Report of the Investigation

of a man overboard fatality from

the Etchells 22 keelboat

WAHOO

off Yarmouth, Isle of Wight

on 14 May 1999

File: 1/10/191

Marine Accident Investigation Branch
Carlton House
Carlton Place
Southampton

Extract from

The Merchant Shipping

(Accident Reporting and Investigation)

Regulations 1999

The fundamental purpose of investigating an accident under these Regulations is to determine its circumstances and the causes with the aim of improving the safety of life at sea and the avoidance of accidents in the future. It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame.

CONTENTS

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

BCU	British Canoe Union
BST	British Summer Time (UTC +1)
°C	measurement of temperature - degrees centigrade or Celsius
CPR	Cardiopulmonary Resuscitation
IOW	Isle of Wight
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
N	Newton, a unit of force
PADI	Professional Association of Diving Instructors
PCST	Professional Crew and Skipper Training
RYA	Royal Yachting Association
UKSA	United Kingdom Sailing Academy
UTC	Universal Co-ordinated Time
VHF	Very High Frequency (radio)

SYNOPSIS

(all times are BST)

The accident occurred at approximately 1230 British Summer Time (UTC + 1) on 14 May 1999 and was notified to the Marine Accident Investigation Branch (MAIB) by the Marine Police Unit, Cowes at 1500 on the same day. After gaining further information, MAIB Inspector, Captain Nick Beer, began an investigation on 21 May.

A student who was attending a Professional Crew and Skipper Training course at the United Kingdom Sailing Academy (UKSA), fell from *Wahoo*, an Etchells 22 keelboat **(Photograph)** while sailing with two other students off Yarmouth, Isle of Wight. The boat had gybed accidentally and the student, who was of very large build, was unable to get out of the way of the boom which knocked him overboard.

Two instructors who were accompanying the sailing boat in a diesel launch were unable to recover the student from the water, and he quickly became unconscious. After 24 minutes in the water, the student was airlifted to hospital, where despite extensive efforts to resuscitate him, first in the water and later in the aircraft and at hospital, he was eventually declared dead.

The investigation found the UKSA's safety management to be deficient, because the risks associated with this particular student's involvement in the activity were not fully assessed and minimised. The academy has since corrected this shortfall and therefore no recommendations are made.

SECTION 1 FACTUAL INFORMATION

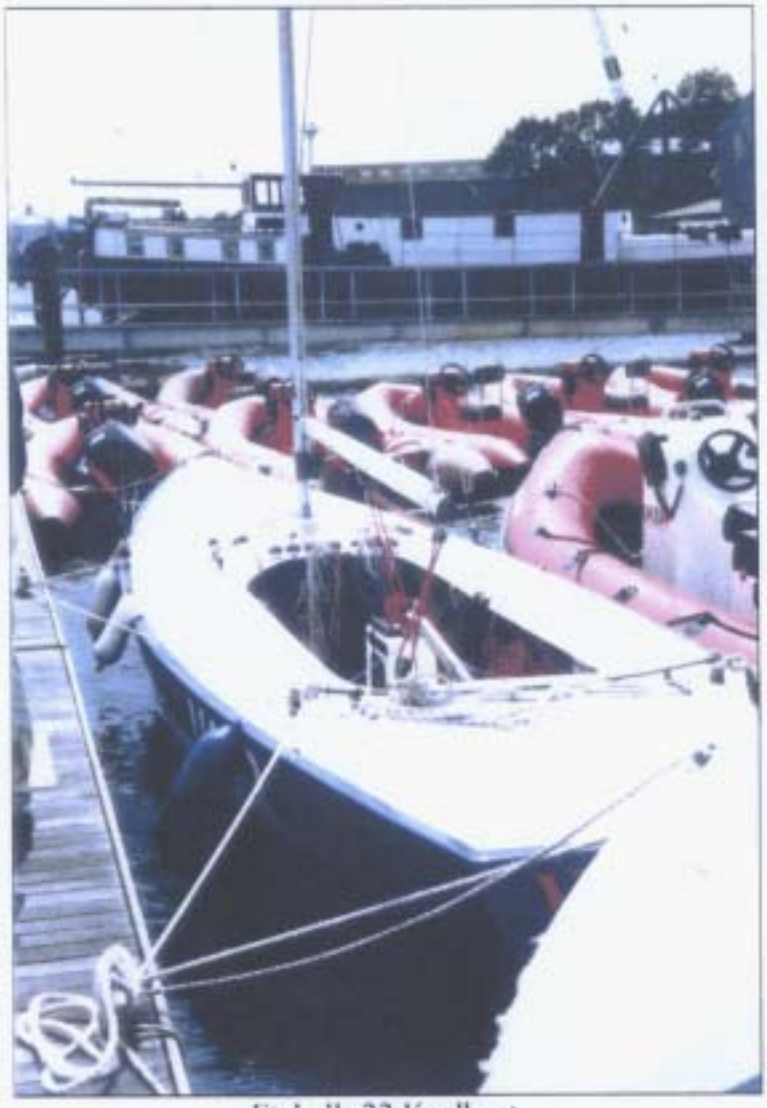
1.1 Boat and Accident Information

Boat

Name	:	*Wahoo*
Type	:	Bermudan Sloop, Keelboat
Length	:	9.2m (overall) 6.7m (waterline)
Beam	:	2.1m
Displacement	:	1.56 tons
Sail Area	:	$27m^2$
Class	:	Etchells 22
Owner	:	UK Sailing Academy
Crew	:	Three students

