

**REPORT No: 03 0994 VESSEL NAME: UNNAMED
KAYAK**

KEY EVENTS

- 1.1 On Friday 28 March 2003, at approximately 1740 hours New Zealand Standard Time (NZDT), Mr Zephlyn Vlahovich met his friend, Mr Donald Dukers. Their intention was to take Mr Vlahovich's vehicle to the Shotover / Kawarau rivers confluence, which Mr Vlahovich intended would be the end point for his kayaking trip that evening. Mr Dukers took his own vehicle also, in order to give Mr Vlahovich a ride back to the Frankton marina, which was the starting point for Mr Vlahovich's trip (*See Appendix 1 - Statement of Mr Dukers*).
- 1.2 At approximately 1800 hours, Mr Vlahovich prepared to embark on his trip from the Frankton marina. Mr Dukers watched him leave the jetty and paddle across the Frankton Arm towards the Kawarau Falls bridge, at which point he lost sight of him. Mr Dukers then returned home (*See Appendix 1*).
- 1.3 At approximately 1900 hours, Mr Michael Spijkerbosch was driving across the Kawarau Falls bridge when he saw a reddish-yellow (or orange) kayak about to pass under the southern end of the bridge through, "one of the last two bays under the bridge, over the campground side". As he continued driving, Mr Spijkerbosch did not see the kayak emerge downstream (*See Appendix 2 - Statement of Mr Spijkerbosch*).
- 1.4 At approximately 1930 hours, Mr Simon Myers, Ms Paula Sommerville and Mr Andy McKenzie were returning from a fishing trip on the Kawarau River. At a point about 250 metres below the bridge they saw an object in the water and went to investigate. They found Mr Vlahovich, who was still wearing his lifejacket, but they saw it was pulled up on his body covering his face. His head was under the water. They pulled Mr Vlahovich on board their boat. He had no pulse and was not breathing. The extremities of his body were cold, but his core retained some warmth. He appeared to be waterlogged (distended abdomen). They left his paddle in order to get help for Mr Vlahovich as quickly as possible (*See Appendix 3 - Statement of Mr Myers*).
- 1.5 At approximately 1932 hours, they arrived at Kawarau Falls motor camp jetty where CPR was administered and an ambulance called to assist (*See Appendix 3*).
- 1.6 At 1935 hours, the Police were notified of the accident.
- 1.7 At 1953 hours, the Police arrived at Kawarau Falls motor camp where ambulance staff were already in attendance.

- 1.8** At 2010 hours, the Police contacted Kawarau Jet and arranged for a search of the river. Mr Vlahovich's kayak was located 70 metres downstream of the bridge, on the south bank of the river. The paddle was located near the water tower, at a point 250 metres downstream of the bridge, close to where Mr Vlahovich was recovered.
- 1.9** On Saturday 29 March, at 1100 hours, the Queenstown Harbourmaster, Mr Marty Black, found Mr Vlahovich's spraydeck in trees that were situated directly below the bridge.

KEY CONDITIONS

- 2.1 Mr Vlahovich, although regarded by his peers as physically fit and tough, had experienced health problems in the previous 15 months. He was also asthmatic. Mr Vlahovich was 54 years old. *(See Appendix 1)*.
- 2.2 Mr Vlahovich had experienced paddling on lakes and gentle rivers. He often used a kayak to cross rivers while hunting. His friends' perception was that he was an experienced kayaker. However, Mr Vlahovich was unable to roll (re-right) a capsized kayak, a basic self rescue skill. He was also unable to read (interpret) hydraulic features or to accurately assess their affect on a kayak, as evidenced by discussions the Investigator had with a Senior Raft Guide/Safety Kayaker and friend of Mr Vlahovich's.
- 2.3 Mr Vlahovich began his trip sometime between 1800 and 1830 hours. It was totally dark by 1915 hours at this time of the year. It was also overcast at the time, further reducing visibility. As Mr Vlahovich passed under the bridge, he would have been paddling in rapidly fading light conditions, making it difficult to accurately discern hydraulic features in the river. He had never paddled this section of the river before *(See Appendix 1)*.
- 2.4 At the time of the accident, Mr Vlahovich was wearing/carrying the following clothing and equipment:
- Beanie
 - Splashjacket (windproof parka)
 - Spraydeck (blue nylon, sized to fit kayak) *(See Appendix 4 - Photo 1)*
 - Paddle (appropriate to the kayak)
 - Polypropylene top and bottom
 - Personal Flotation Device (PFD)/Bouyancy aid (Hutchwilco Reactor; Australian Standard 1499) *(See Appendix 4 - Photo 2)*
 - Training Shoes
 - Perception "Minnow" Kayak *(See Appendix 4 - Photo 1)*
- 2.5 Mr Vlahovich's equipment was largely appropriate for the trip he was attempting. An experienced kayaker might consider the equipment adequate but not ideal. The kayak was a family/recreational kayak, suitable for flat water and gently moving flat water. It was short, slow and stable. It had no internal buoyancy and was unsuitable for whitewater. This section of the river would be regarded as Class 1, meaning slow moving water, and not requiring specialist whitewater paddling equipment (such as internal buoyancy in the boat). However, the hydraulic reversals found beneath the Kawarau Falls bridge that day would represent a significant risk to an inexperienced white water kayaker. The risk these items pose is not representative of the whole trip.

