No. 95-210

White Water Rafting

Shotover River, Queenstown

27 November 1995

Abstract

On Monday, 27 November 1995 at approximately 1600 hours, during a summer white water rafting trip down the Shotover River near Queenstown a raft capsized and one of the passengers drowned. Safety issues identified included the difficulty rafting operators have in conveying the nature of white water rafting to non-English speaking passengers. It was recommended that the proposed Commercial White Water Rafting Code of Practice include a requirement for raft operators to show passengers an audio-visual summary of the demands of the rafting experience before they embark on the trip.

Transport Accident Investigation Commission

Marine Accident Report No. 95-210

Vessel Particulars:

Type:	Inflatable raft
Make:	Incept (self bailing)
Length:	4.6 m
Width:	2.1 m
Capacity:	8 person
Buoyancy:	7 compartments
Propulsion:	Paddles
Owner:	The Helicopter Line
Operator:	Danes Shotover Rafts

Location:	Toilet Rapid, Shotover River, Queenstown
Date and time:	27 November 1995 1600 hours *
Persons on board:	Crew: 1 Passengers: 7
Injuries:	Passenger: 1 fatal
Information sources:	Transport Accident Investigation Commission field investigation
Investigator in Charge:	T M Burfoot

* All times in NZDT (UTC + 13 hours)

1. Factual Information

1.1 History of the trip

1.1.1 On 21 November 1995 a group of Thai Nationals arrived in Perth, Australia, on a business trip. Four of the group, two males (Preema and Yutti) plus one couple (Prasong and Hausa), continued on to New Zealand for a vacation which had been arranged by one of the group's Australian business associates. Another Australian business associate (John) offered to accompany the group on their vacation. The New Zealand vacation included a trip to Queenstown where, among other activities, they were booked on a white water rafting trip.

1.1.2 Preema, Yutti and John flew from Perth to New Zealand on Friday, 24 November 1995, arriving in Queenstown on Saturday. Prasong and Hausa followed one day later, joining the others in Queenstown on Sunday, 26 November.

1.1.3 The group met after breakfast on Monday, 27 November and spent the morning sight seeing around Queenstown. From 1130 to 1200 hours the group lunched at a Thai restaurant in Queenstown, during which no alcohol was consumed.

1.1.4 The group arrived at the company's booking office at 1245 hours as indicated on the pre-arranged trip tickets. A number of other people had gathered at the office for the rafting trip which was to include 39 passengers carried in a convoy of six rafts. Four rafts from other companies were also making the trip down the Shotover River that day. Some of the 39 passengers were already embarked on other activities as part of a package adventure tour, the last part of which was to join the convoy and raft the Shotover River.

1.1.5 No information about the forthcoming trip was given to the passengers at the booking office but there were photographic displays of rafts negotiating rapids from previous trips, and several advertising pamphlets. John noticed this display when he checked in at the counter while the rest of the group waited outside near the bus.

1.1.6 At 1300 hours the group was loaded into a small bus together with approximately 10 other passengers and taken to the Rafters Barn. The group was then gathered in the foyer and given an aural briefing for the trip. The briefing covered the following main points:

- rafting is a water-based outdoor activity that includes an element of risk
- things could happen quickly and anyone falling from the raft may be subjected to high physical demands
- people with any medical condition that could restrict their movement or render them unable to meet the physical demands may not be allowed to raft and should inform their guide immediately
- any person who could not go, or decided not to go prior to boarding the raft, could return and would receive a refund in full.