Accident

Accident type	:	Man overboard
Date and Time of Accident	:	14 May 1999, 1230 (BST) approx.
Place	:	Solent, 1 mile East of Yarmouth, IOW
Weather	:	Cloudy with occasional showers
Wind	:	WSW'ly 3 to 4
Sea Conditions	:	Moderate
Sea temperature	:	11°C
Injuries	:	One fatality
Damage	:	None



Etchells 22 Keelboat

1.2 Background to the Accident

The UK Sailing Academy (UKSA) is a registered charity set up to promote watersports activities for young people. The academy caters for a wide range of abilities, from complete beginner to professional yacht skipper, from its training establishments in Cowes and Barbados. The academy is licensed by the Adventure Activities Licensing Authority in respect of courses run for under-18 year olds. It operates a fleet of over 300 craft and provides training facilities for over 45,000 'day persons' each year.

Mr Goran Ekman, a 40 year old Swedish national, was attending the academy as a student and following courses designed, firstly, to get him back to sailing in general ("Jump Start") and, subsequently, to build up his experience of sailing offshore ("Mile Building"). It was planned that these short courses would serve as an introduction to the academy's Professional Crew and Skipper Training (PCST) course. The PCST course is a 17-week course designed for people wishing to pursue a career in yachting. Mr Ekman already had experience in sailing yachts and had qualified as a Royal Yachting Association (RYA) Day Skipper in 1995.

1.3 Narrative of Events (All Times are BST [UTC+1])

Mr Ekman arrived in Cowes to start his training on 7 May. He was met at the ferry landing by the instructor who was to supervise him during the introductory Jump Start course. It was at this stage that the instructor, and the UKSA, first became aware of Mr Ekman's large size. He was over 1.8m in height and 125kg in weight and, although described as reasonably fit, his mobility and agility were adversely affected by his size. Immediately it was apparent that the activities planned for his first week, especially windsurfing and kayaking, would need to be revised. It was also apparent that much of the academy's safety equipment including buoyancy aids and waterproof clothing would not be suitable.

These matters were fully discussed with Mr Ekman and it was decided that his Jump Start course would be largely based on powerboating and sailing in a Wayfarer dinghy. On the day of his arrival he was taken, by his instructor, into Cowes and then to Shanklin to purchase suitable yachting clothing and a lifejacket. His training started the following morning, sailing in a Wayfarer dinghy on the River Medina. While helming the Wayfarer, Mr Ekman got tangled in the sheets and caught up on the tiller which resulted in him falling over the side as the boat heeled in a turn. His instructor, who was in the boat, took control and, with Mr Ekman hanging on to the stern, a safety boat towed them to a nearby pontoon where two instructors pulled him from the water.

It was apparent that Mr Ekman was going to have difficulties sailing a Wayfarer because of his size, so he was shown one of the academy's keelboats, *Wahoo,* an Etchells 22. After sitting in the boat while alongside and discussing the possibilities with his instructor, Mr Ekman agreed that the sailing part of his Jump Start course would be best accomplished in a keelboat.

On Sunday 9 May and Monday 10 May, Mr Ekman underwent training towards an RYA Power Boat Level 1 certificate. On Tuesday 11 May, he had his first sailing experience in *Wahoo* which he sailed all day with two instructors. Mr Ekman took the helm for the majority of the time and on

that day received individual instruction in the operation of the boat, including all points of sail. He was considered by both instructors to be competent at sailing.

On Wednesday Mr Ekman was accompanied by two students who were undertaking their first sailing at the academy. They were both attending a fast track dinghy instructor's course and, although they had previous sailing experience, neither of them had sailed for some time. The instructors introduced the three students to the Sonar keelboat which they were to sail that day in an area in the mouth of the River Medina. The students were then left to sail the boat alone, while the instructors watched from the safety boat. In the next few minutes the students proved themselves incapable of sailing the boat safely without further instruction. An instructor re-boarded the boat and helped them sail it to a position upriver of the academy where they spent the rest of the day receiving detailed instruction.

On Thursday, Mr Ekman sailed *Wahoo* again, with the same two instructors.

At 1030 on Friday 14 May, Mr Ekman, the two students who had accompanied him on Wednesday, and the two instructors, set off for a full day's sailing. Yarmouth was the destination, where it was planned they would lunch before returning to Cowes. *Wahoo* was accompanied by the academy's 6m long Duver diesel launch. After first ensuring that the students were happy sailing the Etchells alone, both instructors travelled in the motor launch. The wind was WSW'ly force 3-4.

During the beat towards Yarmouth, Mr Ekman tended the jib sheets while one of the other students helmed and the other looked after the main sheet. The launch made a course parallel to the shore which occasionally brought them close to *Wahoo* as that vessel tacked to windward.

When the two craft had travelled about two-thirds of the way to Yarmouth, the instructors noticed that the students had not swapped duties onboard as they should have done. As *Wahoo* tacked towards the shore and close to the launch the instruction to change roles was given. Mr Ekman then took over responsibility for the main sheet.

