



Disaster at Whiddy Island, Bantry, Co. Cork

REPORT OF TRIBUNAL OF INQUIRY

established pursuant to resolutions passed by Dáil Éireann on the 6th March, 1979, and Seanad Éireann on the 8th March, 1979.

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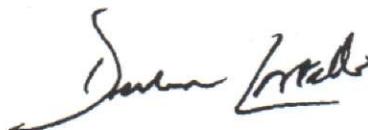
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To: The Minister for Transport,
Dublin.

The Report herein is the Report of the Tribunal established pursuant to Resolutions passed by Dáil Éireann on the 6th March, 1979, and Seanad Éireann on the 8th March, 1979, to inquire into the disaster which occurred at Whiddy Island, Bantry, Co. Cork on the 8th January, 1979.

Dated 9th day of May, 1980.

A handwritten signature in black ink, appearing to read "Seamus Lavelle". The signature is written in a cursive style with a prominent initial 'S'.

The Tribunal.

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PART I

Introduction

Outline of Report

Summary of Principal Conclusions

CHAPTER 1

Introduction

1.1.1 Introduction

The M.V. "Betelgeuse" left Ras Tanura in the Persian Gulf on the 24th November, 1978, bound for Leixoes, in Portugal. She was a large tanker (having a gross registered tonnage of 61,776) and was carrying a cargo of 75,000 metric tonnes (approximately) of Arabian Heavy crude and 40,000 metric tonnes (approximately) of Arabian Light crude. Originally the intention was to call first at Sines, which is south of Lisbon, to lighten ship but the weather was so bad that she could not enter the harbour. Her plans were further frustrated at Leixoes; a ship sank across the entrance to the harbour and she was prevented from calling there and discharging her cargo. She was then instructed to sail to Whiddy Island, which is situated in Bantry Bay, County Cork, and where an oil terminal is operated by Gulf Oil Terminals (Ireland) Ltd. She stopped in Vigo to change some of her crew, and sailed for Bantry on the 30th December. She encountered heavy weather in the Bay of Biscay and after reporting a leakage of oil was instructed to head towards Brest and reduce speed. However, the origin of the leak was discovered and stopped, and the vessel proceeded on passage to Bantry, arriving in the Bay on the 4th January, 1979. She completed berthing at the offshore jetty (which is situated about 1,300 feet (396 metres) off Whiddy Island) at 20.00 hours on Saturday, 6th January.

Early in the morning of the 8th January, a disastrous fire occurred which enveloped a large section of the ship and the offshore jetty. The fire was accompanied by a number of explosions, one of which was a massive one. All the crew of the tanker, the wife of one member of the crew, two visitors on the tanker, the crew on the jetty and the ship's pilot (fifty persons in all) lost their lives. The vessel was rendered a total wreck and extensive damage was caused to the offshore jetty and its installations.

On the 9th January, 1979, the Minister for Tourism and Transport appointed a surveyor in his Department to carry out an inquiry into the casualty under the provisions of section 465 of the Merchant Shipping Act, 1894. At the same time an inspector appointed by the Minister for Labour under the Factories Act, 1955, began an inquiry into the disaster. It was also announced that a public inquiry would be held into the disaster and subsequently it was stated that this would take the form of a Tribunal to be established under the provisions of the Tribunals of Inquiry (Evidence) Act, 1921 (hereinafter: "the Act of 1921").

1.2.1 The Tribunals of Inquiry (Evidence) (Amendment) Act, 1979

Before the present Tribunal was established it was decided to amend the Act of 1921, and the Tribunals of Inquiry (Evidence) (Amendment) Bill was passed by the two Houses of the Oireachtas on the 20th February, 1979. The amending Act (hereinafter: "the Act of 1979") provided by section 2:

"2 (1) A tribunal may consist of one or more than one person sitting with or without an assessor or assessors appointed by the instrument appointing the tribunal or any instrument supplemental thereto.

(2) An assessor appointed under this section shall not be a member of the tribunal in relation to which he is so appointed."

