

SOUTH



AUSTRALIA

FINDING OF INQUEST

An Inquest taken on behalf of our Sovereign Lady the Queen at Adelaide in the State of South Australia, on the 14th, 15th, 16th days of August, 12th day of September, and 9th day of November, 2000, before Wayne Cromwell Chivell, a Coroner for the said State, concerning the death of Kelly Organ.

I, the said Coroner, do find that Kelly Organ, aged 18 years, late of 14 Seaspray Avenue, North Haven, in the State of South Australia, died at the Queen Elizabeth Hospital on the 14th day of September, 1999 as a result of hypoxic encephalopathy due to raised intracranial pressure caused by severe closed head injury. The circumstances of death were as follows:-

1. **Background**

- 1.1 During the evening of Saturday 11 September 1999 Kelly Organ attended a barbecue with a group of about eight friends at a house at North Haven. During the course of the evening there was a barbecue, and everybody present was drinking alcohol. Gregory Buckingham estimated that Kelly only consumed about three beers (Exhibit C.7a, p2).
- 1.2 At about 11.30p.m. the group left the house and moved towards Kelly Organ's house where some of them were sleeping over. The group stopped at the playground in Fotheringham Reserve near the corner of Osborne Road and Lady Gowrie Drive at North Haven.
- 1.3 The statement of Gregory Buckingham contains a description of what followed:-

“At 1.00a.m. we all left Richards for the exception of my girlfriend Johanna who drive my car back to her house which is somewhere in Marden. We all walked as a group towards the Yacht Club and we all ended up at the children's playground which is located on the grassed area between Lady Gowrie Drive and the Yacht Club and is at the

Outer Harbour end of this grassed area. The playground is for children and consists of various play equipment and has bark on the ground bordered by wood and is covered by 4 large separate sails for shade during the day. I don't really know whose idea it was to go down to the park.

I think one person just started walking down towards that direction and we all just followed. When we were walking down Seaspray Avenue, I just guessed that we would probably be going down to Kelly's house and I was going to sleep there for the night and ring my girlfriend who would pick me up as she was tired and did not want to stay out anymore. We kept walking and went past Kelly's and I kept following behind everyone. A short time later we all ended up at the park. I sat on the swings for about 30 seconds when we first got to the park.

Someone who I honestly don't remember stood up on a platform near the slide and got up with one step up onto the shadecloth which is about 13 feet or something like that high off the ground. There was another about three people followed the first person and also climbed up onto the cloth and I then followed leaving Joel, Richard and Chantelle who was sitting on the ground. Joel followed me up onto the cloth and then it was Richard. Chantelle stayed on the ground for a little bit of time (about one minute) then she decided to follow us all up onto the cloth". (Exhibit C.7a, p2-3).

- 1.4 The witnesses said they had no difficulty getting access to the sail surface. Joel Pryke said:-

"To get on the sail there was a spiral ladder for the slippery-dip and the top of that is the same height as the edge of the sail". (Exhibit C.6a, p2).

Chantal Atkins said:-

"I climbed up a plastic net and got to the top of a fort. Then all I had to do was step over onto the mesh". (Exhibit C.9a, p2).

- 1.5 By the time Chantal Atkins arrived at the playground, the others were all sitting on the sail. She said:-

"I saw that there was a big sag in the mesh and noticed that everyone was sitting in it like a hammock.

Where they were sitting the sag was only about a metre off the ground. A couple of people were climbing up to the top of the poles holding the mesh and sliding down the sails like slippery dips. The mesh was joined to a pole about as tall as a stop light, I heard this morning it was 13 feet. I climbed up a plastic net and got to the top of a fort. Then all I had to do was step over onto the mesh. I did that and sat down where everyone else was. As I sat down, Kelly was walking up the mesh to the top of the pole and she was about halfway up the mesh when the pole just gave way sort of just came out of the ground, it didn't bend or anything. She fell face first onto the ground probably from about 2 and a half metres". (Exhibit C.9a, p2-3).