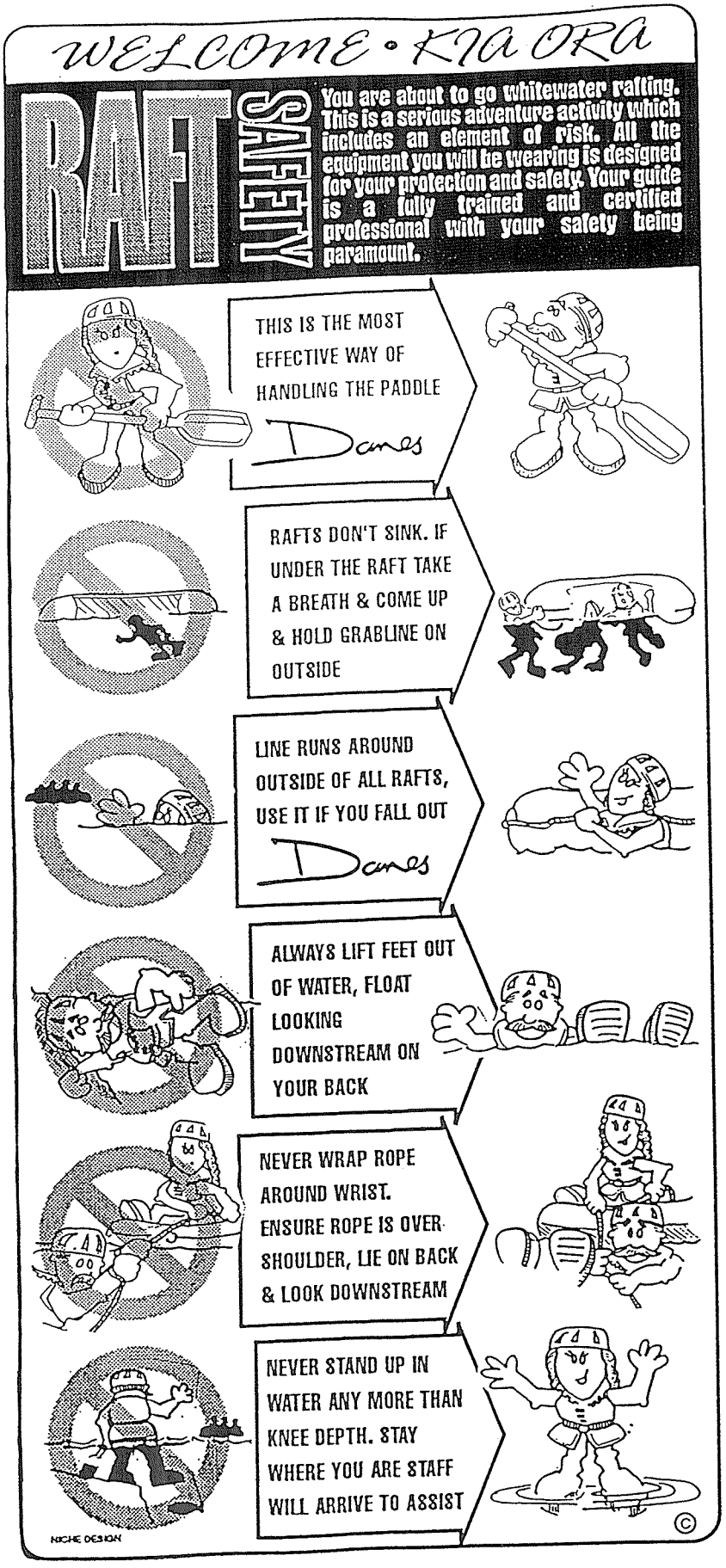

Figure 1
Operator's safety card

1.1.7 Each member of the group was then invited to fill in and sign a form incorporating name and country of residence. The form contained the following quote:

> "I have read and approved the following:
>
> 1) Participation in rafting activities involves a degree of risk and the rafting operator cannot absolutely guarantee participant's safety.
> 2) I declare that I am physically fit and have no condition that could be affected by this activity.
> 3) I understand that any time prior to the rafting trip, I can cancel and obtain a full refund of the rafting portion.
> 4) I release the rafting operator, its management and staff of all claims in regard to loss or damage of equipment and/or injury."

The quote is repeated in German, Japanese and Chinese.

1.1.8 The trip leader (guide in charge of the trip) was responsible for ensuring that each person read, understood and signed the form. As each person read and signed the form his/her hand was stamped to assist the trip leader in identifying those who had done so.

1.1.9 No passengers opted to withdraw from the trip and all signed the form. Hausa expressed some concern to her travelling companions about her husband going on the trip as he could not swim. Initially Prasong indicated that he would withdraw and be refunded. He was concerned about the trip. Yutti, who was very enthusiastic and confident about the trip, convinced Prasong to go along.

1.1.10 Each member of the group was then fitted with a full length, seven millimetre neoprene wet suit, a five millimetre neoprene jacket, and neoprene boots and gloves. A splash jacket was provided to be worn over the top of the wet suit. Neoprene booty liners and extra splash jackets were available for those who felt the cold.

