CORONERS ACT, 2003

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 21st, 22nd, 23rd, 24th, 25th, 28th and 29th days of August 2006 and the 18th day of October 2006, by the Coroner's Court of the said State, constituted of Elizabeth Ann Sheppard, a Coroner for the said State, into the deaths of Petrus Jacobus Jong, Helena Alida Maria Jong and Miranda Gertruida Maria Jong.

The said Court finds that Petrus Jacobus Jong aged 56 years, late of Main Road, Forreston, South Australia died at Morgan Road, Overland Corner, South Australia on the 3rd day of July 2004 as a result of crush asphyxia.

The said Court finds that Helena Alida Maria Jong aged 54 years, late of Main Road, Forreston, South Australia died at Morgan Road, Overland Corner, South Australia on the 3rd day of July 2004 as a result of multiple injuries with crush asphyxia.

The said Court finds that Miranda Gertruida Maria Jong aged 25 years, late of 60 Albert Street, Gumeracha, South Australia died at Morgan Road, Overland Corner, South Australia on the 3rd day of July 2004 as a result of crush asphyxia.

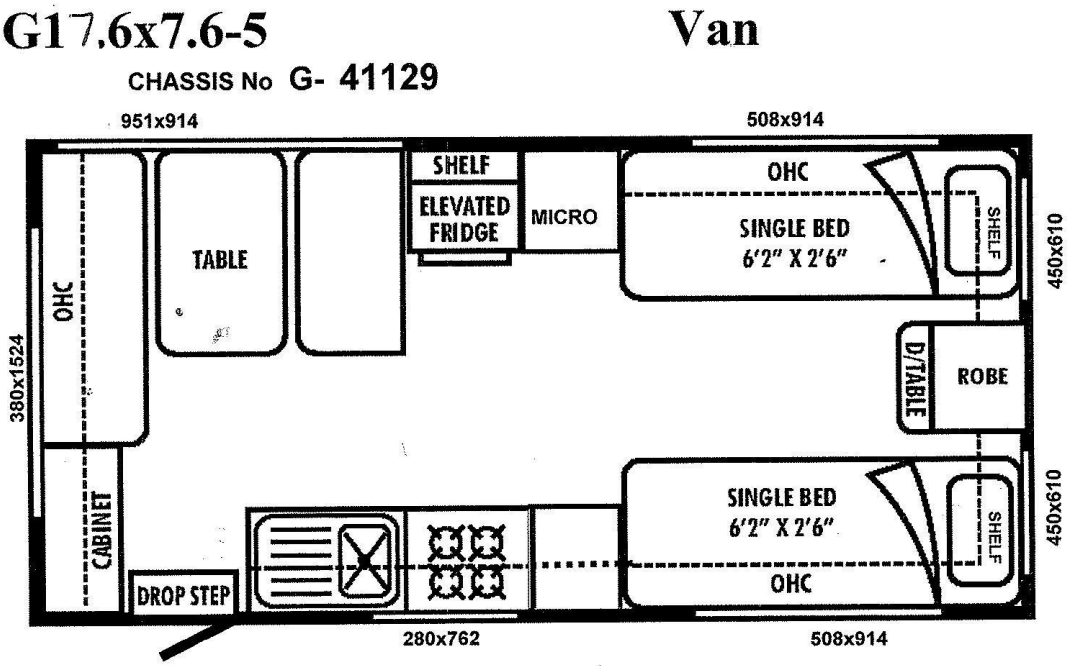
The said Court finds that the circumstances of their deaths were as follows:

1. Background leading to the day of the collision

1.1. On 2 April 2004, Mr Jong placed an order to purchase a new Galaxy caravan with McKenzie Caravans in Victoria when Mr Jong attended the Melbourne Caravan Show. The contract specified a 17.6 x 7.6 dual axle caravan which was to have a few extra cupboards and a larger table than would normally be present in the standard 16.6

series. The requested modifications were discussed with the manufacturer, Steven Borg from Galaxy Caravans, and were approved.

1.2. Colin Young is Executive Officer for the Recreational Vehicle Manufacturers Association of Australia, an organisation which provides a code of practice and construction standards for its members. According to Mr Young, Galaxy Caravans is a member of this organisation and is considered to be of good standing. Galaxy Caravans engaged G & S Chassis to construct the chassis for Mr Jong's caravan. Mr Young stated that he had conducted an audit of this chassis company and considered it to be 'very professional'. According to Mr Young, the layout of Mr Jong's new Galaxy caravan was unexceptional in as much as the heavy kitchen items were located centrally between the axles, or slightly forward of that point[1].



Layout of the caravan ordered by Mr Jong

1.3. According to Mr McLaughlin, General Manager of McKenzie Caravans, he advised Mr Jong to have a heavy duty tow bar fitted to his Ford Explorer to tow the new caravan. This type of tow bar was not fitted before the collision, however there is no evidence which enables me to find that if one had been fitted the collision is less likely to have occurred[2]. Mr Jong travelled from South Australia with his old single axle 17.6 Hacienda caravan to trade-in. He took possession of the new Galaxy caravan on 4 June 2004 in Melbourne. The evidence suggests that Mr Jong was an

[1] Transcript, Page 250 and Exhibit C17
[2] Transcript, Page 402

experienced caravaner, although this does not necessarily imply that he had a sound understanding of matters relevant to safe towing. According to Mr McLaughlin, Mr Jong expressed his displeasure when he found that the air-conditioning unit had been installed towards the front, instead of the rear. Mr McLaughlin is said to have explained to him that it was important to have it placed in that location to maintain the integrity of the weight upon the tow ball[3].