Section 3 of the Act created offences *inter alia* for noncompliance with the tribunal's orders. Section 4 provided:

"4 A tribunal may make such orders as it considers necessary for the purposes of its functions and it shall have, in relation to their making, all such powers rights and privileges as are vested in the High Court or a Judge of that Court in respect of the making of Orders."

Section 5 dealt with the non-admissibility in criminal proceedings of evidence given to tribunals and section 6 gave, for the first time, a power to a tribunal established under the Act of 1921 to award costs. It provided:

"6 Where a tribunal, or, if the tribunal consists of more than one member, the chairman of the tribunal, is of the opinion that, having regard to the findings of the tribunal and all other relevant matters, there are sufficient reasons rendering it equitable to do so, the tribunal or the chairman, as the case may be, may by order direct that the whole or part of the costs of any person appearing before the tribunal by counsel or solicitor, as taxed by a Taxing Master of the High Court shall be paid to the person by any other person named in the order."

Applications for costs under this section were subsequently made. The matter is dealt with in Chapter 24 of this Report.

1.3.1 The Resolutions of the two Houses of the Oireachtas

Pursuant to the provisions of the Act of 1921, Dáil Éireann passed a resolution on the 6th March, 1979, and Seanad Éireann passed a resolution on the 8th March, 1979. The terms of the resolutions were as follows:

"That it is expedient that a tribunal be established for—

1. inquiring into the following definite matters of urgent public importance:

- (1) the immediate and other causes of, and the circumstances of and leading to, the explosions and fires on and in the vicinity of the ship "Betelgeuse" and the jetty of the terminal of Gulf Oil Terminals (Ireland) Limited at Whiddy Island, Bantry, in the County of Cork on the 8th January, 1979.
- (2) the circumstances of and leading to the loss of life on and in the vicinity of the ship and jetty on the 8th January, 1979.
- (3) the measures, and their adequacy, taken on and before the 8th January, 1979, on, in the vicinity of and in relation to the ship and at, in the vicinity of and in relation to the terminal to prevent, and to minimise and otherwise to deal with—
 - (a) fires and explosions of the kinds aforesaid, and
 - (b) the occurrence of circumstances of the kinds that led to the loss of life aforesaid;

and

2. making such recommendations (if any) as the Tribunal having regard to its findings, thinks proper".

1.4.1 Appointment of the Tribunal

The Order appointing this Tribunal was made on the 9th April, 1979, by the Minister for Tourism and Transport. After reciting the terms of the Resolutions passed by the two Houses of the Oireachtas, the Order provided as follows:

- "1. A Tribunal is hereby appointed to investigate and report to the Minister for Tourism and Transport on the said definite matters of urgent public importance.
2. The Honourable Mr. Justice Declan Costello is hereby nominated to be the sole member of the Tribunal.

3. The following persons are hereby appointed to be assessors to the Tribunal:

Dr. Hugh Kenneth Black B.Sc.Ph.D., Scientific Consultant, 79, Popes Avenue, Twickenham, Middlesex, England.

Captain Donald George Hindle, Master Mariner, "Brands Hatch", Queenswalk, Cleveleys, Blackpool, Lancs., England.

Mr. Gerard Van Zon, Chief Engineer, Robert Kochstraat 13, Hengelo, Holland.

Mr. Jens Theodor Wilse, Naval Architect, Senior Principal Surveyor. Det Norske Veritas, Veritas Centre, Oslo, Norway.

4. The Tribunals of Inquiry (Evidence) Act, 1921 (as adapted by or under subsequent enactments), shall apply to the Tribunal."

1.5.1 Public Sitings

The first public sitting of the Tribunal was held on 26th April, 1979, the sitting having previously been advertised in the public press in this country and in France. The hearings on that day were devoted to the consideration of applications for liberty to be legally represented at the hearings.

The first public sittings of the Tribunal at which oral testimony was received were held on the 14th May, 1979. In all (including the sittings on the 26th April) the Tribunal sat for 72 days throughout the year 1979.