At about 1215, as *Wahoo* tacked close to the launch again, the student who was then tending the jib sheet, said that she was feeling cold. One of the instructors passed his sailing jacket across to her. The students were then instructed to turn *Wahoo*, and start making their way downwind back towards Cowes.

The turn was accomplished and *Wahoo* began sailing on a dead run (with the wind directly astern). The instructors called to the helmsman to steer further to starboard which he did. The wind was then on the starboard quarter and both sails were set on the port side. A short time later, at about 1230, the student on the helm turned to try and hear a further instruction which had been given from the launch which was astern of *Wahoo*. As he turned, he inadvertently moved the tiller; the boat bore away and gybed.

The two instructors shouted a warning but, although two of the students were able to duck out of the way of the swinging boom, Mr Ekman was not. He was consequently pushed over the starboard side as the boom swung from port to starboard.

Immediately, the instructors manoeuvred the launch alongside Mr Ekman and instructed him to inflate his lifejacket, which he did. He had been wearing a full 150N lifejacket, which consisted of part permanent foam buoyancy and part buoyancy; achieved by oral inflation. Mr Ekman at this time was conscious and lucid. He reported that he had not been injured.

The two instructors tried to recover him into the launch using various techniques, without success. The launch had a freeboard of about 1.0m. Although initially Mr Ekman was able to assist the instructors, he quickly became tired, and eventually showed signs of panic. After about 4 minutes, Mr Ekman's eyes were seen to roll and he became unconscious. He stopped breathing very soon afterwards.

One of the instructors used the Very High Frequency (VHF) radio to broadcast a "Mayday" call to alert the coastguard. The call was overheard by another UKSA boat which relayed the emergency message to the UKSA headquarters in Cowes. The instructors tried to give mouth-to-mouth resuscitation from the launch and then one of them went into the water. In-water mouth-to-mouth resuscitation was given continually.

A coastguard rescue helicopter was tasked to attend the scene, and the UKSA's own fast rescue craft, manned by senior instructors, left Cowes to assist.

The instructors hailed a nearby fishing vessel. The fishing vessel transferred one of her crew to the launch to help. However they were unable to lift Mr Ekman into the boat.

The rescue helicopter arrived on scene at 1250 and Mr Ekman was lifted into the aircraft at 1254. Cardio-pulmonary resuscitation (CPR) was started immediately and defibrillating pads were attached to Mr Ekman's chest. It was noted that the monitor was indicating no electrical output from his heart. CPR continued throughout the short flight to St Mary's helicopter landing site at Newport IOW, where at about 1305, Mr Ekman was transferred by ambulance to hospital.

Despite further attempts to revive him, Mr Ekman was pronounced dead at 1350.

After a post-mortem examination, the pathologist concluded that the cause of death was hypothermia.

1.4 Environmental Conditions

At the start of the day the instructors obtained a weather forecast which indicated a wind from the south-west of between force 3 and 4. The evidence suggests that the wind speed might have increased slightly during the day. The wind direction and strength, as assessed by the rescue helicopter, was WSW'ly force 5.

The visibility was good and there was a moderate sea with waves of about 0.6 to 0.9m in height.

The sea temperature was about 11°C.

1.5 The UKSA's Course and Safety Management

The UKSA has developed its own quality assurance and safety management procedures. The academy does not follow any particular national or international standard, although appropriate operations are vetted by the Adventure Activities Licensing Authority, the Health and Safety Executive, and the Maritime and Coastguard Agency. Safety is taken very seriously. Each activity has undergone risk assessment scrutiny and appropriate safety rules have been adopted as a result. All instructors are trained in first aid, and good quality safety clothing and equipment are supplied. The guidelines of the national governing bodies of the various sports and activities taught, including the Royal Yachting Association (RYA), British Canoe Union (BCU) and Professional Association of Diving Instructors (PADI), are strictly followed.

Keelboat sailing at the UKSA follows the guidelines laid down by the RYA, which considers it closely aligned to dinghy sailing as far as teaching is concerned. Keelboat sailing is not one of the principal group activities at UKSA but is largely considered an extra activity used to expand the experience of students on other courses. *Wahoo* is the only keelboat owned by the academy, although Sonars have been hired on many previous occasions.

When *Wahoo* was given to the academy some months before the accident, it was assessed by the training manager for its operational and safety requirements before it was included in the academy's fleet of training boats. His proposals arising from the assessment were put to senior management for discussion. Later, "Keelboat Standing Orders" **(Figure 1)** were produced and included in the academy's Standard Operating Procedures booklet. Every instructor must read, and sign a declaration to abide by the standard operating procedures.

In general, courses are tailored to the individual needs of the student, and are arranged in detail about three weeks before the student's arrival at the academy. At this time the level of instruction is assessed in accordance with guidelines, and instructors and boats are allocated to the course/activity. On application for a place on a course, each student completes a detailed questionnaire which includes their relevant experience and qualifications. It also includes questions about medical ailments and history but does not ask details of height and weight.