1.4. An electronic integrated brake unit was installed into the Ford Explorer before Mr Jong took delivery of the new caravan[4]. According to Mr McLaughlin, Mr Jong's Ford Explorer was fitted with clip-on extension mirrors at the time he took delivery of the new Galaxy caravan[5]. I accept Mr McLaughlin's evidence that these types of mirrors may vibrate to some extent and would not be as effective as the fixed style mirrors, but would be good enough to enable Mr Jong to see trucks and semi-trailers approaching from the rear[6]. After returning to Adelaide, Mr Jong was said to have contacted Mr McLaughlin for information about the airconditioner. During their telephone conversation Mr Jong thanked Mr McLaughlin for his assistance during the sale process, stating that he was happy with the caravan[7].

2. The day of the collision

2.1. On Saturday 3 July 2004, Petrus Jong, his wife Helena and daughter Miranda were travelling in the Ford Explorer four wheel drive sedan towing the new dual axle Galaxy caravan along the Morgan Road towards Morgan.

2.2. The Jong family had just left a property at Overland Corner. They had stopped there to catch up with friend Peter Mitolo, who had coffee with them and chatted for a while. When they departed at about 12:30pm Mr Mitolo set off first in his vehicle, intending to stop at another property further along the Morgan Road. Mr Jong followed Mr Mitolo in his vehicle for a short distance, heading away from Adelaide in a westerly direction[8]. The weather was fine with a strong north/north westerly wind

[3] Transcript, Pages 222 and 223
[4] Exhibit C19
[5] Transcript, Page 210
[6] Transcript, Page 211
[7] Exhibit C22, Page 2
[8] Exhibit C13, Page 2

blowing[9]. This wind would blow from the right for traffic travelling in a westerly direction.

2.3. Mr Mitolo saw what looked like a semi-trailer in his rear-vision mirror behind Mr Jong's caravan. This was in fact a prime-mover in B-double configuration towing two trailers. Mr Mitolo was travelling at 80 kilometres per hour and he estimated that Mr Jong would have been travelling at about the same speed.

2.4. Mr Mitolo anticipated that the prime-mover would overtake Mr Jong. When he checked his rear-vision mirror, he noticed that the truck and the caravan were veering off to the side of the road[10]. Mr Mitolo was unable to see where Mr Jong's vehicle was. He saw the prime-mover continue into the scrub before coming to a stop. Mr Mitolo assumed the worst and telephoned for help before approaching the position where the prime-mover had stopped.

2.5. Kevin Mackereth was the driver of the prime-mover. He had started his journey very early that morning but claimed he had adequate rest and was feeling awake at the time. He had been driving semi-trailers for 38 years and B-double prime-movers for about three months. He was driving at 100 kilometres per hour in a westerly direction along the Morgan Road. He reduced his speed to between 80 and 85 kilometres per hour when he came across the Ford Explorer towing a caravan. He followed the vehicle for about 1.5 kilometres. Mr Mackereth began an overtaking manoeuvre, but pulled back when he had the impression that the driver of the Ford may not have realised he was there. He formed this impression because the Ford was positioned towards the centre of the road and not at the far left of it as one might expect of a vehicle about to be overtaken in such circumstances. According to Mr Mackereth, the Ford did not drop its speed.

2.6. Soon after passing a bend in the road, Mr Mackereth built up speed to overtake the Ford again, this time along a flat, straight stretch of road. He stated that before moving out to overtake the vehicle in front, there were between four and seven car spaces between them. As his vehicle moved out and commenced to pass the Ford and the caravan, everything seemed alright until he was level with the Ford Explorer at which time it moved over towards him[11]. He was able to see the driver's arm through

[9] Exhibit C24
[10] Exhibit C13, Page 2
[11] Exhibit C7b

the window as the Ford came over. He then heard a small 'click' and lost control of his own vehicle. Before losing control of his prime-mover, Mr Mackereth had the impression that there had been contact between the right side of the Ford and the passenger side door and bull bar of the prime-mover. The prime-mover continued on in a north westerly direction and drove off the road into the scrub before coming to rest. From his elevated position in the prime-mover, he was unable to see where the Ford Explorer was until he exited his vehicle and saw that it was upside down, crushed and lodged partly beneath the front of the prime-mover. It later became clear that the Ford Explorer had rolled over a number of times whilst being pushed along by the prime-mover.

2.7. Mr Jong, his wife and daughter all died at the scene from injuries sustained in the collision.

3. Post-Mortem examinations

3.1. A post-mortem examination was conducted upon Petrus Jong by Dr John Gilbert, Forensic Pathologist at the Forensic Science Centre in Adelaide on 3 July 2004. Dr Gilbert concluded that Petrus Jong died as a result of crush asphyxia[12].

3.2. A post-mortem examination was conducted upon Helena Jong by Dr Karen Riches of the Forensic Science Centre in Adelaide on 5 July 2004. Dr Riches concluded that Helena Jong died as a result of multiple injuries with crush asphyxia[13].

3.3. Dr Riches also performed a post-mortem examination upon Miranda Jong on 5 July 2004 and concluded that Miranda Jong died as a result of crush asphyxia[14].

3.4. I accept the opinions expressed in the reports received from Dr Gilbert and Dr Riches and find that Petrus Jong, Helena Jong and Miranda Jong sustained their fatal injuries as a result of the collision with the prime-mover driven by Mr Mackereth.

4. Weather Conditions

4.1. The nearest meteorological observations were recorded at Loxton, giving a reading of north, north-westerly winds at 20.5 kilometres per hour at 12:30pm on 3 July 2004

[12] Exhibit C3a, Page 1
[13] Exhibit C4a, Page 2
[14] Exhibit C4b, Page 2

with wind gusts of 31.3 kilometres per hour[15]. I refer to the role which this wind might have played in the collision shortly.

5. Mechanical Examination of the prime-mover, Ford explorer and caravan

5.1. Evidence received during the Inquest enables me to find that there was no mechanical fault of any of the vehicles concerned which might have caused the collision[16].