Its sittings were held in the West Lodge Hotel, Bantry on the 26th April, the 14th-18th May, the 21st-25th May, the 28th May-1st June, and the 11th-15th June. The hearings were then adjourned. As appears later in this Report (see, in particular, Chapter 16) it had been possible to raise only portion of the wreck (the forebody of the vessel) before the hearings started, and it was considered desirable to await the evidence which would be available from the raising of the mid-section before resuming the hearings.

The Tribunal sat again in Bantry from the 1st October to the 5th of October. It then adjourned to Dublin and held public hearings in the premises of the Incorporated Law Society in Blackhall Place. The Tribunal sat on the 8th-12th October, the 15th, 16th and 19th October, the 22nd-26th October, the 30th October-2nd November, the 5th-9th November, the 12th-16th November, the 19th-22nd November, the 26th-30th November, the 3rd-6th December, the 11th and 12th December, and the 17th-20th December.

Most of the witnesses heard in Bantry were local witnesses; most of the expert evidence in the case was heard in Dublin.

At the conclusion of its public hearings the Tribunal indicated that it did not require to obtain any further evidence, including the results of any further surveys or examinations of the mid-section of the "Betelgeuse". The reasons for this decision are given later in this Report.

1.6.1 Witnesses

The Tribunal heard evidence on sixty-five days and oral submissions at the end of the evidence for six days.

One hundred and eighty-four witnesses were heard, of whom seventy-eight gave technical or expert testimony. Ninety-seven gave evidence relevant to the facts of the disaster. Others assisted the Tribunal by the production of photographic and other miscellaneous types of evidence.

All the oral testimony, as well as counsels' submissions, was taken down in shorthand and transcribed overnight into Books of Evidence.

The procedure adopted in relation to the oral testimony was as follows. All witnesses were called by the Tribunal's counsel and first examined by him. They were then available for examination by counsel for the parties to whom the right of representation had been granted. Prior to their oral examination, a written statement of the witness's evidence was

circulated. In the case of expert witnesses, reports were obtained and circulated. In most cases the written statement or report was accepted by the Tribunal as part of the witness's testimony; it was, however, in most cases supplemented by oral evidence.

The list of witnesses who gave evidence is given in *Appendix 1* to the Report.

An alphabetical list of witnesses was prepared by the Tribunal's registrar and this, together with a reference to the Book of Evidence in which the witnesses' oral testimony is to be found, is given in *Appendix 2*.

Those witnesses whose statement or report was accepted in evidence are identified in *Appendix 1* by the letter "S" or "R", as the case may be, after their names. These statements and reports are forwarded, as are the Books of Evidence, with this Report.

A list of exhibits is given in *Appendix 3*.

- 1.6.2 The persons legally represented before the Tribunal had, in many instances, carried out surveys and examinations of the "Betelgeuse" and the terminal and jetty, and had obtained reports arising from such surveys and examinations. These were forwarded to the Tribunal with a request that the expert who prepared the report be called as a witness. In nearly all cases these requests were complied with. It will be found convenient to refer to such witnesses as, for example, a "Gulf" witness or a "Total" witness, even though, strictly speaking, all witnesses were called by the Tribunal itself to give evidence.

The Tribunal was not in any way restricted in its inquiry to the evidence or witnesses proposed by those legally represented before it. Immediately after the disaster the Department of Tourism and Transport had engaged as consultants Mr. Anthony Viner, a naval architect in the Hull Structure Department of Lloyd's Register of Shipping, and Mr. Gordon Victory, a chartered engineer and a former member of the Marine Division of the Department of Trade of the British government and a past President of the Institute of Marine Engineers. Both Mr. Viner and Mr. Victory assisted the Tribunal's legal advisers and gave evidence before the Tribunal.

The IIRS and Lloyd's Register of Shipping were requested by the Tribunal to carry out certain examinations and tests, and their reports were part of the evidence considered by the Tribunal.