1.1.11 The group then re-boarded the bus and started the 45 minute drive to the "put in" point (Deep Creek). During the bus trip to Deep Creek, one of the operator's guides briefed the passengers again. They were told to take out a "fold-out" safety card that the operators had produced which, with the aid of comic style pictures, summarised the main points of the safety talk they would receive on the beach and contained a risk warning similar to that given to the group at the Rafters Barn. The pamphlet was repeated in several different languages to assist the guide in conveying the safety message to non-English speaking passengers. (See figure 1)

1.1.12 The guide worked through each diagram on the card fully explaining what each diagram meant. At the end of the brief the four Thai passengers asked John to clarify some points. They all understood what they had to do but wanted clarification of "why". Thai was not one of the languages used in the safety card. Prasong stated that he could interpret about 80 % of the English version, and Yutti's understanding of English was much better than his.

1.1.13 The guide asked everyone if they could swim. Prasong advised the guide that he was a "non-swimmer" and Yutti said he could swim "a little".

1.1.14 On arrival at Deep Creek the passengers were told to disembark from the bus and take a helmet, gloves, lifejacket and paddle. They were told to fit their own helmets adjusting them to fit properly, but not to secure their lifejackets. This was done by a guide to ensure proper fitting and any loose ends were secured.

1.1.15 After the other passengers arrived by helicopter and were similarly attired the group gathered around the rafts for another safety briefing which was conducted by the trip leader. The safety talk began with the following statement:

> "You are about to go white water rafting on the Shotover River. This is a serious adventure activity which includes an element of risk. In the event of falling out of the raft, being separated from the raft or the raft flipping, there will be considerable physical demands placed on you. It is important that you listen to this safety talk so we can minimise the inherent risks in white water rafting."

1.1.16 Following the introduction the safety talk included the following points:

- How to sit in the raft
- How to hold the paddle
- How to paddle forwards and backwards
- How to hang on when the order was given
- What to do if the raft capsizes
- What to do if you fall in the water
- What to do if you find yourself under the raft
- The correct position to assume if floating in the water
- The purpose of the throw line
- How to haul someone back into the raft
- Not to stand up in running water deeper than your knees.
- Once in calm water swim to the left (slower) side of the river and wait to be picked up

1.1.17 A raft was used to give a dry run demonstration to emphasise the above points. At the end of the talk everyone was again given the opportunity to return in the buses and receive a full refund.

1.1.18 John understood the briefing commenting on how much easier it was to understand when someone was demonstrating. His Thai companions understood what was required of them but did not fully comprehend the turbid conditions in which they would have to raft. John's impression was that most of the other passengers understood, although it was a large group and he could not speak for everyone.

1.1.19 The passengers were then asked to split up into groups of seven. John's group had met with another Thai couple so they joined together to make up the seven. The guide they were assigned to asked if anybody had been rafting before and when they all replied "no" he reassigned the Thai couple to another raft and replaced them with a Canadian and a German tourist who were travelling together. The Canadian had rafted before.

1.1.20 The guides then gave their groups a "paddle talk". This consisted of more dry runs at paddling, jumping from one side of the raft to the other and sitting down and hanging on in the bottom of the boat at the command from the guide. These were all commands the guide would issue during the course of the trip.

1.1.21 At approximately 1500 hours each group launched its raft. The guides ran their groups through the drills several times on the water until the passengers were familiar with their commands and responded appropriately. The convoy then set off on the trip in loose formation. There were either six or seven passengers in each raft under the control of a qualified guide. The first and last rafts (sweep rafts) in the convoy carried first aid and rescue equipment. The trip leader's raft was fifth in the convoy, one behind the raft with John's group in it. A photographer in a kayak accompanied the convoy to photograph the rafts as they negotiated the rapids.

1.1.22 The first 40 minutes of the trip was made in smooth flowing water with occasional small rapids. The guide in control of their raft made John's group carry out several more drills during this period. He also explained in broad terms what lay ahead. He asked if everyone could swim and when Prasong told him "no" the guide signalled to the guide in the raft behind that he had a "non-swimmer" on board.

1.1.23 As the raft neared each rapid or obstacle the guide gave a detailed description of what was coming up and the most likely action they would be required to take. Occasionally they would practise those actions just prior to entering the rapid.

1.1.24 At approximately 1545 hours the convoy entered Mother Canyon which consists of a series of six rapids or obstacles, Sharks Fin, Germans Drop, Anvil, Toilet, Oh Shit and Pinball. The rafts entered the rapids with sufficient distance between them to enable them to assist each other in the event of a raft capsizing, but not so close as to impede each other's progress (truck-and-trailering).