5.2. Alcohol has also been excluded as a relevant factor with respect to the driving behaviour of Mr Jong and Mr Mackereth[17].

6. Major Crash Unit Investigation

6.1. Sergeant Peter McGuire and Senior Constable Sharon Beebee from the Major Crash Unit of the South Australia Police Department attended the scene at about 5:00pm. An approximate point of impact was nominated by the officers, although there were no marks on the roadway which confirmed the accuracy of the point nominated[18]. I take this to indicate that there were no fresh gouge marks observed on the roadway, or fragments from the vehicles. No tyre marks were seen along the roadway leading up to the point of impact. Two tyre marks were clearly seen along the east bound traffic lane of the roadway which were consistent with the Ford Explorer being pushed sideways along the road for a distance of some 38 to 45 metres in front of the prime-mover towards the northern edge of the roadway before leaving the bitumen surface and travelling on into the scrub[19].

6.2. Sergeant McGuire formed the opinion from the tyre marks that the Ford Explorer had rotated 90 degrees in a clockwise direction to a position in front of the prime-mover. Two other tyre marks observed in the same general location were regarded by the police investigators as of uncertain significance. They were thinner than the other tyre marks and extended for approximately 31 metres inside the wider tyre tracks attributed to the Ford Explorer[20]. The photographs of these marks are of poor quality. The police did not prepare a plan in which these and other points of potential significance were illustrated.

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[15] Exhibit C24
[16] Exhibit C12a, Pages 9, 13, 16, 18 and 24
[17] Exhibit C5a, Page 2 and Exhibit C10a
[18] Transcript, Page 284
[19] Exhibit C8a
[20] Exhibit C8a, Page 8

6.3. Photographs taken by police at the scene show the dirt verge to be sandy with scrub on both sides. An examination of the verges showed no sign that the Ford had left the road surface before the point of impact which might have explained subsequent loss of control[21]. The relevant stretch of road runs in an east-west direction and is straight with no visual obstruction for west bound traffic.

6.4. The road was bitumen, measuring 6.5 metres wide and is divided by a single broken white line. The road surface appeared dry and in good condition. The applicable speed limit was 110 kilometres per hour. According to a report prepared by Sergeant McGuire, the prime-mover and Ford Explorer came to rest 163 metres from the estimated point of impact on the northern side of the road in scrubland, and 43.2 metres north of the northern bitumen edge of the roadway[22]. Sergeant McGuire summarised his view of the final movements of the prime-mover and Ford Explorer as follows:

> 'It was apparent that the right side of the vehicle collided with the Kenworth prime mover and trailer combination. After the collision the Ford Explorer station sedan traveled west across the bitumen road surface in front of the Kenworth prime-mover and trailer combination, before rolling several times and being pushed along on its side and roof before coming to a stop facing in a northerly westerly direction in front of the Kenworth prime-mover and trailer combination'[23].

No doubt Sergeant McGuire's summary was influenced to some extent by the account given by Mr Mackereth.

6.5. The caravan was also damaged during the collision, with most damage to the front right and left side and draw bar area. The caravan became detached from the Ford Explorer in the course of the collision and continued on in a north westerly direction into the scrub, coming to rest against shrubs and a tree, roughly parallel with the rear trailer of the prime-mover. No investigations were conducted by officers from the Major Crash Unit concerning features relevant to the caravan including whether the jockey wheel was in place at the time the caravan came to rest[24]. It was not until the Court assembled at Ottoway to view the caravan on the fifth day of the Inquest that it became apparent that the jockey wheel was situated in the boot of the caravan and that the rim of the wheel was distorted in part and the tyre was completely absent[25]. At no

[21] Transcript, Page 287
[22] Exhibit C8a, Pages 4-5
[23] Exhibit C8a, Page 5
[24] Transcript, Page 298
[25] Transcript, Page 350

stage during the investigation was the caravan weighed. No internal inspection was made of the caravan which might have shed some light upon the overall weight of the caravan and the way in which packed items were distributed throughout the caravan.

6.6. The caravan was towed to a repair yard at Barmera, operated by Peter Morrelli[26]. From this time the integrity of the caravan as a potential exhibit was compromised. The caravan was stored undercover for a week, during which time police mechanic Christopher Graham examined and photographed it, but did not inspect the interior. The personal contents were removed at the request of Miranda Jong's brother Michael, however, there is no record of what was taken and how much these items weighed. The caravan was then 'dragged' up onto a flat top tow truck and towed to another location in Barmera where it was stored in the open[27]. A forklift was used to place the caravan in the yard where it remained for some months.

The damaged caravan as it appeared on 6 July 2004

[26] Exhibits C30 and C31
[27] Exhibit C30

The damaged caravan as it appeared on 6 July 2004

6.7. Photographs taken by Christopher Graham on 6 July 2004 depict points of contact between the right side of the caravan and the left passenger side and bull bar of the prime-mover. Another photograph depicts the twisted tow bar and broken safety chains which have severed at approximately mid-point[28].

6.8. A decision was made to release the caravan without consulting the State Coroner, or anyone on his behalf despite it being clear to the relevant police investigators that there was a Coroner's investigation in progress[29]. When the caravan was released by police, two fork lifts were required to lift it onto the transport which conveyed it to an auction yard, known as Pickles Auctions at Salisbury Plain. I am mindful that this activity may have caused some further damage to the caravan. Photographs of the caravan were said to be available on the internet at about this time depicting the caravan in its damaged condition. Copies were introduced into evidence which show the caravan unsupported in a horizontal position with the gas cylinder bottle still located at an angle on the A-frame at the front of the caravan[30]. In photographs taken subsequently, the gas bottle is absent.

[28] Exhibit C12b, Photographs 28, 38 and 48
[29] Transcript, Page 293
[30] Exhibit C17c

6.9. Approximately eight weeks after the caravan was delivered to this auction yard, Counsel assisting the State Coroner made inquiries with Senior Constable Beebee as to its whereabouts and it was taken back into police custody on 5 July 2005 for further examination.