- 1.6 It would seem that Kelly hit her head on a pine log which was used as a border around the play equipment. Inside the border, bark chips had been placed in order to provide a soft surface in case of a fall from the play equipment. This is confirmed by the photographs taken by Sergeant Huxley early the following morning (see Exhibit C.13a). Although the border took account of the shape of the play equipment, it did not correspond to the shape of the sail area. If it had, and Kelly had fallen on to the bark chips, as her friends did, her death may not have occurred. I will discuss this issue again later in these findings.
- 1.7 Police were called to the scene and arrived at about 1.05a.m., and an ambulance arrived soon afterwards. Kelly was conveyed to the Queen Elizabeth Hospital, where she was admitted. A CT scan of her head was performed, and this showed a fractured skull and multiple intracerebral, subdural and subarachnoid haemorrhages. She also had extensive facial fractures. She underwent surgery in an attempt to control the bleeding, but her intracranial pressure was extremely high. She was transferred to the Intensive Care Unit, but her intracranial pressure did not respond to treatment and she failed to regain consciousness.
- 1.8 On 13 September 1999 tests demonstrated that there was no blood flow to Kelly's brain, and on 14 September 1999 two Intensive Care Unit consultants considered that there had been irreversible cessation of brain function and her life was pronounced extinct at 3.15p.m. on 14 September 1999.

2. **Cause of death**

- 2.1 A post mortem examination was carried out on the body of the deceased on 15 September 1999 by Dr. M. Texler under the supervision of Dr. J. Pierides. A neuropathological examination was also carried out by Dr. Peter Blumbergs. These examinations confirmed that the cause of death was hypoxic encephalopathy as a result of raised intracranial pressure caused by severe closed head injury (see Exhibits C.3a and C.4a and C.4b).
- 2.2 A toxicological analysis carried out by Mr. P. Harpas at the Forensic Science Centre disclosed that on admission, Kelly's blood contained 0.030% alcohol. No other drugs were detected (see Exhibit C.5a).

3. **Investigation**

3.1 At about 7.30a.m. on Sunday 12 September 1999 Constable S.J. Bowley of Port Adelaide Crime Scene Unit attended the playground. In his report (Exhibit C.14), Constable Bowley described the general layout of the facility:-

“The playground area is in an irregular shape about 25 metres long by 13 metres wide and is situated about 30 metres from the northern end of the reserve, roughly equidistance from the marina and Lady Gowrie Drive.

The playground area has various apparently well-constructed steel play equipment pieces, including a slippery slide and ladder. The top rail of the play equipment is about 3 metres from the base. There is a border of 100-mm permapine posts laying on their sides surrounding the play equipment within which is a layer of bark chips. The posts appear to be used as a raised border to separate the bark chips from the lawn area. The permapine posts protrude about 40 mm from ground level.

The play equipment is irregularly covered by a sunshade that is constructed of a translucent nylon type material, held about 4.75 metres from the ground by 9 steel posts placed in a rough rectangle. The shade material is held in position by steel cables that pass through sewn hems along the edge of the material. The cable is connected at the corners to galvanised screw shackles that are then fastened to the top of the posts by a steel ring welded to it. The shade material that had fallen with the post was cut into a rough rectangle, about 10 metres long by 6 metres wide. The sunshade has curved sides and is meant to resemble the sails of a boat”. (Exhibit C.14, p2-3).

Mr. Bowley said that the height of 4.75 metres was the point where the sail was attached to the post, and not the height at the mid-point above the play equipment (T.34). The evidence of Mr. Sandery, the engineer who designed the structure, was that his design indicated that the sails were attached to the posts at two different levels - at the two highest points, diagonally opposite each other, they were attached at 4.5 metres above the base, and at the lower level at 3.6 metres. There is a discrepancy of about .25 metres between Mr. Sandery’s design and Constable Bowley’s estimate, which I will take into account. When the sail is connected, a complex, curved shape is created.

3.2 From those figures, it can be estimated that, at about the midpoint of the cable between two posts on the sides of the rectangles, the edge of the sail would have been about half way between the upper and lower points, or between about 4.00 and 4.25 metres above the ground. If one accepts Constable Bowley’s measurements, that the top of the play equipment was three metres high, this left a gap of only between 1.00 and 1.25 metres between the top of the play equipment and the edge of the sail.