1.1.25 The passage through Sharks Fin, Germans Drop and Anvil went without incident. John stated that the guide told them what to expect before each section. Prasong, Hausa and Preema were concerned about the danger to themselves. Yutti was enjoying the ride and had become excited. He had taken to repeating the guides commands in a raised voice. John asked him to stop this as he could not hear the guides commands over Yutti's excitement.

1.1.26 Just before going into Toilet Rapid their guide said that after the drop they would have to paddle hard to avoid being swept left by a back-eddy into the "hole" of "Toilet" where the raft would be in danger of capsizing.

1.1.27 As they entered Toilet Rapid the front of the raft rode up on a wave. John and the Canadian, who were in the front, fell back and overboard. The Canadian was offered a paddle which he managed to hold on to momentarily before being swept down river. He was pulled under water twice as he "swam" through Toilet Rapid and made his way "exhausted" to the left bank further down river where he was later picked up by another raft.

1.1.28 John managed to hang on to the grab lines around the outside of the raft and "swam" down Toilet Rapid with the raft. The raft was swept left by the eddy and while the guide's attention was focused on retrieving John, the raft was drawn into the "hole" and capsized spilling the remaining six occupants into the water.

1.1.29 The guide pulled the raft into the left bank in the eddy and signalled to the other guides that he had swimmers in the water. John, Preema and Prasong were swept to the left bank in the eddy, but Yutti and Hausa were swept down river.

1.1.30 The trip leader saw Hausa "swimming" down river and carried on through Toilet Rapid chasing her. He managed to pick her up approximately 200 metres down river in the smooth water after Pinball Rapid (the last rapid in the Mother Canyon). At this time the trip leader looked down stream and observed the guide from the second raft in the convoy retrieving another "swimmer" from the water.

1.1.31 The second raft to enter Mother Canyon passed through all of the obstacles without incident. Their guide was chasing a female "swimmer" who had fallen out of the first raft going through Sharks Fin Rapid. They caught up and retrieved her about 100 metres below Pinball Rapid, pulling her into the back of the raft. Having swum the entire length of Mother Canyon the girl was pale, shivering and, although conscious and breathing normally, was not responding to conversation and remained in a huddle on the floor of the raft.

1.1.32 The guide from the second raft, having heard the signal from the guides upriver, looked up to see Yutti floating approximately 40 metres up river from them. He appeared to be floating in the correct white water floating position, on his back facing down stream with his eyes open. The guide turned his raft and ordered the passengers to paddle upstream towards Yutti and then positioned the raft mid river, side on, in Yutti's path. While he held the raft in this position two of the passengers attempted to pull Yutti on board. This attempt was not successful and Yutti disappeared under the raft. The guide leaned over the front of the raft and when Yutti appeared he hauled him into the front section of the raft, face up on the floor. Yutti looked in a similar state to the female passenger the guide had just retrieved.

1.1.33 The guide then assessed the situation. He was in the main stream of the current with nine passengers on board, two of whom looked in need of medical attention. The guide moved to the back of the raft and got his passengers back on the job. They manoeuvred the raft to the nearest landing spot "river left" approximately 100 metres further down stream. During this time the passengers in the front of the raft commented to the guide that Yutti "did not look too good". The female "swimmer" was showing signs of improvement.

1.1.34 On arriving at the river bank the passengers disembarked and the guide laid Yutti out on the river bank and checked for breathing and pulse. He could not be sure of either as Yutti's neck was cold and the guide's hands were "freezing", so he removed Yutti's helmet tilted his head back and listened for breathing. Still not able to detect any breathing the guide unclipped Yutti's life jacket and lifted his spray jacket to check visually for chest movement. It was about this time, approximately two minutes later, that the first sweep raft arrived on the scene. The guide from the sweep raft, after assessing the situation, used the radio from the rescue pack to call for assistance while the other guide unzipped Yutti's wet suit and commenced cardiorespiratory resuscitation (CPR). He noted that it was "quite hard" to get air into Yutti's lungs in spite of having checked the airway was clear.

1.1.35 After the sweep raft guide had made the call for assistance, he helped perform CPR on Yutti. They inserted an airway tube which appeared to make it a little easier for the guide to breathe for the patient. As they worked the guides noticed a small cut above Yutti's eye. As the remaining rafts arrived the passengers were marshalled away from the scene while the guides performed CPR in shifts. The rescuers noticed the patient's stomach distending and he appeared to vomit several times hindering their attempts to revive him. A helicopter arrived after 20 minutes with two doctors on board. The guides continued CPR while the doctors set up their equipment. Yutti did not respond to the CPR or the treatment administered by the doctors.