6.10. Sergeant McGuire was said to be the principal investigator but he no longer works in the Major Crash Unit and was not called to give evidence. According to Senior Constable Beebee, she knew nothing about caravans, but wondered whether the caravan might have played a contributing role in the collision and was advised by officers in the Major Crash Unit to contact Tom Olthoff.

6.11. Tom Olthoff had given evidence in a Coronial Inquest in 1994 concerning his view about the behaviour of a caravan seen to be swaying from side to side just before the towing vehicle became involved in a fatal collision with a large passing truck towing a large tandem-axle trailer. At that time, Mr Olthoff was described as an 'automotive engineer with lengthy and specialised experience in relation to caravans and towing equipment generally'. It was also accepted that he acted as a consultant to the caravan industry on safety and design issues, wrote articles in caravan magazines and conducted classes on driving techniques relevant to towing caravans. Mr Olthoff's opinion was summarised in the Coroner's Findings in 1994 as follows:

> 'The high surface area of the caravan, its relatively light weight, and the fact that its axles were positioned immediately below the centre-point of the vehicle, rendered it especially susceptible to being drawn over to and contacting the truck.'[31]

6.12. As a result of evidence given on this topic, the then Coroner made a recommendation as follows:

> 'That the caravan manufacturing industry give careful consideration to the design of caravans with a view to eliminating, or at least minimising, the tendency of caravans to "yaw" towards a vehicle engaged in overtaking it, particularly by placing the axles(s) of the caravan further towards the rear'.

6.13. On 3 August 2004, Senior Constable Beebee showed Mr Olthoff photographs taken during the investigation and had a general discussion with him about how caravans may become unstable and whether this might have occurred with Mr Jong's caravan. Mr Olthoff was said to have expressed a preliminary view that Mr Jong's caravan may have been inherently unstable due to a design fault which produced insufficient

[31] Finding in Patten Inquest 1 March 1994

weight upon the tow ball of the Ford Explorer. Senior Constable Beebee reported this information to Counsel Assisting the State Coroner, but did not provide any documented statement from Mr Olthoff. Counsel Assisting the State Coroner wrote to Mr Olthoff on 17 May 2005, enclosing a summary of available facts and copies of witness statements, requesting a report. The relevant portion of this request was expressed as follows:

> 'I understand that you have had some contact with the investigating officer from the major crash investigation section, and have expressed some views about possible causes or contributing factors to the collision, and in particular the configuration of the four-wheel drive and the caravan, the stability of the caravan in its design, and other factors relating to the vehicle's towing ability.
>
> I would be pleased if you would review the enclosed materials, and provide your opinion about the possible contributing factors to this collision. I would be pleased if you would, in light of any conclusions that you draw about those contributing factors, provide your opinion about any safety measures that could be implemented in an effort to prevent similar accidents and deaths in future.'

6.14. During the Inquest, counsel for Galaxy Caravans was critical of the quality of the police investigation and was also critical of the nature of Mr Olthoff's expertise to express the opinion sought. Senior Constable Beebee conceded that when she tried to obtain some expertise from officers within the Major Crash Unit to analyse how the fatal collision could have occurred, the assistance was not forthcoming. According to Senior Constable Beebee, a decision was taken not to prosecute Mr Mackereth in relation to the collision. If a prosecution had been instituted, a plan would have been prepared, depicting how the collision was thought to have occurred, noting points of significance observed by police at the scene. But in this case 'standard operating procedures' dictated that no such plan was prepared[32]. I find that a plan should have been prepared to assist with the Coroner's investigation.

6.15. There was no accident reconstruction expert engaged to determine the cause of the collision and to consider what if any effect the wind might have had at the time. According to Senior Constable Beebee, this was not done because of a lack of an available expert and also because of financial constraints which operated at that time. The financial constraints are said to have been relaxed following the recommendations from the Kapunda Road Royal Commission[33].

[32] Transcript, Page 300
[33] Transcript, Page 306

7. Opinion of Tom Olthoff

7.1. One issue considered by Senior Constable Beebee was whether the Ford Explorer might have moved onto the incorrect side of the road during the overtaking manoeuvre as a result of excessive swaying movement of the caravan.

7.2. In a report produced by Mr Olthoff, general observations were made about problems with unstable caravans when being overtaken, causing the towing vehicle to veer from its intended path. Mr Olthoff has no tertiary level qualifications in engineering, however he has completed a number of certificate courses in automotive engineering between 1960 and 1981. He has worked as an automotive mechanic until 1970 at which time he commenced training others in the use of diagnostic equipment and procedures. From 1972, he was a lecturer at the Croydon Park College of Automotive Engineering, teaching qualified automotive mechanics on a range of subjects including electrical systems, brakes, steering and transmission systems. In the late 1970s, Mr Olthoff started offering classes for those interested in towing caravans. In about 1994, he commenced his own business as a consultant and continues to conduct courses in 'safe towing'. In 1985, Mr Olthoff was awarded a Bachelor of Education. He is well known in the caravan industry and has a regular column in a caravan magazine devoted to the technical aspects of pulling trailers and caravans. He stated that he is regularly asked to conduct testing of towed vehicles.

7.3. Mr Olthoff explained that when a vehicle towing a caravan is being overtaken by a larger vehicle, the driver should move over as far as possible to the left, but remain on the bitumen surface and maintain the same speed throughout the process[34]. He suggested that if caravans comply with recommended load distribution factors and towing vehicles have appropriate towing equipment, problems with instability are minimised. According to Mr Olthoff, the correct load distribution in a caravan is generally recommended to be 60% forward of the wheels and 40% behind. He acknowledged that this was often difficult to calculate and to implement.