- 2.6 When recovered from the water, Mr Vlahovich's lifejacket (PFD) had slipped up over his head (*See Appendix 3*) and was therefore failing to provide its maximum buoyancy. This is a common problem with PFD's that are poorly designed (inadequate cinching around the waist) or poorly fitted (not tightened sufficiently around the waist by the wearer). It is unclear which was the case here. The PFD held an Australian Safety Standard 1499 (similar in buoyancy rating to the New Zealand Standard), and appeared to be of good quality.
- 2.7 The Kawarau Falls Bridge has weirs between the pylons of the bridge. A concrete weir has been constructed along the base of the bridge pylons in order to control lake outflow using metal gates that can be lowered to rest on top of the weir (*See Appendix 4 - Photo 3*). There are 10 channels between the pylons supporting the bridge. In some of these channels, the concrete weir has been degraded by age, allowing water to flow through in a natural manner. In the channels where the concrete weir is still intact, water flowing over the weir is forced into a recirculating pattern called a reversal (*See Appendix 4 - Photos 4, 5 & 6*). There are currently reversals under channels 1, 2, 5 and 10, as counted from south to north (*See Appendix 5 - Sketch Map*). The reversal in channel 2 is powerful enough to capsize and recirculate a kayak and its occupant. A skilled white water kayaker **may** (*Investigator's emphasis*) have been able to avoid the reversal or; if they found themselves in the reversal, recover sufficiently to escape it.
- 2.8 Directly downstream of channel 2 is a curved concrete apron between the two pylons (*See Appendix 4 - Photo 7*). This apron served to increase the power of the reversal by partially blocking downstream flow. The smooth walls of the pylons also served to accentuate the power and 'severity' of the reversal.
- 2.9 The shape and power of the reversals are dependent on the amount of water flowing over the top of the weir (lake level); the uniformity of the top of the weir and the fall from lake level to the river downstream. At higher lake levels, more water flows over the weir and the severity of the reversal is diminished. The feature begins to resemble a wave form and has little or no consequence for kayakers or jet boaters. As the lake level decreases, the wave form gradually changes to the reversal form. The two features are at opposite ends of a hydraulic continuum.
- 2.10 The lake level on 28 March was 309.65 metres above sea level (*See Appendix 6 - ORC Website Flow Information*). It is not possible to determine at which lake level the reversal loses its potential to capsize and hold a kayak unless the shape of the reversal is studied at all lake levels. It is interesting to note that the Wakatipu High School Outdoor Education Risk Management Plan (Kayaking) identified these hydraulic hazards, as evidenced by a discussion the Investigator had with an Outdoor Education Teacher from Wakatipu High School. On the day of this investigation, a group of students were learning to kayak in the area directly downstream of the bridge. This is an excellent and very safe area in which to learn to kayak (*See Appendix 4 - Photo 9*).

- 2.11** A large sign indicating "Down Traffic This Way" was positioned directly above the second channel from the southern end of the bridge (channel 2) on the upstream side (*See Appendix 4 - Photo 3*). Its purpose is to direct jet boats to use the southern side of the river for downstream channel. A sign indicating "Up Traffic This Way" was positioned above channel 6 on the downstream side of the bridge. These signs are an effective way of minimising the chances of jet boats (both commercial and non commercial) colliding as they pass beneath the bridge. There was nothing on the signs that indicated that they were for the benefit of jet boats only.
- 2.12** At low lake levels, jet boat operators choose to use the channel to the north of the one indicated by the sign (channel 3). They were concerned about striking their jet units on the weir.

CONTRIBUTING FACTORS

N.B. These are not listed in order of importance.