1.2 Post-mortem examination

1.2.1 Yutti appeared to have suffered a "near drowning" injury and was retrieved from the water in shock and not breathing. Post-mortem examination showed that he had a lung and airways obstruction caused by the aspiration of gastric content. This may have occurred at any time from the period of water immersion up to the time when resuscitation commenced. Once aspiration had occurred it would have been very difficult for the rescuers to have established CPR effectively without suction equipment.

1.2.2 Vomiting is a not uncommon consequence in the event of "near drowning". In the water, or in the confines of a raft, it is not always possible to prevent aspiration of fluid or gastric content into the airways and lungs, or to apply suction to remove it should such equipment be available.

1.3 Weather and river conditions

1.3.1 The river conditions had been assessed by a representative from each rafting company intending to raft the Shotover River that day. The river level was moderate and dropping (Grade 3).

1.3.2 The river water temperature was approximately +5° Celsius.

1.3.3 The weather was fine with air temperature of 22° Celsius.

1.4 Crew information

1.4.1 The trip leader had approximately four years' rafting experience, most of which had been spent in Queenstown on the Shotover and Kawarau Rivers. During this period he had completed approximately 750 commercial trips down the Shotover River. He was registered as trip leader with the Queenstown Lakes District Council (QLDC).

1.4.2 The guide in control of the raft to which John's group was assigned to had one year's experience as a raft guide. He was registered as "boatman" with the QLDC and had completed approximately 200 trips down the Shotover River.

1.4.3 One of the other guides was registered as trip leader and the other three were registered as "boatman" with the QLDC. As required by the QLDC all six guides held a current first aid certificate and were trained in CPR.

1.5 Raft information

1.5.1 The rafts used on the day of the accident were Incept W46S self-bailing squareback inflatables constructed in Du Pont reinforced synthetic rubber with neoprene armouring to protect against abrasion.

1.5.2 This type of raft is divided into seven independent airtight compartments so that in the event of one compartment becoming punctured the rest will remain inflated and the raft can still support its maximum complement.

1.5.3 Nineteen D-rings in total are attached at various locations on the raft for running grab lines and securing equipment needed to perform rescues, and recovery of the raft.

1.5.4 Normally a minimum of two rafts is assigned to each convoy to allow for "safety" to be run where needed. This involves one raft stopping and observing the other raft negotiate a potentially dangerous obstacle, and rendering assistance if required. On the day of the accident the convoy consisted of six rafts, two of which were sweep rafts. The trip leader usually guided the lead raft, but due to the size of the convoy he had positioned another qualified trip leader at the head of the convoy and stationed himself near the rear where he could observe the convoy from above. Emergency equipment carried in the sweep raft included the following:

- Low frequency radio
- FM radio
- First aid kit
- Puncture repair kit
- Air pump
- Rescue lines and equipment

1.5.5 If a problem is encountered with any of the rafts up or down river then one of the sweep rafts will either float down to the scene or the scene will float down to it.

2.7 Prasong's main concern was that he could not swim. Yutti could swim "a little". The combined effect of the buoyancy provided by the wet suit and the life jacket is enough to bring a "swimmer" to the surface and support him/her naturally in the white water floating position. The only disadvantage a non-swimmer may have is in making his/her way to the river bank once in smooth water. This is not considered to be a factor in Yutti's drowning, as he was retrieved soon after entering relatively smooth water, and was already incapacitated at this time.

2.8 In white water rafting, a raft capsize in a rapid is not an unusual occurrence on rivers of grade three. Passengers falling from rafts and "swimming" rapids, whether due to a capsize or from passengers not holding on, is an inherent risk of the activity. Once in the water considerable physical demands are placed on a "swimmer". Each individual will respond to those demands in a way consistent with his/her physical and mental status and familiarity with being immersed in water, gained from other water-based activities.

2.9 During the initial capsize of the raft, Yutti and Hausa would have been sucked into the "hole" of Toilet Rapid, probably being submerged for approximately five seconds before the buoyancy from their wet suits and life jackets brought them to the surface. They may have been submerged several more times during their "swim" through the remainder of the rapids.

2.10 Yutti and Hausa travelled the same distance through rapids. When Hausa was retrieved she was shaken but otherwise unharmed. Yutti floated approximately 100 metres further down river in relatively smooth waters, yet when he was retrieved he had suffered a "near drowning" injury.

