

- Chemical, Environmental, Process Safety, Loss-Prevention, Risk and Forensic Engineers •
- OHS Consultants • Occupational Hygienists • Town Planning Advisors

The Coode Island Fires 20 years on - Ian F Thomas

1.0 Introduction

The 20th anniversary of the Coode Island fires was remembered in the emergency access road adjacent to the Terminals Pty Ltd facility on Sunday, 21st August 2011. A group comprising MFB, CFA, council representatives and residents met four of the fire-fighters who were present and listened to talks by the fire chief at the scene, Keith Adamson and the MFB CEO, Nick Easy.

Much progress has been made in the management of safety not only at the site where the fires occurred, but at all others storing dangerous goods at the Port of Melbourne Corporation Coode Island Bulk Liquids Terminalling Facility. Fire fighting systems have been upgraded, tanks nitrogen-blanketed, discharges incinerated before entering the atmosphere and impervious synthetic clay mats installed beneath storage tanks to reduce ground pollution.

What concerns me however, is the fact that those who know what really happened are still not talking. In response to a paper I prepared on the accident back in 1995 and submitted to the company for comment, I enjoyed an hour-long conversation with a senior official of the company. He told me that if I publish the paper, the company will sue me. He also said that he knows what happened and if he told me, I would 'fall off my chair'. He then said 'but I am not going to'.

It is important that real causes be made public and available for peer-review, so that lessons learned are known and so that actions taken can be scrutinised.



Truck loading area after the event



Sign found on ground after the accident

2.0 What happened

At 2.17pm on Wednesday, 21st August 1991 a sequence of events took place leading to a major fire at the 'A' terminal of Terminals Pty Ltd, Mckenzie Road, Footscray, Victoria. An early event was the rising up into the air of tank no 80 which contained acrylonitrile (vinyl cyanide) monomer, the

discharging of its contents into the tank bund and the crashing down of the tank and associated pipework and pump, onto the main fire-fighting water and foam lines of the plant adjacent to the office building.

Shortly after this, tank no 81 which contained molten phenol and was located in the same bund, rose into the air and landed near to benzene tank no 79. A very large fire ensued in the tank bund area and in a relatively short period of time, a number of other tanks became involved and either blew off their lids or collapsed in place. The truck-fill stand and two trucks previously loading benzene quickly became involved as did the nearby drum-filling area.

The incident was substantially over later that afternoon but flared up again the following day to an inferno of similar scale, following inability to extinguish a residual flange fire emanating from methyl ethyl ketone (MEK) tank no 69. No lives were lost, no significant injuries caused and the fires were fully extinguished on the second day. There were substantially no off-site effects.

The event taxed state emergency services to the limit, requiring large quantities of fire fighting foam and specialised tenders to be borrowed from Tullamarine Airport. 8.5 million litres of chemicals were lost but by preventing the fire spreading to other sites, the combined MFB/CFA effort saved 19 million litres.