As in this case, the detail of the course may be reassessed if found necessary after the student's arrival at the academy. Mr Ekman's size and weight had not been appreciated before he arrived to start his course. On his first day, his course was rearranged and special provision to equip him with safety clothing was made. As he progressed through his course and when beginning any new activity, the safety requirements were considered. Mr Ekman participated fully in these discussions. When keelboating was agreed as an activity, an additional instructor with yachting qualifications was brought into the team to assist.

In addition to complying with the general safety requirements laid down in the standing orders, each activity is reassessed with regard to the particular conditions on the day. A morning meeting is held at the start of every day, where instructors discuss their programmes with senior management and final approval for the activity to start is given. The weather forecast, tides and any special requirements of the students or instructors are considered.

The students are briefed by the instructors on their first day (general safety brief) and each day before starting any activity afloat.

Figure 1

Keelboat Standing Orders

Equipment

All keelboats used at UKSA should carry the following equipment at all times when sailing.

Buoyancy aids or lifejackets for each member of crew should be worn at all times unless express permission from the chief instructor has been given.

Bucket
Two paddles
Anchor and line
Warps and fenders
Compass

Safety boats capable of towing all the keelboats in the fleet with carrying capacity to convey all persons afloat within the designated carrying capacities of the safety boats.

Safety boats will carry, VHF, mobile phone, flares, first aid kit, survival bag, throw lines, floating lines, compass, basic tool kit with spares and charts of the proposed area of operation. If the area is between Gurnard sailing club and Norris Point charts need not be carried.

Safety boats should carry sufficient fuel for the day's activities with consideration given to the possibility of a tow back from the furthest point of the proposed sailing area.

Instructors should ensure that all participants carry spare warm clothing and that if on a passage adequate supplies of hot drinks and food is taken.

Sailing areas

Keelboat sailing will take place within a line from the Needles to Hurst Point eastward to a line from Bembridge to Chichester harbour entrance. Other areas of operation may be agreed in advance with the chief instructor or senior manager.

Due to the nature of keelboat sailing the fleet may be operating in a large sailing area therefore particular attention must be paid to group control and the instructor in charge of the fleet must remain in visual contact at all times.

Operation within the Medina

Permission to sail in and out of the Medina must be obtained from the chief instructor. Only boats with an instructor in or experienced sailors will be allowed to sail in and out of the river.

Radio procedure should be adhered to at all times.

Keelboat Standing Orders (Cont)

Grounding

In the event of grounding the Academy must be informed as soon as practically possible after attempting to refloat the boat.

If the attempt to tow the boat off fails then an anchor should be laid out towards deeper water and the boat made ready for drying out.

Stowage of boats

Upon return the boats should be cleaned, sails should be dried before they are stored and secured in a seamanlike manner using fenders and springs.

Any damage must be reported in the dinghy defect book kept in reception.

The procedures, meetings and briefings, were followed during the week, and on the day of the accident; although no formal briefing was given to the students on the Friday, the relevant information was passed informally. The general safety requirements had been discussed when the same crew had sailed a keelboat with the same instructors on the previous Wednesday. On Thursday evening Mr Ekman and his instructor had also discussed the day's planned activity and safety requirements in detail.

A safety boat was needed to accompany the Etchells 22. The UKSA's operational criteria of a safety boat to accompany keelboating activities, included the ability to tow all the craft in the fleet if necessary, and to carry everyone taking part. The Duver, being a 6m inboard diesel launch, fitted the criteria. The main foreseeable event which may make the use of the safety boat necessary was a change in weather requiring the craft to be towed back to Cowes. Secondary functions of the boat included acting as an instructional platform; the students could be allowed to sail the Etchells 22 alone, with the benefit of instruction from the launch. Most of the safety equipment including VHF radio, mobile phone, extra clothing and flares were carried in the launch.

As an extra emergency back-up, a 6m fast rescue boat is kept ready for immediate use at the UKSA headquarters building, and a VHF radio is monitored whenever boating activities are taking place. When this accident occurred, the duty manager was aware of it within a few minutes and, despite the fact that it had happened about 8 miles from Cowes, the fast rescue craft manned by senior management was on scene within 35 minutes.

1.6 The Principal People Involved

1. The Instructors

   Mr Ekman's instructor for the Jump Start course was 26 years old. He held relevant qualifications including first aid, and as an RYA instructor in dinghy sailing and powerboating. Before the week of the accident, his only experience in keelboats was instructor induction training at the UKSA. He had worked for the UKSA for about 12 months.

   The additional instructor, who was brought in for her yachting qualifications and experience, was aged 20 years. She held relevant qualifications including first aid and as an RYA dinghy instructor and an RYA yachtmaster's offshore certificate. She had worked at the UKSA since the Monday of the week of the accident. She had previously gained about 36 hours experience sailing keelboats. She did not hold an RYA keelboat instructor's certificate, but she had the relevant qualifications and experience necessary to hold one. The UKSA is able to examine for and issue such a certificate.

2. The Students

   Mr Goran Ekman, a Swedish national, was 40 years old at the time of the accident. He had gained RYA qualifications as day skipper, coastal skipper/yachtmaster (theory) and yachtmaster ocean (theory) on previous visits to England. He had also attended a five-day RYA course on practical boathandling. He had attended these courses at other sailing

schools. He had over 2000 miles sailing experience as a crew member, mostly on large yachts. He was described by his instructors as a confident and competent sailor. He was 1.85m tall and weighed over 125kg. He took regular exercise and, although overweight, was reasonably fit. He had undergone a medical check-up within the previous 12 months; he was not told of any problems.

