dinghy sailing, particularly in a seaway. Therefore, it can be difficult

and impracticable to keep all boats together at all times when under sail. In any event, *M68* had tried its best to render immediate assistance to *Stratos No 9* as soon as it overturned.

5.8 Probable cause of the accident

- 5.8.1 Delta had difficulty in controlling *Stratos No. 9* when hit from behind by an irregular wave in the rough sea resulting in the capsize and she had difficulty in rescuing the entrapped student after *Stratos No 9* was inverted.
- 5.8.2 After capsizing of *Stratos No. 9*, one of the students had clung to *Stratos No. 9* making it invert faster.
- 5.8.3 According to the Autopsy Report, it appears that the left leg of the deceased was accidentally entangled by the trapeze wire. It was evident that a segment of the trapeze wire was kinked into a circle measuring roughly 30 cm in circumference (Figure 9). Once his left leg was entangled, it was very difficult for him to set it free because the trapeze wire was connected to an elastic cord which was secured to the gunwale of the dinghy. The elastic cord and the connection rope was subsequently cut off by the Marine Police but the deceased had already been drowned after submerging in the water for a prolonged period of time.



Figure 9 The Trapeze wire was kinked with a loop

- 5.8.4 In the emergency situation, Alpha did not have the opportunity to effectively organize others to work as a team to right *Stratos No. 9* and with the poor underwater visibility caused by the wave action it appears he was not aware at first instance that the deceased had been entangled by the trapeze wire.
- 5.8.5 From the autopsy report, the cause of death of the deceased appears to be drowning. He had suffered various injuries to his left forehead, nose, left loin, right arm, right shin and left leg.

6. Conclusions

- 6.1 Sometime after 1145 on 18 August 2005, the sailing dinghy *Stratos No. 9* capsized in Stanley Bay to the west of Bluff Head.
- 6.2 Onboard *Stratos No. 9* were the Assistant Instructor and 3 students. After capsizing, the dinghy eventually inverted. One of the students was trapped under the inverted dinghy.
- 6.3 He was subsequently rescued by the Marine Police and admitted to hospital. He was certified dead by the attending doctor.
- 6.4 The investigation identifies that the cause of capsizing of the dinghy was a sudden onset of a wave from the starboard quarter of *Stratos No. 9*. The student was drowned after he was trapped under the dinghy for a prolonged period of time.
- 6.5 The investigation also identifies the following likely contributory factors to the incident:
 - 6.5.1 In the emergency situation, Alpha did not have the opportunity to effectively organize others to work as a team to right *Stratos No. 9* and with the poor underwater visibility caused by the wave action it appears he was not aware at first instance that the deceased had been entangled by the trapeze wire;
 - 6.5.2 Delta had difficulty in controlling *Stratos No. 9* when hit by an irregular wave in the rough sea resulting in the capsizing and she had difficulty in rescuing the entrapped student after *Stratos No. 9* was inverted;
 - 6.5.3 The deceased had not been given a practical capsizing drill before sailing; A practical drill would be more appropriate than simply a verbal briefing.
 - 6.5.4 In view of the nature of this entrapment, the simple presence of trapeze wires on dinghies being sailed by young sailors is not an advisable practice;

- 6.5.5 After capsizing of the *Stratos No. 9*, one of the students had clung to *Stratos No. 9* making it inverted faster; and
- 6.5.6 *Stratos No. 9* was not equipped with a mast flotation device which might be able to prevent the dinghy from totally inverted.

7. Recommendations

- 7.1 It is recommended that a letter should be issued to the RHKYC requesting them to review their safety guidelines, safety measures and procedures for sailing to ensure safety especially procedures for capsize drill, rigging of trapeze wires and communication.
- 7.2 It is also recommended that the RHKYC should exchange information with Royal Yacht Association of Great Britain, other Yacht Association and Leisure and Cultural Services Department, Hong Kong for time to time to promote the safety of yacht sailing.
- 7.3 It is further recommended that RHKYC should ensure their Instructors and Assistant Instructors fully familiarize with procedures for handling situations in time of emergency.

8. Submissions

- 8.1 In the event that the conduct of any person or organization is criticized in an investigation report, it is the policy of the Marine Department that a copy of the relevant parts of the report is given to that person or organization so that he can have an opportunity to rebut the criticism or offer evidence not previously available to the investigating officer.
- 8.2 The relevant parts of the final draft of the report were sent to the following:
- Assistant Instructor Delta
RHKYC
- 8.3 Submissions have been received from the concerned parties and the draft report has been amended as appropriate.