Aerial view courtesy of The Age newspaper

3.0 Propagation

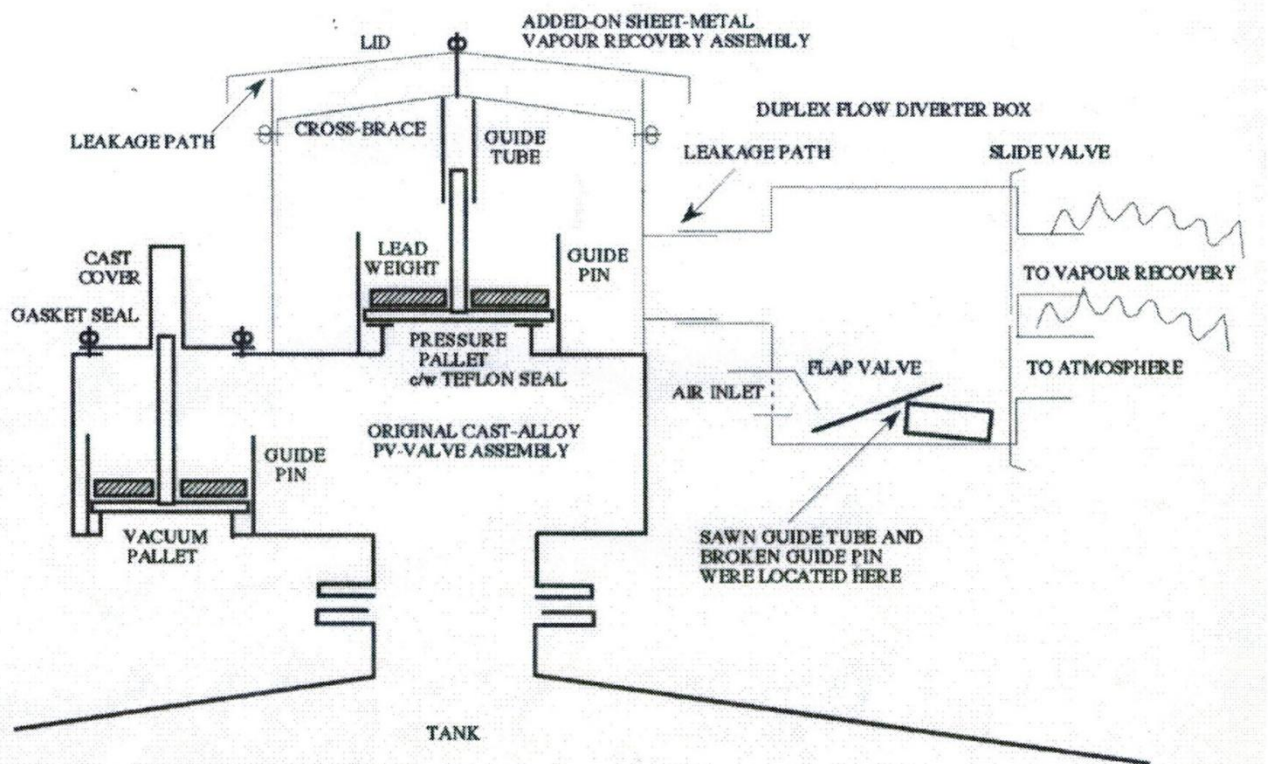
It was gratifying for me to learn shortly after the accident that my theory as to the cause of the fires was supported by WorkCover. Not so much the cause but the propagation from a tank on fire to other, distant tanks. This was found to be passage of fire through the interconnecting vapour recovery system pipework. The manufacturer of the recovery system claimed that propagation was through the fire-fighting foam network which connected tanks together similarly. This too is feasible.

4.0 Tanks rising vs lids popping

Early in the investigation, an explanation was found for some tanks which were on fire rising into the air and others remaining in-place and popping their lids. The latter is the design intent. This was found to be a consequence in some cases, of wall-to-roof welds being stronger than wall-to-floor welds. I was fortunate to be shown samples cut from the welds which demonstrated this, before their likely destruction. Given that any tank could pop its roof at any time, it was particularly brave of fire chief Keith Adamson to control the fire-fighting effort from the top of benzene tank no 52. At least he said on 21st August 2011, that he had ensured that all valves leading to the tank were closed before he ascended and that the position was ideal to permit proper control.

5.0 Doubt about the cause as found

The 1994 inquest which I attended lasted a month. It concluded 'on the balance of probabilities' that the cause was an explosion in the vapour space of acrylonitrile tank 80 following a strike of 'St Elmo's Fire' entering through the pressure/vacuum relief valve (PV-valve) at the top of the tank. This was allegedly made possible by the absence of the valve pressure-pallet (see diagram below). Anyone, in particular experienced chemists and chemical engineers who accept this finding, are perhaps naive.



Most now realise that this finding suited everyone except those who prefer facts and truth because any form of lightning is an 'Act of God' rather than of mankind. Particularly so because this kind of lightning is invisible and so the fact that no-one saw it, is 'explained'.