The helmsman at the time of the accident was aged 32 years. He had previously attended a course and gained RYA level 2 standard in dinghy sailing. He had limited dinghy sailing experience apart from this, but he had sailed as a crew member on yachts on a number of occasions. He had also obtained a qualification as an RYA day skipper during the year before the accident, although he was unimpressed by the practical element of that particular course as he had gained very little experience on the helm. At the time of the accident he was attending a dinghy sailing instructor's "fast-track" course at UKSA which had started on Monday 10 May. He, and another student, were assigned the keelboat sailing activity on both Wednesday and Friday as a preference to kayaking with the other students on the fast-track course. This was the first sailing they had done at the academy.

The other crew member was aged 19 years. She had qualified as RYA level 3 in dinghy sailing and had considerable experience sailing on her family's yacht. However, she had not sailed for some time before the course and was not confident of her ability to sail the keelboats. She, too, was attending the fast-track dinghy instructor's course which had begun on the Monday prior to the accident. She had also opted for sailing the keelboats instead of kayaking.

1.7 The Boats

1. *Wahoo* **(Photograph)**

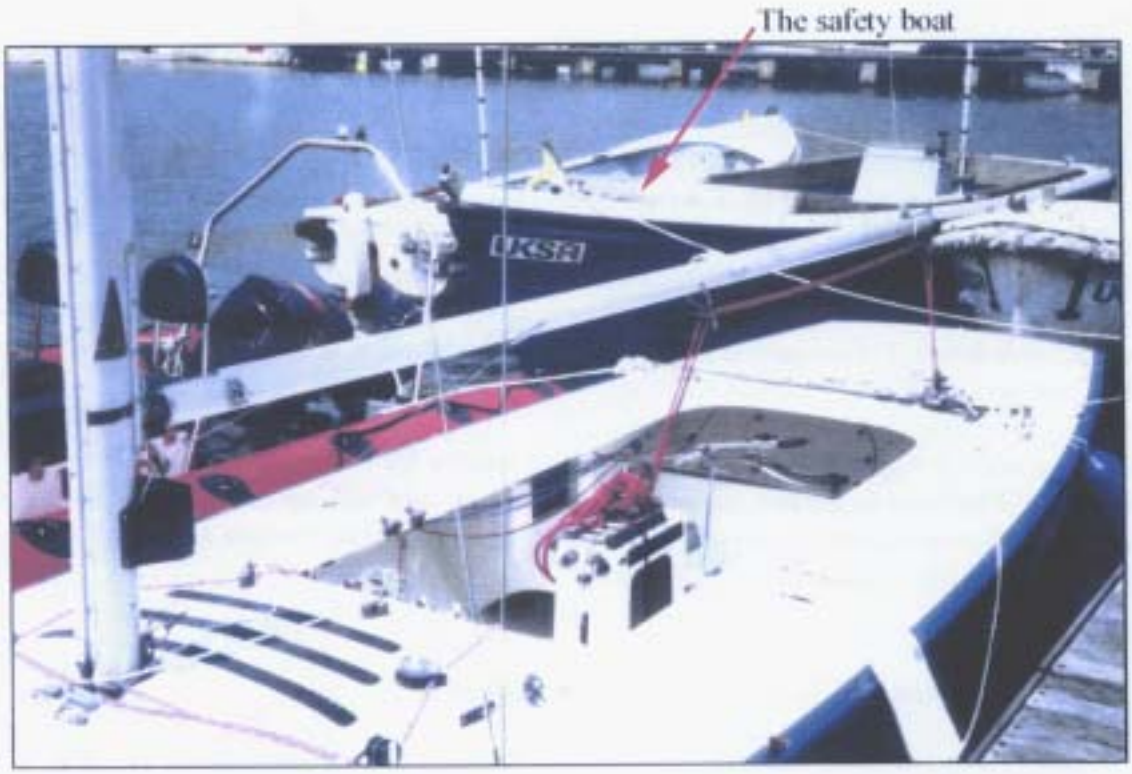
The Etchells 22 boat is primarily a racing keelboat which is built of glass reinforced plastic (GRP) and designed for performance. She is Bermudan rigged and carries a large sail area of $27m^2$. She is a day boat; there is no cabin. She is designed for a crew of two or three who stand inside, or perch on the sides of the cockpit **(Photograph)** while sailing. The boom is carried low to maximise the sail area. Movement within the cockpit is hindered by a central mounting, to which the main sheets and other cordage are led. Weight appears to be kept to a minimum and there are no safety rails fitted to the boat. She has a freeboard of about 0.8m when upright.

2. Safety Boat **(Photograph)**

The Duver safety boat is a 6m long GRP launch with an inboard diesel engine. She is an open boat with a freeboard of about 1m when upright.