Furthermore, Mr. John Denham, a Chief Engineer in Irish Shipping Ltd., was seconded to assist the Tribunal and he supervised a number of examinations, tests and surveys and reported on them to the Tribunal.

1.7.1 Representation

Under the provisions of the Act of 1921, the Tribunal had power to authorise the representation before it by counsel or solicitor of any person "appearing to be interested".

A number of applications for representation were made on the 24th April and on subsequent days. Particulars of the applications and of the names of the legal representatives of those whose applications were granted are given in *Appendix 4*.

There is one particular aspect of the subject of the legal representation before the Tribunal to which reference should here be made. On previous occasions when tribunals were established under the provisions of the Act of 1921, the evidence was obtained by the Chief State Solicitor and presented by counsel instructed by him on behalf of the Attorney General. In the present instance the Attorney General suggested that this practice should not be adhered to and that, instead, he would assign solicitor and counsel to the Tribunal who would act as its solicitor and counsel. This suggestion was readily accepted by the Tribunal and it has been found to be of immense value. A tribunal established under the Act of 1921 is not a court of law hearing evidence adduced by opposing parties; its function is to conduct an inquiry. In the present instance, it would have been very difficult for it adequately to carry out its statutory functions if it had not been able to consider, with its own solicitor and counsel, what evidence should be obtained, and direct what steps should be taken in the search of the cause of the disaster. A further reason for adopting this procedure arose from the fact that the role of the public authorities could come under the scrutiny of the Tribunal,

and it was obviously not desirable that the Attorney General—who would represent the government departments involved and the Garda authorities—should at the same time be responsible for the presentation of evidence to the Tribunal.

As pointed out above, a tribunal established pursuant to the provisions of the Act of 1921 differs fundamentally from a court of law. For ease of reference, the persons to whom the right to appear by solicitor and counsel was granted were referred to throughout the proceedings as “parties”. But it should be borne in mind that such persons have neither the status nor the functions of parties in a civil suit.

1.8.1 Glossary and Abbreviations

Inevitably a great number of technical terms, with which the general reader of this Report may be unfamiliar, occurred in the course of the evidence. A Glossary has been prepared and is included in *Appendix 5*. A list of Abbreviations used in the Report is contained in *Appendix 6*.

1.9.1 Expression of the Tribunal's gratitude

It is right that the public record of the Tribunal's work should contain a reference, however brief, to those who assisted it, and an expression, however inadequate, of the Tribunal's warm appreciation and deep sense of gratitude for that assistance.

The Tribunal could not have adequately carried out its functions without the assistance of its assessors. It was most fortunate in having available to it experts who were quite outstanding in their own particular specialist fields. Dr. Black had, in addition to his high academic qualifications, much expert knowledge gleaned both as Chief Inspector of Explosives in the Home Office of the British government and as a member of committees of international organisations concerned with dangerous substances. His knowledge and experience were constantly made available to the Tribunal up to his retirement on the 6th October, 1979. Captain Hindle has a wealth of sea-faring experience and has commanded two of the largest ships in the world. He has a specialist knowledge of the management and operation of oil tankers and the operation of oil terminals and has made a particular study of tanker safety, having contributed many papers on the subject to various professional bodies. Mr. Van Zon is a Chief Engineer with wide experience of product and crude oil tankers. His experience and knowledge embrace not only the practical operation of oil tankers but also their design and construction. Mr. Wilse is a naval architect and senior principal surveyor of Det Norske Veritas. He has represented Det Norske Veritas on a number of working groups of the International Chamber of Shipping concerned with tanker safety and has taken part as an expert assessor in a number of inquiries which followed tanker casualties. Captain Hindle, Mr. Van Zon and Mr. Wilse not only helped throughout the entire of the Tribunal's public hearings but advised and assisted during the drafting of its Report. No Tribunal could hope to have more sage advice or more unstinting assistance.