We can forgive the Coroner presiding at the inquest for accepting that this is what happened because that is the way the evidence pointed. However, what she probably did not know and the general public certainly did not know, is that evidence was led from a group of witnesses selected at a private meeting, rather than from all who were available. It is therefore likely that the selection process was geared to lead to a particular finding. It was clear fairly early on, that the inquest was leading to a tank-top

initiated event. Not completely without justification as there was obviously an explosion inside the tank before it took off. What the Coroner did not appear to pick-up on, was the questionability of a diary entry relating to the pressure pallet inside the PV-valve being present hours before the accident. The barrister for EPA suggested that this entry had been made after the accident and for my part listening to the evidence as presented, this was clearly the case.

Other evidence which has been provided to me since by eye witnesses who were not called, indicates that the cause was an explosion and fire at ground level near to the tank, that employees were coached about what evidence to give and that the pressure pallet was thrown into the river so that it could not be used in evidence. One said that it was standard practice to remove the pressure pallet when a ship was being unloaded to reduce unloading time by between 4 and 5 hours. This would lead to prolific vapour discharge (see diagram above). Both of these witnesses said that acrylonitrile was being pumped into tank 80 at the time, directly contradicting evidence given at the inquest.

Add to this that little evidence and consideration was given to more plausible causes such as a major leak of a pipeline at 'Exchange Pit 6' where many employees were gathered shortly before the event, ignited for example, by welding activity, by static electricity or by an overheated pump seal. An exchange pit contains a series of inlet and outlet pipelines and these are interconnected as required, using flexible hoses. It is easy to get this wrong, to connect or disconnect a wrong pipe resulting in a major spill, particularly if it was a line which was under pressure. The suspected spilled liquid in the event, is benzene or acrylonitrile.

Evidence which was presented, comprising footage recorded by a nearby security camera, shows clearly that there was a flash at ground level adjacent to the tank, rising to tank top level rather than initiating at the tank top. To appreciate this, the footage must be moved frame-by-frame and this was not done at the inquest, nor presented in this way at the time, by MFB.

The Victorian WorkCover Authority in its 1999 regulatory impact statement on the proposed major hazard facilities regulations, expressed the view that the cause of the Coode Island fires is yet to be established, directly contradicting the inquest finding.

The MFB in its report to the inquest, concluded that the cause of this fire be categorised as suspicious circumstances. Although this might imply sabotage, the report actually shows that a number of matters are in doubt, particularly regarding the relevance of atmospheric electrical phenomena.

Fundamental in any accident like this, is the need to know what actually happened. There are occasions of course, where this cannot be established but all witnesses should be called not a selection of them and all physical evidence examined. Such an inquest should be held soon after the event rather than as it was, three years later. By this time, all evidence except for some parts of the Tank 80 vapour recovery system originally located on top of the PV-valve, had been sold as scrap.

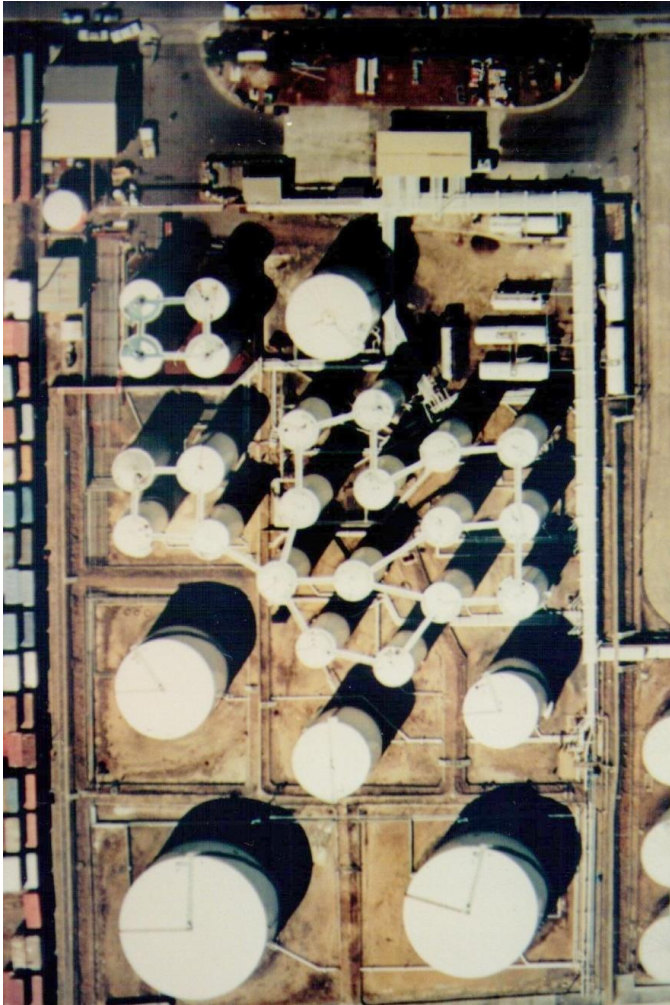
I have made several calls for the inquest to be re-opened and for the other witnesses to be questioned. I make this call again, now.