1.8 The Accident

Mr Ekman had gained some experience in helming keelboats during the three days before the accident. He had practised sailing under controlled conditions, and all points of sail had been


The safety boat

covered. He was described by his instructors as a competent and confident sailor. During those days Mr Ekman had developed, with the help of his instructors, ways of managing the problem associated with his size and consequent lack of agility. Before tacking or making a controlled gybe, for instance, Mr Ekman would move across to the leeward side in preparation. He managed this successfully. Before the accident the boat had not made an unintentional gybe.

Mr Ekman had not informed his instructors that he had any concerns about sailing the keelboats, and in phone calls home he had indicated that he was enjoying this part of his course. However, the instructors' confidence in Mr Ekman's ability was not shared by his fellow students. He gave them the impression that he knew little about sailing and he was reluctant to take the helm. He apparently talked of his preference for the Sonar keelboat over the Etchells, because it had more room in the cockpit. On the day of the accident the other students felt that Mr Ekman wished to stay tending the jib sheets, because he had more space in that position. When they were instructed to change roles, Mr Ekman did so reluctantly and was only too pleased that he did not have to helm.

When the boat gybed, Mr Ekman was tending the main sheets and perching to starboard of the central mounting. All the crew members were wearing buoyancy aids, as was required under the standing orders for keelboat sailing. Mr Ekman was wearing a full 150N lifejacket which had been bought the previous weekend as he could not fit into the academy's standard buoyancy aids. The lifejacket had a certain amount of permanent buoyancy **(Photograph)**. He was also wearing a new set of yachting waterproofs and, beneath them, a fleece. His agility and mobility was additionally hindered by this equipment. When the boom swung across unexpectedly, he needed to duck low down or move forward of the central mounting. He did not have time to do either and the boom pushed him over the side.

Once in the water it was the task of the instructors to recover Mr Ekman to either the launch or the sailing boat. They tried to get him on board the launch but, even with his help initially, this proved impossible. After an estimated 4 minutes he became unconscious and the task was then to seek help and to assist him in the water until it arrived.

1.9 Actions taken by UKSA as a result of the Accident

Since the accident, UKSA has amended its Keelboat Standing Orders to include a requirement for "suitable equipment for the recovery of people in the water" to be carried. The amended orders also include requirements for all keelboat helmsmen to be proficient in man overboard procedures, and for a qualified RYA keelboat instructor, or at least an RYA senior instructor with a yachting qualification, to supervise the use of keelboats in training.

All the academy's displacement launches are now fitted with an overside ladder, and trials have been undertaken, and a training exercise developed focusing on the recovery of an unconscious person to an inflatable boat.

The academy has stated that it is generally experienced in providing training for special needs groups with either mental or physical incapacity, and it is not willing to exclude potential students solely on the grounds of weight or fitness which would, in any case, be contrary to Sports Council policy. However, in order to assist in the assessment of the suitability of courses, student

The lifejacket worn by Mr Ekman

application forms now ask the applicant to state his or her weight. This information is used to give the academy prior warning of the need to gauge strength to weight abilities. Each student undergoes a physical assessment of his/her abilities after arrival at the centre. This assessment dictates the course most suitable for the student, the level of instructor required and the equipment to be provided.

Despite recognising that the instructors in this instance were trained in rescue and life-saving techniques over and above regulatory body requirements, and that commendable efforts were made to resuscitate Mr Ekman, the academy is considering further supplementing the courses it provides for instructors.

SECTION 2 ANALYSIS

2.1 Environmental Conditions

The environmental conditions which were experienced on 14 May were as forecast, and well within the safe sailing capabilities of an Etchells 22 keelboat. In the opinion of the MAIB, taking into account the inexperience of the students charged with control of the boat, the weather and sea conditions were suitable for the planned activity.

2.2 The Etchells 22 Keelboat

The Etchells 22 is designed principally for racing, not as a training boat. However, the students who were sailing the boat on 14 May were not complete beginners, and the purpose of their respective courses was to prepare them for some professional involvement in sailing, either as an instructor or as professional crew. It was appropriate, therefore, that a boat like an Etchells 22 should be used at some stage in their courses to increase the breadth of their sailing experience.

2.3 The Students

At the start of the sailing activity on the Wednesday before the accident, Mr Ekman and the two other students demonstrated that they were incapable of safely sailing the Sonar keelboat alone without further instruction. They were given practical instruction for the rest of the day and all points of sailing were covered. At the completion of that day's training, the two instructors were content that the students showed a degree of competency in the keelboat.

Mr Ekman gained further keelboat sailing experience on the Thursday when he sailed for the whole day with the two instructors. At the end of that day, the instructors expressed their opinion again that he was a competent sailor.

After an initial introduction to the Etchells 22 boat on Friday, while the boat was towed down river by the launch, the three students were left to sail the boat alone. There is no reason to think that they were not sufficiently competent by that time to sail the boat safely in the weather and sea conditions that prevailed. The instructors, although not on board the Etchells, were able to keep an eye on the performance of the students and to give advice and instruction as necessary.

2.4 The Instructors

1. Qualifications

Although neither instructor was a qualified keelboat instructor, they were both dinghy instructors and first aiders, and one, who had been brought in especially for the keelboat activity, had a yachtmaster's offshore certificate. The students were not being schooled in the finer points of keelboat sailing, but on sailing in general. Therefore, in the opinion of the MAIB, the combination of yachting and instructor's qualifications was sufficient for the purpose of the activity.