7.4. The compliance plate details for Mr Jong's Galaxy caravan specifies that the empty, fitted-out caravan, weighed 1480 kilograms. This is referred to as the Tare Mass. The ATM or Aggregate Trailer Mass is specified at 1780 kilograms. This is a figure nominated by the manufacturer[35] and said to constitute the weight of the caravan, plus

[34] Transcript, Page 475
[35] Galaxy Caravans

an allowance of a maximum of 300 kilograms for items loaded into caravan, plus whatever weight is on the tow ball[36].

7.5. The Gross Trailer Mass (GTM) on the Galaxy compliance plate is specified as 1680 kilograms. This figure represents the amount included in the ATM, minus the weight placed upon the tow ball. On the assumption that these figures are accurate, when the caravan was fully loaded in accordance with the nominated limit, subject to how the loaded items were distributed within the caravan, there should have been approximately 100 kilograms of tow ball weight. According to Mr Olthoff, it is generally accepted within the caravan industry in Australia that a tow ball load of around 10% of the ATM is desirable to maintain stability when towing a caravan. The above figures indicate that a100 kilogram tow ball load equates to approximately 6% of the 1780 kilogram ATM. To measure tow ball load, one needs to use a special scale which is placed underneath the couplings, otherwise it may be measured by way of a weighbridge, placing the entire caravan and tow-bar on the weighbridge, repeating the reading with the A-frame and tow-bar lifted off the weighbridge and calculating the difference in the two measurements[37].

7.6. During the Inquest, some reference was made to lower recommended tow ball weights applicable in the United Kingdom. According to Mr Olthoff, the lower recommended weights apply there because the typical tow vehicle in the UK is very light and the caravans being towed are two thirds the weight of Australian caravans[38].

7.7. Mr Olthoff explained that the lower the tow ball load, the centre of mass or centre of gravity moves further back along caravan. According to Mr Olthoff, where there is an inadequate tow ball load, once the towing vehicle gets to a critical speed, the caravan becomes unstable and will begin to yaw or sway.

7.8. Mr Olthoff was informed by Senior Constable Beebee that when Mr Jong's caravan detached, it continued on by itself into the scrub before coming to rest in bushes. In the absence of any other explanation for the movement of the caravan, Mr Olthoff concluded that it could only have occurred if there was no tow ball weight, leaving the caravan upright when it detached from the Ford Explorer[39]. Mr Olthoff also assumed from reading statements provided to him, that Mr Jong's Galaxy was a one-off design,

[36] Tow Ball Load
[37] Transcript, Page 376
[38] Transcript, Page 464
[39] Transcript, Page 371

rather than a standard model and that it was extended to the rear to accommodate the modifications requested by Mr Jong. After viewing photographs and subsequently seeing the caravan, he considered that there was a larger surface area of caravan behind the axles than in front and that this would reduce the tow ball load and was contrary to the 60/40 split desirable for stable towing. Mr Olthoff's evidence became a little confusing once he conceded that he had no dispute with the measurements taken by Mr Borg which indicated that there was marginally more length in front of the axles than at the rear[40].

7.9. When Mr Olthoff inspected the caravan in June 2005, he was struck by the fact that the empty caravan was horizontal and that the A-frame was unrestricted and unsupported. This observation confirmed his view that the caravan had zero tow ball load as a result of the wheels being 'positioned too far forward in relation to the length of the load carrying area'[41]. According to Mr Olthoff, the position of the axles are the prime influence upon the tow ball load[42]. He elaborated as follows:

> 'The cause of the zero tow ball weight can only be the location of the axle group or axle assembly relative to the length of the body.'[43]

Photograph taken of damaged caravan in June 2005

7.10. When he examined the caravan, Mr Olthoff found no sign of damage to the axle, springs, wheels or tyres which would account for the caravan remaining in an unsupported horizontal position. Whilst he did not inspect the water tank, Mr Olthoff

[40] Transcript, Page 387
[41] Exhibit C28b and Transcript, Page 373
[42] Transcript, Page 380
[43] Transcript, Page 386

suggested that whether it was full or empty this would not significantly affect tow ball weight, because these tanks are generally positioned over the axles[44].

7.11. During cross-examination, Mr Olthoff insisted that the horizontal position of the Galaxy caravan inspected by him in June 2005 at the auction yard indicated to him that there was no ball weight and that all the weight was being taken by the wheels. When he pushed the A -frame down and then took his weight off it, it came back up again. I accept that in these circumstances, there is no point in estimating the tow ball weight with scales because in this horizontal state, there was nothing to be measured[45]. The issue is whether this caravan was designed and constructed in a manner which resulted in zero ball weight in its unladen state, making it an inherently unstable caravan.

7.12. Mr Olthoff suggested that if this was the case, even when it was loaded up it may still have an inappropriately low tow ball weight. Unfortunately there is now no way of estimating how the caravan was packed at the time of the collision and what the tow ball load would have been. With an inherent instability, according to Mr Olthoff, it is possible that when it was being overtaken by the prime-mover, the changing wind pressure may have upset the stability of the caravan[46]. This theory was illustrated and photographed by Mr Olthoff using miniature vehicles in positions said to indicate the way in which the caravan may have swayed whilst being overtaken, leading to loss of control of the Ford Explorer[47].

7.13. Calculations made by Mr Olthoff, demonstrated that Mr Jong's caravan had a greater surface area behind the axles than to the front of them[48]. Mr Olthoff emphasised that during an overtaking manoeuvre, a caravan with a large surface area rear of the axles will be more vulnerable to this yawing motion because there is a greater area for the pressure difference to react against. Subject to knowing how items have been loaded inside the caravan, I accept the logic in this argument, especially when one considers how light a caravan is compared with a prime-mover B-double. Mr Olthoff expressed the view that in his experience, most caravans have their wheels positioned more towards the rear than the position of the wheels in Mr Jong's caravan[49].