- 3.3 This does not sit well with the evidence of Mr. Soulsby, the manufacturer of the shade structure, who said that he allowed 1.8 metres clearance (T.46).
- 3.4 The evidence of Mr. Jim Pantzikas, the consultant civil engineer engaged by the Port Adelaide and Enfield Council to review the shade structures, was that if a 60kg weight is dropped .3 metres on to the midpoint of a ten metre cable, this will result in a sag of 1.1 metres in the cable (see his report, Exhibit C.17b, p6).
- 3.5 If the edge of the sail was only 1 to 1.25 metres or so above the height of the play equipment, and will sag about a metre if 60kg is dropped on its midpoint, it is easy to see how Kelly Organ and her friends gained access to the sail. I reject Mr Soulsby's evidence (T44-45) that there would have been any difficulty associated with this exercise.
- 3.6 Constable Bowley also made an examination of the broken post. His description was as follows:-

“The support post is made of steel tubing 4800mm long. The tubing is 140mm (outside diameter) and has a wall thickness of about 5mm. A steel ring about 200-mm diameter was welded around the tube about 50mm from the top and held in place by four radial steel pieces. The screw shackles from the sunshade were attached to this steel ring. The post had a steel-capping piece attached to the top of the post and was arc welded to a steel plate at the base. The support post had been galvanised and then a green plastic type coating applied to the support post and base, prior to erection. I subsequently weighed a 560-mm section of this pipe that had been cut off the original. This section weighed 9.595kg. Assuming that the pipe is of a uniform section, the whole pipe would weigh about 82.25kg, not including the capping piece or attachment ring”. (Exhibit C.14, p4).

- 3.7 Constable Bowley described the baseplate as follows:-

“The baseplate is about 30cm square and is 16mm galvanised steel plate. The plate and post had been buried to a depth of about 100-mm and was attached by bolts to a concrete block, which went to a depth of at least 450-mm. I did not excavate the concrete block any further. The plate was attached to the concrete block by $\frac{3}{4}$ Whitworth bolts that had been set in the concrete. Two of the bolts had steel nuts attached to the thread and then the nuts were welded. The other two had been cut off level with the baseplate and then welded. The green plastic coating on the baseplate was cracked and had flaked off in many areas allowing water to get in around the welded base. The soil was damp around the baseplate and of a sandy loam type”. (Exhibit C.14, p5).

- 3.8 In relation to the welded join between the post and the baseplate, Constable Bowley said:-

“On examination of the welding of the baseplate it appears to be of a low quality with considerable oxidation around the lower weld run and an apparent previous crack in the weld, which had oxidised prior to the accident. There were no support fillets to assist the post to adhere to the baseplate.

The baseplate environment could be described as harsh, as it was buried about 100mm into sandy loam soil within 50 metres of a salt water impoundment and was consistently being irrigated via the lawn sprinklers. The plastic coating was cracked and was trapping water in the baseplate and weld area to further accelerate oxidation. At this time there has not been an engineer’s report done on the baseplate and post”. (Exhibit C.14, p5-6).

- 3.9 Although Constable Bowley had experience in previous employment as a welder, he did not profess to be an expert (T.26). However, his comments about the standard of the welding were supported by the evidence of Mr. Sandery, the engineer who designed the structure. After he examined the baseplate and the bottom of the column in court, he agreed that the welding was inadequate, in places only 3 to 4mm thick rather than the required 6mm (T.88). It should be pointed out that Mr. Sandery did not supervise construction of the equipment, nor did he inspect or certify it afterwards, so he should bear no responsibility for the quality of the construction.

4. **Design of the structure**

- 4.1 The structure was constructed by a company called Soulsby Sails Pty. Ltd., a principal of which company is Mr. Mark Soulsby. He describes his company as the “pioneer in this particular industry” (Exhibit C.15, p1). The company began erecting shade structures for the City of Port Adelaide/Enfield in 1996, and the order for the structure in question here was placed in September 1997. Mr. Soulsby engaged Mr. Sandery to perform the engineering design for the structure, the Council approved the design, and Mr. K.W. Campbell of Campbell Engineering was engaged to perform the metal fabrication. The structure was installed in December 1997.

- 4.2 Mr Soulsby confirmed that the structure was not designed to be weight-bearing (T42). He added that the Council did not want the structure to incorporate guy wires for aesthetic reasons and because they may have constituted a hazard for children (T40).