2. Safety Management

Pre-activity briefings were not formally given, and on Wednesday, the students had been left to sail the boat alone without the instructors having first assessed their competency. These shortfalls in the performance of the instructors, although not having an immediate bearing on the accident itself, indicate a casual attitude to their responsibilities for safety. However, when the accident occurred, after Mr Ekman had been knocked into the water, the actions of the instructors were praiseworthy. A distress message was transmitted, help summoned, first aid administered and generally every effort was made to recover Mr Ekman to the launch. They acted quickly and correctly but were faced with circumstances that were beyond their experience and capabilities with the equipment provided.

2.5 The Accident

Some of the problems associated with Mr Ekman's size were identified soon after his arrival at the UKSA and, as a result, special clothing and equipment was bought and his activity schedule was changed. The schedule was changed further in the light of experience gained. Sailing the Etchells 22 was considered to pose less risk to Mr Ekman than sailing dinghies, and this was undoubtedly true; the Etchells provides a more stable platform and has a more spacious cockpit. However, given the low boom height, lack of guard rails, Mr Ekman's size and the extra encumbrance of clothing and lifejacket, falling or being knocked overboard while sailing the Etchells 22 was a foreseeable risk. In the circumstances on 14 May, allowing for the inexperience of the crew and therefore the possibility of an accidental gybe, the risk was quite high. The additional risk of his suffering injury in the fall also existed.

To allow for the possibility of a fall overboard, in compliance with the academy's standing instructions, the crew were each equipped with a buoyancy aid and warm clothing. In the circumstances, with a sea temperature of 11°C and assuming that a casualty could be recovered to the safety craft in reasonable time, the risk of serious injury from a fall overboard was small. On 14 May, Mr Ekman had greater than minimum protection provided by a full 150N lifejacket as opposed to just a buoyancy aid. The risk of being injured by the boom was not considered sufficiently high to warrant the provision of head protection.

The safety launch was not an ideal craft for recovering people from the water due to its significant freeboard, but it had been used for that purpose on numerous prior occasions. In fact, on this occasion, the instructor was recovered to the boat, with little difficulty, after Mr Ekman had been airlifted from the water. With no special equipment, the success of recovery to the safety launch depends on the size of the person being recovered, that person's ability to assist his or her rescuers and the strength and training of the rescuers. Even while Mr Ekman was conscious and helping, it is unlikely that he could have been successfully recovered to the launch without special equipment.

Alternatively, a person in the water could be recovered to the Etchells 22 which has slightly less freeboard. On this occasion, however, after Mr Ekman had fallen, the two remaining students could do no more than maintain control of the sailing boat. Even if the instructors had chosen to board the Etchells 22 to try and recover Mr Ekman to that craft, the chances of success were minimal. They would also have had to leave Mr Ekman unattended in the water while they transferred to the sailing boat. They were correct to use the safety launch.

The UKSA also keeps a fast rescue boat, and senior personnel to crew it, ready to go to assist any of its boats. On 14 May the rescue boat was on scene within 35 minutes; about 5 minutes after Mr Ekman had been airlifted to hospital. If Mr Ekman had still been conscious and in the water at that time, it is possible that he would have been recovered successfully to that craft.

Mr Ekman had become unconscious after about 4 minutes in the water, and after that time, special equipment was necessary to recover him to any craft. The fact that he became unconscious so quickly, turned what might have been an unremarkable incident into a fatality. The reason for his unconsciousness, so soon after entering the water, has not been established positively by the MAIB, and is not readily apparent in the pathologist's report. It is not considered to be something that the UKSA should necessarily have foreseen and allowed for. In normal circumstances, it would have been reasonable to expect Mr Ekman to survive in the water for 45 minutes or more without seriously harmful effects, and rescue by UKSA craft was feasible within that time.

However, the MAIB considers that the UKSA's safety management was deficient in that it did not foresee the problems associated with recovering Mr Ekman from the water, following the high risk event of his falling or being knocked into the water from the Etchells 22. Only a superficial risk assessment of Mr Ekman's involvement in the activity was carried out by the academy. Arrangements for the instructors and crew to recover their largest member from the water in reasonable time should have been provided. Where people of unusually large stature, or people with other special needs are carried, careful thought must be given to the effectiveness of the safety equipment carried, and suitable alternative equipment must be provided if necessary.

2.6 The Cause of Death

The pathologist initially concluded that the cause of death was hypothermia. Bearing in mind:

- the water temperature was 11°C;
- he had been in the water for only 24 minutes;
- he had lost consciousness after only 4 minutes;
- he was well clothed;
- he was wearing a lifejacket;
- he was apparently uninjured,

this was a surprising conclusion with wide implications for sail training establishments. The inspector discussed the relevant facts of the case with a recognised expert in cold water immersion from the Institute of Naval Medicine, and with the pathologist who carried out the post-mortem. As a result of these discussions, the MAIB believes that the cause of death was unlikely to have been hypothermia.

The pathologist reached his conclusion based on excluding other possible causes. At the time of the post-mortem he was unaware of some key facts, including the water temperature. He does not consider that he is expert in cold water immersion/hypothermia and is now uncertain of his conclusion.