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[44] Transcript, Page 394
[45] Transcript, Page 426
[46] Transcript, Page 395
[47] Exhibit C28b
[48] Exhibit C28f and Transcript, Page 397
[49] Transcript, Page 404

8. Mr Olthoff's level of expertise and qualifications

8.1. Counsel for Galaxy Caravans made vigorous submissions, critical of Mr Olthoff's expertise. He was also critical that a curriculum vitae was not provided until a request was made by Counsel Assisting the Coroner during the Inquest[50].

8.2. I have no doubt that Mr Olthoff is well regarded within the industry generally and has made a valuable contribution particularly in the area of safety for motorists towing caravans. Whilst I accept that he is able to provide assistance in understanding the behaviour of caravans with inadequate tow ball weight, he is not sufficiently qualified to give evidence concerning accident reconstruction generally. He demonstrated during his evidence, that he has limited understanding of the role and responsibilities of an expert witness. It is regrettable that Mr Olthoff's curriculum vitae was not provided in a timely fashion to enable those seeking his opinion to clarify the nature of his expertise.

9. Response from the manufacturer

9.1. Steven Borg, on behalf of Galaxy Caravans, explained that he had been involved in building caravans for some 20 years. His principal skill is as a cabinet maker, although these days he is mainly concerned in the running of the business. He acknowledged the necessity for sufficient tow ball weight when towing a caravan to prevent it from swaying[51]. Mr Borg stipulated that the ball weight must be roughly between 8% and 10% of the unladen weight of the caravan, or TARE weight[52]. He also conceded that the distance between the centre point between the two axles and the rear of the caravan may have an effect on ball weight[53].

9.2. Mr Borg expressed the view that it is very difficult sometimes to have the caravan constructed and fitted out in a way which gives a 10% tow ball load. According to Mr Borg it is a particular problem when doing custom made caravans and whilst the accepted figure is not mandatory, it acts as a guideline[54].

9.3. Because Mr Borg was prevented from inspecting the damaged caravan after he realised there was criticism of the positioning of the wheels under the caravan, he

[50] Exhibit C28
[51] Transcript, Page 109
[52] Transcript, Page 111
[53] Transcript, Page 114
[54] Transcript, Page 159

tried to recreate the measurements in his workshop. As a result of this exercise, he claimed that there was 190mm more length to the rear of the wheels than to the front[55].

9.4. After Colin Young, from the Recreational Vehicle Manufacturers Association of Australia was shown a photograph of the damaged caravan, he commented that it appeared to be 'very borderline' in terms of having less body at the rear of the centre of the axle group than the front in accordance with design rules stipulated in Vehicle Standards Bulletin, No 1. He conceded however, that if the lengthwise dimensions supplied by Mr Borg were accurate, it would comply with the stipulated design rule[56].

9.5. The order generated with G & S Chassis by Galaxy Caravans for Mr Jong's caravan indicates that the chassis was to extend 1763 millimetres to the front of the wheel arch and 1350 millimetres to the rear, giving a total length for the chassis of 4700 millimetres, including 1587 millimetres to accommodate the wheel arch[57]. According to Mr Borg, a 17'6" caravan with dual axles requires a chassis size of 4700[58]. He agreed that Mr Jong's caravan was not regarded as a standard caravan because it was extended, but later in evidence seemed to retreat from this concession and indicated that all 17' 6" caravans are made the same size and shape, working off a fixed 'jig'. Entries made at his workshop in the VIN book are used for information stamped onto the compliance plate placed in each new caravan. A perusal of the book indicates that a number of measurements appear very regularly, including the 1780 kilograms ATM attributed to Mr Jong's caravan. The evidence suggests to me that when caravans of a particular model are made by Galaxy, they are not individually weighed, but instead, a weight is attributed to them, which may or may not be completely accurate[59].

9.6. Clearly, some extra items in a caravan will affect the figures, for example if, as in Mr Jong's case, a 70 kilogram air-conditioning unit is installed, or larger furniture is built. Mr Borg conceded that when unpacked and unsupported at the front, the A-frame should be resting on the ground, unlike the damaged caravan which was horizontal when returned to police custody[60]. Mr Borg claimed that he had never seen one of his caravans remain in that position without a jockey wheel in place[61]. He speculated that

[55] Exhibit C17b and Transcript, Page 120
[56] Transcript, Page 254
[57] Exhibit C17
[58] Transcript, Page 145
[59] Exhibit C17e
[60] Exhibit C21
[61] Transcript, Page 127

damage to a shackle under the caravan may explain this unusual observation. Later inspection excluded this as a possible explanation.

10. Opinion from Christopher Hall

10.1. Christopher Hall was called as an expert witness at short notice by counsel for Galaxy Caravans. In Mr Hall's curriculum vitae, his qualifications and experience demonstrate that he may be regarded as an expert witness on the topic of accident reconstruction. I accept that he is well qualified in the field of analysis of motor vehicle accidents and that he has particular expertise about the role played by tyres in motor vehicle accidents. He has a degree (with Honours) in mechanical engineering and has analysed over 2000 motor vehicle accidents.

10.2. Whilst Mr Hall does not claim to have any significant experience concerning collisions involving caravans, I accept that he is able to make a general contribution towards understanding the forces which might have been generated when Mr Mackereth's prime-mover commenced his overtaking manoeuvre which resulted in these tragic deaths.

10.3. Mr Hall conducted an examination of the caravan once the Inquest had commenced. He also had an opportunity to examine all relevant statements and photographs in addition to hearing Mr Olthoff's evidence. When he measured the length of the caravan from the tapered point at the front to the rear of the caravan, he found that it was slightly longer in front of the mid point between the axles than behind them, approximately in accordance with Mr Borg's calculations. He did not calculate the surface area as Mr Olthoff had done. According to Mr Hall the surface area of the caravan is more relevant to how wind might affect stability and how disturbances from a passing truck might apply, rather than how it relates to weight distribution[62].