2.11 It could not be established whether Yutti received the abrasions during the capsize or subsequently during his passage down the rapid, which would have involved several periods of immersion in close proximity to rocks.

2.12 It is estimated that Yutti spent approximately seven minutes in the water before being retrieved, a further two minutes in the bottom of the raft and a further two minutes while the guide undid Yutti's clothing and checked for vital signs.

2.13 Yutti did not respond to the CPR being administered by his rescuers on the beach. At no time did he show any vital signs. The vomiting would have been gastric content being expelled by the build up of air in the stomach due to the blockage in the airways and lungs.

2.14 While it may not be relevant in this accident, rescuers should be aware of the risk of vomiting and aspiration following any period of unconsciousness or respiratory arrest, especially in the event of "near drowning". Persons who have been retrieved following any such injury should be observed, and where practicable maintained in the unconscious (recovery) position; where necessary, any inhaled fluid should be drained by placing the person in the head down position.

3. Findings

3.1 River and weather conditions were suitable for commercially rafting the Shotover River on the day of the accident.

3.2 Each of the guides on the accident trip was appropriately qualified to conduct commercial rafting activities on the Shotover River.

3.3 Each of the guides on the accident trip had appropriate training in first aid.

3.4 The risk warnings, and the opportunity to withdraw from the trip and be refunded, which were given by the operating company were adequate for the passengers to know that their safety could not be "guaranteed".

3.5 Few of the passengers knew or anticipated how severe conditions in the rapids would be during the trip.

3.6 Yutti's display of confidence and excitement during the ride through the rapids prior to the raft capsize indicated that he was not concerned about the severity of the rapids.

3.7 Yutti was an unfortunate victim of the inherent risks involved in white water rafting.

4. Safety Recommendations

4.1 It was recommended to the Director of Maritime Safety that he include in the proposed Commercial White Water Rafting Code of Practice:

4.1.1 A requirement for raft operators to show passengers an audio-visual summary of the demands of the rafting experience before they embark on the trip. (015/96), and;

4.1.2 A standard safety card that must be used by raft operators to convey safety procedures to the passengers prior to embarking on the intended rafting trip.

This card should include several of the main languages and with the aid of clear and concise diagrams, should be effective in conveying the message to non-English speaking passengers. (020/96)

26 June 1996

M F Dunphy
Chief Commissioner

Glossary of Marine Terms

AC	Alternating current
Aft	Rear of the vessel
Beam	Width of a vessel
Bilge	Space for the collection of surplus liquid
Bridge	Structure from where a vessel is navigated and directed
Bulkhead	Nautical term for wall
Bus	An arrangement of copper conductors (Bus bars) within a switchboard, from which the circuits are supplied
Cable	0.1 of a nautical mile
Chart datum	Zero height referred to on a marine chart
Command	Take over-all responsibility for the vessel
Conduct	In control of the vessel
Conning	Another term for "has conduct" or "in control"
DC	Direct current
Deckhead	Nautical term for roof
Dog	Cleat or device for securing water-tight openings
Draft	Depth of the vessel in the water
EPIRB	Emergency Position Indicating Radio Beacon
Even keel	Draft forward equals the draft aft
Freeboard	Distance from the waterline to the deck edge
Free surface	Effect where liquids are free to flow within its compartment
Freshet	Term used to describe an increase of water level in the river due to rain in the mountains
Focsle	Forecastle (raised structure on the bow of a vessel)
GM	Metacentric height (measure of a vessel's statical stability)
GoM	Fluid Metacentric height (taking account the effect of free surface)
GPS	Global Positioning System
Heel	Angle of tilt caused by external forces
Hove-to	When a vessel is slowed or stopped and lying at an angle to the sea which affords the safest and most comfortable ride
Hz	Hertz (cycles)
IMO	International Maritime Organisation
kW	Kilowatt
List	Angle of tilt caused by internal distribution of weights
m	Metres
MSA	Maritime Safety Authority
Point	Measure of direction (one point = 11¼ degrees of arc)
Press	Force a tank to overflow by using a pump

SOLAS	Safety Of Life At Sea convention
Sounding	Measure of the depth of a liquid
SSB	Single-side-band radio
Statical stability	Measure of a vessel's stability in still water
Supernumerary	Non-fare-paying passenger
Telegraph	Device used to relay engine commands from bridge to engine room
Ullage	Distance from the top of a tank to the surface of the liquid in the tank
V	Volts
VHF	Very high frequency radio
Windlass	Winch used to raise a vessels anchor