Firefighters on the narrow bund

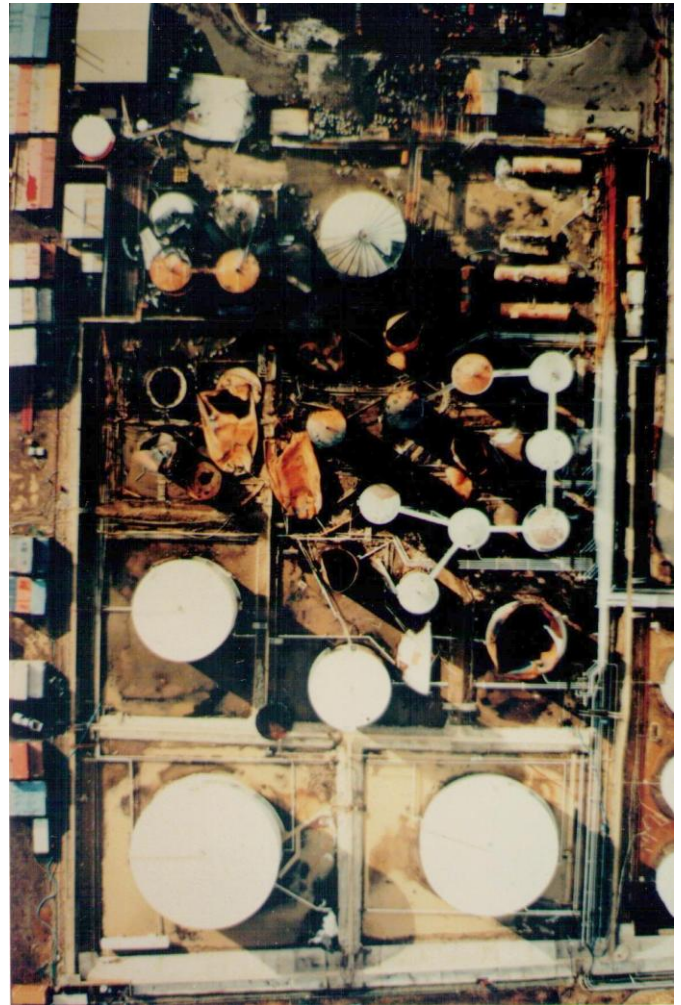


WorkCover officers and employees at the site entrance





Aerial view before



Aerial view after

6.0 Findings in other accidents

It is regrettably common for causes of major events never to come to light or to be 'found' in ways which are inappropriate. If a cause can be found which implicates no-one, this is preferred. Next best is to find a relatively junior employee to blame as remains the case following the 1974 UK Flixborough disaster where 28 people were killed. Following the Longford gas plant accident in 1998 a great deal of information appears to have been withheld and initially, a small group of vulnerable, relatively junior employees were blamed.

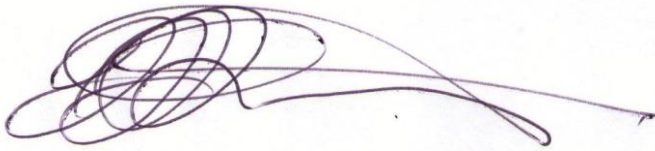
7.0 Ancient history

Both Virginia Trioli during a radio interview and an MFB librarian when asked for the Coode Island fires report, queried why I was still investigating an accident which is 'ancient history'. My response was that it is as important to investigate accidents where there is evidence of cover-up, of fabrication of evidence, where the cause has not been found or where new evidence is found, as there is in investigating cold-case murders.