10.4. In answer to Mr Olthoff's evidence concerning the recommended 60/40 weight distribution, Mr Hall suggested that the relative surface area either side of the centre point between the axles would only be relevant if one assumed a consistent distribution of weight throughout the body of the caravan[63].

10.5. Whilst acknowledging that there is no recognised scientific basis for recommending a certain tow ball weight when towing caravans, Mr Hall agreed that when the tow ball

[62] Transcript, Page 498
[63] Transcript, Page 496

weight is reduced, there is an increased likelihood of instability. According to Mr Hall, in dual axle caravans, it is desirable to have the centre of gravity located forward of the central point between the two axles. As to the 60/40 recommended split, Mr Hall considered that it was an arbitrary method of ensuring that the centre of gravity is in front of the axle. He remarked that the caravan manufacturing industry has evolved mainly through a process of 'trial and error'[64].

10.6. As to the question of zero tow ball weight of Mr Jong's damaged unladen caravan, Mr Hall accepted that normally this caravan would be expected to have a tow ball weight of 100 kilograms which would mean that it would not remain horizontal if unsupported at the A-frame. But Mr Hall pointed to three factors which, in his view, might explain why there appeared to be zero tow ball weight when he inspected the caravan. Firstly, the gas cylinder had been removed from the A-frame[65]. Secondly the distorted and displaced shell at the front of the caravan pushed the equivalent weight of this material closer to the centre of the caravan causing a slight change in weight distribution[66]. Thirdly, Mr Hall observed some subtle damage to the chassis causing the rear of the caravan to dip slightly which he considered might result in some marginal alteration in weight distribution[67]. Mr Hall was unable to estimate the extent to which these factors might have impacted upon the question of tow ball weight, but acknowledged that the first two factors were of minimal significance.

10.7. In answer to these suggestions, Mr Olthoff stated that the gas bottle and displacement of the front part of caravan would be immaterial to ball weight and far short of the 100 kilograms normally expected. According to Mr Olthoff, the aluminium sheeting and Meranti timber which was damaged and displaced was very light[68]. Whilst I am inclined to agree with Mr Olthoff concerning these factors, I do have some concerns about the damage observed by Mr Hall to the chassis.

10.8. When commenting upon how the laden caravan might have continued on into the scrub as if horizontal following the collision, Mr Hall suggested that his observations of the damaged jockey wheel and distorted bracket on the A-frame was consistent with the caravan dropping down onto the wound up jockey wheel enabling the caravan to continue on until coming to rest in the scrub. Mr Hall photographed the

[64] Transcript, Page 535
[65] Transcript, Page 495
[66] Transcript, Page 514
[67] Transcript, Page 516
[68] Transcript, Pages 429 and 460

damaged bracket and jockey wheel during his inspection of the caravan[69]. Mr Hall suggested that a thin black tyre mark seen along the roadway, if freshly made, was consistent with the jockey wheel coming onto the road after the caravan separated from the Ford Explorer. The mark relied upon by Mr Hall for this opinion is one of two marks, referred to above and regarded by police as tyre marks of uncertain significance[70]. Mr Hall suggested that the absence of rubber on the jockey wheel, damage to the rim and damage to the bracket of the A-frame, was consistent with this scenario and contradicts the assumption that at the time of the collision, the laden caravan had insufficient or zero tow ball weight.

10.9. I note however, that Senior Constable Beebee stated that during examination of the scene, no gouge marks were detected along the road which could have been caused by the caravan[71]. Moreover, there were two parallel tyre marks observed by police, not just one. The photographs examined by Mr Hall and relied upon for his opinion are of very poor quality. I also have reservations about the ability of a damaged jockey wheel to move across the sandy terrain if there was any appreciable weight upon it. Yet the caravan continued on into the scrub unit it came to rest against a tree. The distance travelled may only be appreciated by examining available photographs.

10.10. There is no evidence to indicate where the jockey wheel was located after the collision and what condition it might have been in when it was recovered. A photograph depicting the caravan at rest, hard up against the tree in the scrub, suggests an alternative explanation for some of the damage to the front of the caravan, the gas cylinder attachment, jockey wheel and bracket when the caravan travelled through the scrub and struck the tree[72].

[69] Exhibit C29c
[70] Transcript, Page 509 and Exhibits C29a and C29b
[71] Transcript, Page 287
[72] Exhibit C32

The caravan in the position where it came to rest

10.11. When Mr Olthoff was questioned about his observations of the damaged jockey wheel, I formed the impression that he may not have even examined it. He certainly made no note of doing so. He suggested that in its wound up position, when the collision occurred, the jockey wheel was dislodged causing the clamp to break[73]. Mr Olthoff suggested that it is unlikely that the thin black mark referred to by Mr Hall would have been made by the jockey wheel because the caravan would have been travelling to the left of the marks being left by the Ford Explorer when it was being pushed along in front of the prime-mover[74].

10.12. After examining the available material, Mr Hall expressed his view concerning how the collision might have occurred. By comparing Mr Graham's photographs depicting damage to the prime-mover and caravan in particular, Mr Hall concluded that the first point of contact was between the back section of the prime-mover's left steer wheel when it was turning to the right and the right side of the caravan to rear of the wheel arch, leaving a semi-circular tyre mark[75]. According to Mr Hall, this contact would not have destabilised the caravan to a significant degree[76]. Mr Hall also

[73] Transcript, Pages 433 and 434
[74] Transcript, Page 438
[75] Transcript, Page 523 and Exhibit C29d
[76] Transcript, Page 518

pointed to contact between the handrail of the passenger side of the prime-mover and the right side of the caravan at roof level.