4.3 Previous experience

There was ample evidence that young people had been climbing on top of these structures well before Kelly Organ's death occurred.

4.4 In his letter to the Council dated 25 June 1997, Mr. Soulsby observed (in relation to a similar structure at L.J. Lewis Reserve):-

“Due to children or teenagers bouncing on top of the sail itself, the posts have exceeded their designed load capacity, resulting in the posts being sprung over.

The sail itself has bad stretch marks, cigarette burn holes and some tears resulting from the vandals' action.

No matter how high you make these structures, vandals can still reach them. We have had vandals scale tall flag poles and cause damage”. (Exhibit C.15b).

Mr. Soulsby suggested that the Council consider either changing the structure so that the sails were on a sharper angle, or inserting gusset plates around the base of the columns to strengthen them.

4.5 On 22 June 1998, Mr. Soulsby wrote to Mr. George Levay at the Council in relation to the structure at the northern end of Fotheringham Reserve following an inspection. He said:-

“The south-east corner sail - someone has been up on top and fallen through the sail causing an L-shaped tear. There are also numerous smaller holes caused by cigarette lighters or similar. ...

Please note that if you do engage another contractor to perform any work on the sail structures then any warranty still in place will become null and void”. (Exhibit C.15e).

4.6 Modification of design

In December 1998, one of the poles failed because a weld between the baseplate and the column failed. This was presumed to have been caused by somebody gaining access to the top of the sail. Mr. Soulsby engaged Mr. Campbell to carry out the repairs.

4.7 Mr. Campbell said that he suggested that the poles should be pulled out, lengthened and then concreted in (as later recommended by Mr. Pantzikas). He said that Mr. Soulsby did not agree, and instructed him to weld “fins” or gussets around the joints to strengthen them (T.204).

4.8 Mr. Campbell's quotation, Exhibit C.15c, states that he was to:-

- “ • replace sheared pole;
- weld fins to eight poles;
- clean and cold galv”.

The structure consisted of nine poles altogether. The obvious intention of the arrangement was that he should weld gussets to the replacement pole in the workshop, and to the other eight poles still in situ.

- 4.9 Mr. Campbell denied this, arguing that the eight poles in the quotation included the replacement, and one pole, the “last small pole” (the one that failed leading to Kelly Organ’s death) did not need gussets because it was “stable” (T.225).
- 4.10 This is plainly nonsense. In fact, two out of the nine poles did not have gussets. The pole without gussets, which failed causing the death of Kelly Organ, was not a “small” one - in fact it was one of the 4.8 metre poles. I do not believe Mr. Campbell’s evidence on this topic. I find that the obvious intention of the parties at the time was that gussets should be welded to all eight of the poles that were still in situ, and that Mr. Campbell overlooked welding gussets to two of the poles, including the one which failed on 11-12 September 1999.

5. **Engineering review**

- 5.1 Following Kelly Organ’s death, the Port Adelaide and Enfield Council retained the services of Mr. Jim Pantzikas to conduct a thorough review of all of the shade structures in its area. In his first report dated 8 November 1999 (Exhibit C.17), Mr. Pantzikas noted that:-

“There were some differences in the fabrication and the support of each column base. Some bases had gusset plates welded between the column and the baseplate and others did not. The gusset plates were not painted indicating that they were put on after the original fabrication. The quality of the gusset plate welding was relatively poor”.

- 5.2 He concluded:-

“3.1 The column base fixing details are considered to be of significant structural concern. The columns are not adequately fixed at their base and the bolting is loose. This is probably due to any or a combination of the following:

- rusting of washers
- the group below the baseplate does not have adequate strength
- the installation of protruding wedges which have rusted and possibly moved.

3.2 The quality of the welding between the column and the baseplate was not able to be determined due to the paint covering”. (Exhibit C.17, p3).

5.3 Mr. Pantzikas recommended that the structure should be dismantled, and that the baseplate details should be redesigned so that four gusset plates should be welded between the column and the baseplate. He made a number of recommendations about changes to the construction should the structure be re-erected. He suggested that the columns should be embedded in concrete, rather than using the baseplate method (Exhibit C.17, p3).