My concern with the Coode Island Fires, is that despite the seven-year amnesty following a court finding, those who know what happened, remain silent, even those who have long since left the company. I believe this is because they have given evidence in one way and feel unable now, to say anything different. I hope that they relieve their consciences one day, while they are still able to.

8.0 Parts found during the inquest

It does not reflect well on the inquest process when during an interval, I found a sawn-off pressure-pallet guide-tube and broken guide pin inside the duplex flow diverter box of the PV-valve (see diagram in section 5.0 above). Their presence added to my suspicion that the valve was altered before the event - something very relevant to the investigation. Following my advice about this terminal manager and evident lack of awareness of their presence by him and by the inquest team, these items were addressed the following day. The sawing-off could well have occurred after the event.

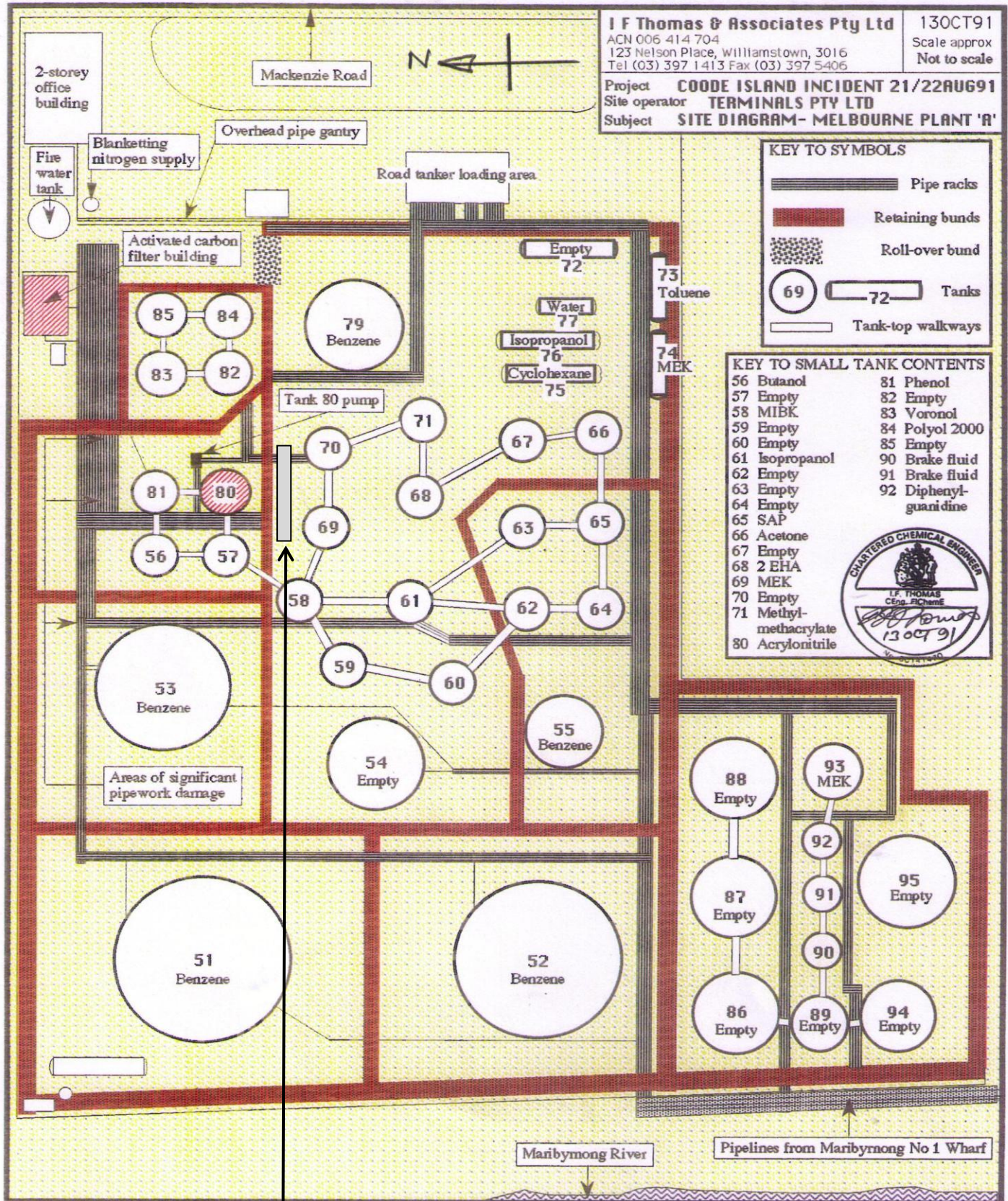


About the author

Ian Thomas is a fellow of RACI, IChemE, IEAust and SIA. He is a Certified Chemist, Certified Practicing Engineer, Registered Safety Practitioner in Australia and a Chartered Engineer in the UK. Mr Thomas has 20 years of chemical, petrochemical and food industry experience and 21 years to date as Principal Partner of I F Thomas & Associates Pty Ltd, consulting chemical, environmental, process safety, loss-prevention, risk and forensic engineers.

References

- (1) Thomas I F, Possible cause of the Coode Island incident, Engineers Australia, 18Oct91
- (2) Thomas I F, Coode Island: vapour recovery to blame ?, The Chemical Engineer, 31Oct91
- (3) Thomas I F, Coode Island Safety Plans - an example, proceedings of symposium 'Coode Island-12 months on', Melbourne, 31Aug92
- (4) Heffey J M, Record of investigation into fire, State Coroner's Office, Case No 2755/91, 1994
- (5) Harris P, Fire investigation report - Terminals Plant A, 28-30 Mackenzie Road, Footscray, Wednesday 21st and Thursday 22nd August 1991, MFB Incident No 3089, MFB