10.13. Mr Edwardson, counsel for Galaxy Caravans, summarised Mr Hall's reconstructed sequence of events and Mr Hall agreed with what was put to him[77]. In essence, it was suggested that as the prime-mover was in the process of overtaking the Ford Explorer, the Ford and caravan moved over to the right with the Ford moving across into the path of the prime-mover. As the truck responded by moving to the right, contact was made between the right hand front corner of the caravan and the bull bar of the prime-mover. This contact is said to have been enough to move the caravan to the left, causing a clock-wise yaw in the Ford Explorer, exacerbating its movement across in front of the prime-mover.

10.14. Mr Hall considered that if there was a strong north wind blowing at the time, Mr Jong would have needed to make an adjustment to his driving to compensate for the force coming from his right. The presence of the prime-mover would have an effect on the stability of the Ford and caravan, according to Mr Hall, partly because the truck would begin to block the prevailing wind. It would also create a bow wave effect as it travelled forward whilst overtaking the Ford and caravan creating a clock-wise yaw in the caravan. Mr Hall explained how as the prime-mover continued, the effect of the bow wave would produce different forces which the driver would sense was making the caravan move in one direction and then the other. According to Mr Hall the respective speed of the two vehicles and the force of the prevailing wind would complicate how the forces operated at the time. He suggested that the driver would try to counter-steer in an attempt to maintain control. According to Mr Hall, the forces generated would also be affected by the distance between the two vehicles as they travelled beside each other.

10.15. Mr Hall acknowledged that he had insufficient information to enable him to form a view about the location where the caravan disconnected from the Ford, nor where the Ford came to be wedged under the prime-mover.

10.16. Mr Hall considered that if the caravan had been inherently unstable and had developed an exaggerated yaw, as Mr Olthoff suggested, one might expect to see

[77] Transcript, Page 523

some evidence of this, by way of tyre marks on the road and tracks on the verge[78]. One might also expect to find evidence of contact between the right rear of the caravan and the prime-mover. There is no such evidence in this case. According to Mr Hall, Mr Olthoff's version of events would have required more time to unfold than the version suggested by Mr Hall. He elaborated as follows:

> 'But what we have here is a scenario where it's actually come across very quickly into the front of the prime mover so that doesn't strongly suggest a growing instability induced into the caravan'.[79] (T561)

10.17. Mr Hall kindly agreed to my request that he prepare a sketch illustrating his opinions concerning the respective positions of the vehicles before the Ford Explorer moved into a sideways position in front of the prime-mover[80]. Having studied the sketch and after examining the other evidence carefully, I accept that the version postulated by Mr Hall is a possible explanation of the collision. If Mr Jong was experienced in towing caravans, it is a little perplexing that in the absence of an inherently unstable caravan, he lost control of his vehicle, notwithstanding the complications of the strong prevailing winds. If Mr Hall is correct in his reconstruction of events, one might expect to find this type of tragic event occurring on a regular basis. Yet the evidence from Transport SA suggests otherwise[81].

11. Conclusions as to the Tow Ball weight

11.1. Whilst the tow ball weight attributed to Mr Jong's new caravan by the manufacturer, was 100 kilograms, there is no evidence of it being measured and documented. Mr Borg conceded that the ball weight is never measured and is never included as a separate figure on the compliance plate. Having considered the evidence on this topic, I regard the 100 kilogram figure said to represent the tow ball weight of this caravan as an estimate only. Mr Borg stated that if there had been a problem with the ball weight, he would have expected to notice it when the caravan was being built. In other words, the caravan would have tilted up when a person walked to the rear of the caravan[82]. The evidence does not enable me to make a Finding as to the adequacy of the tow ball weight when Mr Jong took delivery of the caravan. I consider that it

[78] Transcript, Page 562
[79] Transcript, Page 565
[80] Exhibit C29e
[81] Exhibit C26a
[82] Transcript, Page 160

would be prudent for manufacturers to measure and record the tow ball weight at the conclusion of the manufacturing process. I find that the caravan in its present state has zero tow ball weight. However, I consider it possible that some damage to the chassis at the time of the collision and subsequently may have some bearing upon its present behaviour.

11.2. There is no evidence that during this windy day, Mr Mackereth noticed the caravan in front of him swaying about before he overtook it. There is no evidence of complaint from Mr Jong to anyone before the collision about instability of his new caravan which he had towed a considerable distance from Victoria, apparently without incident.

11.3. Unfortunately, I have reached the view that this Inquest is one in which the evidence is so deficient that I am unable to make positive findings about the circumstances leading to the tragic deaths of Petrus Jong, Helena Jong and Miranda Jong. I am not prepared to conclude that the caravan was inherently unstable at the time of the collision because of its inadequate tow ball weight, in the absence of more reliable evidence. Without evidence of how additional items were distributed in the van and the weight of these items, one can only speculate about the applicable tow ball weight at the time of the collision. Whilst I consider that there is much merit in some of the views expressed by Mr Olthoff, the evidence overall falls short of the required standard which would enable me to find that this particular caravan was inherently unstable and that this instability caused the Ford Explorer to move onto the incorrect side of the road when the prime-mover was attempting to overtake it.

12. Recommendations

12.1. In the circumstances, I am precluded from making any recommendations which might reduce the likelihood of a recurrence of events the subject of this Inquest.

12.2. In a letter to Counsel Assisting the Coroner in March 2005[83], the Minister for Transport indicated that the Chief Executive would be asked to investigate the feasibility of producing a brochure on safe driving when towing, to be distributed when a caravan is first registered. I urge the Department to make a brochure of this

[83] Exhibit C26a

type available as soon as possible, similar to that which has been produced in relation to boat trailers[84].

[84] Exhibit C26b

Key Words: Motor Vehicle Accident; Caravans; Country Road; Crush Injury

In witness whereof the said Coroner has hereunto set and subscribed her hand and Seal the 18th day of October, 2006.

Coroner

Inquest Number 25/2006 (1943/04, 1944/04 & 1942/04)