- 3.1** Mr Vlahovich's white water kayaking knowledge and skill level would have made it difficult for him to recognise, avoid or recover from the hydraulic feature beneath the bridge.
- 3.2** Mr Vlahovich's recent health problems and his asthma may have inhibited his ability to stay afloat after exiting the hydraulic feature.
- 3.3** Mr Vlahovich chose to paddle alone. It is possible that a second kayaker may have been able to assist Mr Vlahovich after he had been released from the hydraulic feature.
- 3.4** Mr Vlahovich's kayak had no internal flotation. Had it done so, it may have enabled him to remain with his kayak, using it for additional flotation after he had been released from the hydraulic feature.
- 3.5** Mr Vlahovich's lifejacket was ill fitting/fitted. It was, however, Australian Safety Standard 1499 approved.
- 3.6** Remnants of the weir originally intended to control lake outflows combined with unusually low lake levels to create potentially dangerous hydraulic features. The gates controlling the outflow are no longer operative.
- 3.7** Misleading (to those who lacked local knowledge of jet boat operations) signage may have led Mr Vlahovich into the reversal in channel 2 (directly beneath the sign).
- 3.8** Mr Vlahovich failed to obtain advice about potential hazards on the river before setting off.
- 3.9** Lack of signs on the bridge warning of the presence of potentially dangerous hydraulic features at certain lake levels.
- 3.10** Mr Vlahovich paddled in failing light and still needed to reach his takeout point. This may have hurried his decision or affected his consideration of which channel to take.

CAUSE

Human Factor

<input type="checkbox"/> Failure to comply with regulations Overloading	<input type="checkbox"/> Drugs & Alcohol	<input type="checkbox"/>
<input type="checkbox"/> Failure to obtain ships position or course	<input type="checkbox"/> Fatigue	<input type="checkbox"/>
Misconduct/Negligence	<input type="checkbox"/> Physiological	<input type="checkbox"/> Error of judgement
<input type="checkbox"/> Improper watchkeeping or lookout	<input type="checkbox"/> Ship Handling	<input type="checkbox"/> Other . . .
<input type="checkbox"/> Lack of knowledge		

Environmental Factor

<input type="checkbox"/> Adverse weather hazard	<input type="checkbox"/> Debris	<input type="checkbox"/> Ice	<input type="checkbox"/> Navigation
<input checked="" type="checkbox"/> Adverse current	<input type="checkbox"/> Submerged object	<input type="checkbox"/> Lightning	<input type="checkbox"/> Other . . .

Technical Factor

<input type="checkbox"/> Structural failure	<input type="checkbox"/> Wear & tear	<input type="checkbox"/> Steering failure
<input type="checkbox"/> Mechanical failure firefighting/lifesaving	<input type="checkbox"/> Improper welding	<input type="checkbox"/> Inadequate
<input type="checkbox"/> Electrical failure	<input type="checkbox"/> Inadequate maintenance	<input type="checkbox"/> Insufficient fuel
<input type="checkbox"/> Corrosion	<input type="checkbox"/> Inadequate stability	<input type="checkbox"/> Other . . .

- 4.1** It is reasonable to assume that when Mr Vlahovich paddled his kayak through the second channel from the southern end of the bridge (following the "Down Traffic This Way" sign), The kayak would have been capsized by the hydraulic feature (reversal) almost instantly. Once in the reversal, he would have had little or no control over himself or his equipment. An experienced kayaker may have had some control in the reversal while still in their kayak. However, once ejected from their kayak, they would have little or no control in this type of reversal.

OPINIONS & RECOMMENDATIONS

- 5.1** At certain lake levels, significant hydraulic hazards (reversals) exist in channels 1, 2, 5 and 10 beneath the Kawarau Falls bridge. There is a large, easily read sign that directs all river users (not just jet boats) to use the second channel (channel 2) to move downstream. It is recommended that the following options be considered by the local council:
- a) Change the signage to indicate different downstream pathways for kayakers and jet boats. The third channel has a clear path for kayakers, and it would appear from riverbed topography that the channel would remain clear at all lake levels and flows. It is important that local river users are consulted on any proposed signage change. The signs exist for an excellent reason. Local white water specialists (including Ken MacIntyre of Wakatipu High School and Glenn Murdoch, a NZRCA Safety Officer) should be consulted prior to any proposed change.
 - b) Alter the uniformity of the concrete weir so that the power of the reversals is diminished. This may be as simple as making holes in the weir in order to achieve non-uniform flow.
 - c) Close the gates on the affected channels.

In commenting on the draft report, the Queenstown Harbourmaster advised that additional signage have now been installed on the four gates of the Kawarau Dam to warn kayakers of the danger. Currently, lake and river levels have risen, hence there is no recirculation at the four gates.

- 5.2** This accident demonstrates a need for the NZRCA to promote their River Safety courses to a wider audience, e.g., hunters and owners of "sit-on-top" kayaks. It is recommended that NZRCA consider the need for a wider education campaign, including equipment checklist signs at common launching sites.