- (6) Thomas I F, The Coode Island Fires - an appraisal of the Coroner's report, proceedings of conference 'Integrated Risk Assessment', Newcastle, Australia, 163-177, 01-02Jun95; also in 'Integrated Risk Assessment- Current practice and new directions', Melchers R E & Stewart M G, Editors. A A Balkema, 1995
- (7) Thomas I F, What really happened at Coode Island ?, Seminar - Coode Island 4 years on, Risk Engineering Society, Melbourne 12Sep95
- (8) Thomas I F, Coode Island - the aftermath, Association of Risk and Insurance Managers Australasia, Hilton on the Park, 17Jul96
- (9) Victorian WorkCover Authority, Fire at Coode Island Melbourne, Regulatory Impact Statement, Proposed Occupational Health and Safety (Major hazard Facilities) Regulations 1999, Victorian WorkCover Authority, August 1999
- (10) Thomas I F, Yes, the Coode Island community consultative process is exciting, proceedings of conference 'Risk99', Melbourne, 30Aug-01Sep99



Approximate location of Exchange Pit 6

References continued

- (11) Thomas I F, Some words from the chair, Seminar - The cause of the Coode Island fires, Risk Engineering Society, Melbourne, 29Oct99

- (12) Thomas I F, The Sham that is Coode Island, proceedings of conference 'Safety in Action', Melbourne, 30Mar-01Apr04
- (13) Lees' Loss Prevention in the Process Industries, 3rd Ed, Elsevier Butterworth Heinemann, Vol 3, 2005; A132 Coode Island 1991 p1/63
- (14) Thomas I F, Applying the lessons from the 1991 Coode Island fires, proceedings of conference 'Safety in Action', Melbourne, Mar09
- (15) Thomas I F, A deeper analysis of lessons learned from the Coode Island fires, Longford gas plant accident, Flixborough disaster, Goodrich vapour cloud, Butlers fire, United Transport fire and the Buncefield accident, ProSafe, Melbourne, May09
- (16) Thomas I F, Applying the lessons from the 1991 Coode Island fires, proceedings of conference 'Risk 2010', Melbourne, 11Mar10
- (17) Names of the witnesses I interviewed will be provided if desired but at this point in time, should not be published
- (18) The name of the provider of the previously unpublished photographs will be advised also if desired but should not be published

NB All photographs and diagrams are courtesy of the author except where otherwise stated