It is the opinion of the expert from the Institute of Naval Medicine that unconsciousness could not have been induced by hypothermia in only a few minutes. Experiments, albeit with fit young people, have shown that to reduce the core body temperature to about 35°C, at which temperature the person is still conscious, takes at least 45 minutes in water with a temperature of 12°C. Information from other incidents indicates that, especially where some facial immersion is taking place, abnormal heart activity frequently occurs. The fact that Mr Ekman was, at first, reasonably calm and lucid, but then began to show signs of panic just before he lost consciousness, supports the likelihood of heart irregularities having occurred.

SECTION 3 CONCLUSIONS

3.1 Findings

1. At the time of the accident Mr Ekman was following the Jump Start course at the UKSA which is designed to refresh a student's knowledge of sailing. [1.2]

2. Mr Ekman started his course one week before the accident. At that time the UKSA first became aware that he was of very large stature. [1.3]

3. The fact that Mr Ekman had fallen out of a Wayfarer dinghy, while receiving sailing instruction in the river, was the catalyst for changing activity to sailing keelboats. [1.3]

4. Before the day of the accident, Mr Ekman had three days' sailing keelboats during which his instructors described him as a competent sailor. [1.3]

5. On the day of the accident, Mr Ekman was sailing in an Etchells 22 keelboat with two other students, while their two instructors travelled in the accompanying safety boat. [1.3]

6. Mr Ekman was pushed into the water by the boom when the boat accidentally gybed, about one mile to the east of Yarmouth. [1.3]

7. Mr Ekman was able to tell his instructors that he had not been hurt in the fall. At that time he was lucid and able to assist his would-be rescuers. [1.3]

8. The two instructors could not recover Mr Ekman to the safety launch due, among other things, to his size and the freeboard of the boat. [1.3]

9. For an unknown reason, Mr Ekman became unconscious and stopped breathing about 4 minutes after falling into the water. [1.3, 2.5]

10. Help was summoned quickly, but despite the best efforts of all concerned he was pronounced dead soon after being airlifted to hospital. [1.3]

11. Mr Ekman had been in the water for about 24 minutes. [1.3]

12. Initially the pathologist initially concluded that the cause of death was hypothermia. However, on reflection, he is now uncertain. [1.3, 2.6]

13. The UKSA's own fast rescue boat was on scene to assist about 35 minutes after the accident. [1.5]

14. Although neither of the instructors was a qualified keelboat instructor, both had sufficient qualifications and experience to supervise the planned activity. [1.6, 2.4]

15. The weather conditions and the boat were suitable for the planned activity. [1.4,1.7, 2.1,2.2]

16. After he became unconscious, Mr Ekman could not have been recovered to any of the UKSA's boats that went to the scene, without special equipment. [2.5]

3.2 Causes

1. The Immediate Cause

The immediate cause of the accident was Mr Ekman's inability to move quickly out of the way of the swinging boom, when the Etchells 22 keelboat accidentally gybed. His large stature and the extra encumbrance of waterproof clothing and lifejacket further affected his mobility and agility.

A fairly minor incident turned into a major accident when Mr Ekman lost consciousness and stopped breathing after 4 minutes in the water. The reasons for this unexpected turn of events have not been determined.

2. Other Factors and Underlying Causes

1. The Duver safety boat had a relatively high freeboard and was not ideally suited to recovering people from the water. [2.5]

2. The risk of Mr Ekman being pushed or knocked over the side was quite high and was foreseeable. [2.5]

3. The problems experienced in recovering Mr Ekman from the water were predictable but had not been allowed for. [2.5]

4. The instructors, in some respects, showed a casual attitude to safety. [2.4]

5. The UKSA's safety management procedures were deficient, in that they did not identify and counter all the major risks associated with Mr Ekman's sailing activity. [2.5]

6. The actions of the instructors after the accident were praiseworthy; they acted quickly but were faced with circumstances beyond their experience and capabilities. [2.4]

7. Mr Ekman's death was probably not caused by hypothermia, as concluded in the pathologist's report, and more likely to have been associated with his heart. [2.6]

SECTION 4 RECOMMENDATIONS

The actions taken by the UKSA since this accident are considered appropriate and adequate and no further recommendations are made. [1.9]

GLOSSARY OF TERMS USED

beat	sailing towards the direction of the wind by tacking
bore away	turned away from the wind.
cleat	a fitting used for securing or controlling ropes
cockpit	a sunken part or well in the deck of a yacht from which the helmsman steers.
dead run	sailing with the wind directly astern
downwind	sailing with the wind aft of the beam
freeboard	the vertical distance between the waterline and the edge of the main deck
gybe	a change of course where the stern of a sailing vessel passes through the wind and the boom of the main sail swings from one side to the other.
helmed	steered (a boat)
hypothermia	reduction of body temperature to below the normal range in the absence of protective reflex actions such as shivering.
jib	the fore sail
keelboat	a boat of a size between a yacht and a dinghy which has a fixed keel
leeward	in the direction away from that of the wind
main	the main sail
quarter	the parts of the vessel either side of the stern.
sheets	ropes used to adjust and control the sails
tacked	altered course on a sailing boat by putting the bow of the boat through the direction of wind.