5.4 Mr. Pantzikas recommended that each of the six other similar structures in the council area should be dismantled and rectified on the same basis.

5.5 In relation to the particular column and baseplate which failed during the accident on 12 September 1999 leading to Kelly Organ's death, Mr. Pantzikas said:-

“I have visually inspected the items and have made the following observations:

- There is evidence of welding failure and subsequent column distress.
- In general the quality of the welding of the column to the baseplate is not of satisfactory workmanship.
- The weld metal did not fuse with the baseplate metal over the complete required contact area. This is probably due to the incorrect settings of the welding machine.
- The resulting small section area of the weld, which has achieved adequate fusion (approximately 60% of the design area), has become overstressed under the applied loadings and has subsequently failed.
- The imposed loadings on the structure by the group of people as detailed in the report by Stephen John Bowley, Constable 708/7, would have caused structural failure even if the quality of the welding had been satisfactory.
(my underlining)

I should also point out that I am not an expert on welding, but make these observations based upon my general experience in the field of structural engineering”. (Exhibit C.17c).

5.6 Structural analysis

Mr. Pantzikas was requested to carry out a structural assessment of the shade sail structures erected by the Port Adelaide and Enfield Council, and his report is Exhibit C.17b. I have already referred to the fact that his calculations reveal that if only one person put their weight of, say, 60kg in the middle of a ten metre span of cable, it would result in a sag of approximately one metre. Not only would this cause a sag in the cable, it would also cause a lateral deflection at the top of the post. Using a

computer modelling approach, Mr. Pantzikas examined the effect of placing loads upon 10mm cable in both six metre and ten metre lengths. He reported:-

“Figure 5 shows the magnitude of the lateral deflection at the top of a 3.6m high post resulting from a mass striking the cable. The tip deflection caused by the 60kg free-falling, 0.1 metre in the example above is approximately 95mm.

The 139.7mm diameter CHS considered earlier can be shown to have a theoretical moment capacity of 21.7kNm at failure, whilst the 6mm weld (E48XX) at the baseplate has a corresponding moment capacity of 17.5kNm at failure.

The weld is the weaker element and therefore the critical point in the member.

A 4.9kN load would deflect the top of a 3.6 metre high post 79mm laterally and fail the weld at the base connection. Figure 5 indicates that 60kg released from a height of less than 0.1m would produce a tip deflection in the order of 90mm and therefore have the potential to fail the weld”. (Exhibit C.17b, p6).

- 5.7 In layman’s terms, Mr. Pantzikas’ calculations suggest that even the weight of one person being placed at the midpoint of a ten metre cable had the potential to cause the welding between the baseplate and the column to fail. This does not take into account the fact that the welding was only 50% as strong as it should have been. The question then arises as to how seven or eight people could get on to the sail, applying such forces to it that the sail material stretched to within one metre of the ground, and yet the welding did not fail much earlier in the piece.
- 5.8 The answer seems to lie in the fact that once all of the people were in the centre of the sail, the load was being distributed to four posts rather than two, some of the force was being absorbed by the elasticity of the sail cloth, and there was, no doubt, a safety margin (which Mr. Sandery estimated at about 30%) built into the design of the structure. It would seem that the post failed when Kelly was climbing to the corner of the sail closest to that particular post, and thereby placing most of her weight directly on to that post rather than spreading it among the others.

6. **Maintenance issues**

6.1 Mr. Soulsby said that during the period of twelve months during which the warranty for the structure was in existence, he visited each structure at least once every three months or so, or more often if there had been a large storm, to retension the sails to be sure they were taut (T.59). He said that he discussed the possibility of an ongoing contract to provide this service to the Council with Mr. Levay, but said that Mr. Levay told him that the Council would undertake that responsibility (T.60).

6.2 Mr. Levay's evidence about this subject was not quite the same. He acknowledged that Mr. Soulsby raised the issue of an ongoing maintenance contract with him, but said that he told Mr. Soulsby they would "look into the matter" (T.101). It appears that they were still looking into the matter at the time of Kelly Organ's death.

6.3 Mr. Levay said that he did not know that Mr. Soulsby continued to tighten the sails during the twelve month warranty period after the sails were installed. He said that he did not recall any specific discussion about retensioning the sails. He said that if Mr. Soulsby had drawn the need to his attention:-

"He would be engaged as a matter of urgency to rectify the situation". (T.115).

6.4 Mr. Soulsby alleged that he had "driven past" a few times after that period and noticed that the sails appeared "quite loose" (T.60). He was vague about whether he notified Mr. Levay though (T.61), and, as I have said, Mr. Levay had no memory of having been so advised.

6.5 It is difficult to make clear findings on the basis of such vague evidence. Even if the sails had been taut, Mr. Pantzikas' evidence indicates that Kelly and her friends would have had no trouble gaining access to the sails. If the sail was not taut, this access would have been even easier.

7. **Conclusions**

7.1 All counsel before me have acknowledged the obvious fact that Kelly Organ and her friends were wrong to have climbed on to the shade sails this night and misused them the way they did. The likelihood of severe damage to the property of the Council should have been apparent to them. Of course, none of them contemplated that serious injury or death might result. Hopefully, Kelly's tragic death at such a young

age will serve as a warning to other young people about the hidden dangers associated with such irresponsible behaviour.

- 7.2 Clearly, the structure in question here was not designed to carry the weight of one person, let alone five or six people. Both the Council and Mr. Soulsby were aware, before Kelly Organ's death, that people were misusing the structure by gaining access to the sails.
- 7.3 I reject the suggestion that the gap between the top of the play equipment and the sails was sufficient to deter misuse. Even if the sails were taut, Mr. Pantzikas' calculations demonstrate that, once weight was applied, access would have been easy. This is borne out by the evidence of what happened on this night.
- 7.4 The evidence is not clear enough to find that the sails were loose that night through failure on the part of the Council to adequately maintain them. If they were, access would have been even easier.
- 7.5 The standard of metal fabrication of the post which failed was inadequate. In particular, Mr. Campbell failed to weld "fins" or gussets to the base plate joint despite being directed by Mr. Soulsby to do so. The original welding was also sub-standard. It is unknown whether, if the welding was adequate and the gussets were installed, the outcome may have been different.
- 7.6 Neither the Council nor Mr. Soulsby took further engineering advice in light of the knowledge they had that the structures were being misused. Further investigation would have revealed how people were gaining access to the sails, and whether any modifications (raising the height in particular) were called for.
- 7.7 Although it is possible to design a structure to carry loads such as the ones being applied that night, the structure would be so massive as to be impracticable. Accordingly, I consider that the correct approach should be to consider the best ways to prevent access. The shade structures provide a valuable service to the public, in reducing exposure to the sun. However, if access to the sails cannot be prevented, perhaps they should be discontinued.
- 7.8 The outcome may also have been different if Kelly Organ had not fallen on to the pine log border. Any future design of these structures should take into account the

possibility that someone may fall from a sail structure, when considering the placement of such hazards below.

8. Recommendations

8.1 The need for an Australian Standard

I agree with the submission of Mr. Crawley, counsel for the City of Port Adelaide and Enfield, that:-

“The creation of a complementary Standard (to the existing Australian Standards for playgrounds) in relation to shade sail structures will eliminate the reliance upon self-appointed experts and provide objective criteria upon which designs can be based and against which designs and construction can be measured”.

8.2 Any such Standard should make provision for at least the following factors:-

- standards for the design and construction, particularly dealing with footings, metal fabrication, welding standards, rust-proofing, strength of materials, etc;
- standards for tensioning of the structure, including recommended methods of performing and checking this aspect;
- formulae for calculation of the stresses involved, taking into account such variables as wind, storms, etc;
- standards for the frequency of maintenance, and particularly retensioning;
- minimum height standards above play equipment to prevent access to the sail surfaces;
- standards for materials to be used;
- design standards for the layout of play equipment, and the placement of ground-level hazards such as borders;
- levels of signage required to warn of the dangers of climbing on the structure.

8.3 I am sure that there are other factors which should be covered by such a Standard as well.

8.4 Pursuant to Section 25(2) of the Coroners Act 1975, I recommend that an Australian Standard be developed to deal with these issues.

Key Words: head injuries; play equipment; shade sails

In witness whereof the said Coroner has hereunto set and subscribed his hand and

Seal the 9th day of November, 2000.