On the Tribunal's solicitor, Mr. James Donegan, fell the onerous task of organising the presentation to the Tribunal of the entire evidence, written and oral, which the Tribunal obtained, of conducting a great volume of correspondence, of briefing counsel and consulting with them, of carrying out the Tribunal's requirements and meeting with the Tribunal at least once a day during the Tribunal's hearings as well as many other functions incidental to a long public inquiry. He outstandingly performed his many duties not only with high professional skill but also with a standard of efficiency which it would be impossible to exceed.

Mr. MacDomhnaill was the Tribunal's Registrar until his appointment as Registrar of the Supreme Court and the Tribunal was greatly assisted by the experience he had gained as Registrar of previous Tribunals established under the Act of 1921. After the first preliminary public sitting, Mr. Gerard Frewen acted as the Tribunal's Registrar. As such, the length and complexity of the Tribunal's hearings imposed many functions on him, all of which he fulfilled with the efficiency with which those associated with him in the Courts will be familiar. But, in addition, he assisted in the preparation of and editorial work associated with the Tribunal's Report. He gave this assistance with a rare combination of talents—an

exceptional organising ability, a meticulous concern for detail, and an inquiring and judicious mind.

Counsel for the Tribunal ensured that all witnesses were given a full and adequate opportunity to assist the Tribunal and they helped, by their skilful questioning, to clarify the many issues that arose during the hearings. Counsel for those legally represented before the Tribunal not only fully protected their clients' interests but also, by their thorough cross-examinations, greatly facilitated the search for the truth of the facts of the disaster and its cause. The co-operation given in full measure to the Tribunal's solicitor by the solicitors for those to whom the right of representation had been given eased many problems and considerably improved its smooth functioning.

Responsibility for the practical aspects of the establishment of the Tribunal and the organisation of its public hearings was discharged by Mr. Humphreys and a small group of his colleagues in the Department of Tourism and Transport. They overcame many problems swiftly and unobtrusively. They served the Tribunal with zeal and care and maintained the highest traditions and standards of the public service of this country.

The oral evidence and counsels' submissions were taken down in shorthand and transcribed overnight into Books of Evidence. The entire proceedings were simultaneously translated from English into French and vice versa as required. Both note-takers and interpreters had to cope at times with technical terms and complex concepts. They did so expertly and without apparent difficulty. They supplied a service to the Tribunal of an exceptionally high order of competence.

The Tribunal particularly welcomes this opportunity to express its thanks to those in the public service and from the office of the Tribunal's solicitor who typed this Report and its preliminary drafts with clarity and expedition. By so doing, they greatly eased the Tribunal's own particular responsibilities.

CHAPTER 2

Outline of Report and Summary of Principal Conclusions

2.1.1 The evidence considered by the Tribunal and its conclusions on it are dealt with in a number of different Chapters, as follows:

PART I of the Report contains a general introduction and this Chapter.

PART II THE FACTS OF THE DISASTER AND RELATED ISSUES

Chapter 3

aims at giving a general introduction to the disaster so as to assist in an understanding of the evidence which is considered in later Chapters.

Chapter 4

outlines the principal events of the 6th/7th January, a number of which are of considerable significance to some of the issues on which conclusions are reached in later Chapters.

Chapter 5

considers the evidence of the eye-witnesses to the disaster, other than that of the witnesses who were on duty on and near the Island on the night when the disaster happened. It is divided into five sections and considers the evidence of witnesses who saw the disaster at different times and from different points around the Bay.

Chapter 6

discusses the evidence of the Gulf employees on the Island and that of the crews of the stand-by vessels. The evidence of five of the Gulf employees was irreconcilably contradicted by the eye-witness testimony referred to in Chapter 5 and the Tribunal's reasons for rejecting that of the Gulf employees are given.

Chapter 7

The efforts made to effect a rescue after the alarm had been raised are dealt with in this Chapter.

Chapter 8

The Tribunal's primary function was to ascertain the cause of the disaster. False evidence was given to the Tribunal by some witnesses and efforts were made to suppress the truth relating to the actions of certain Gulf employees on the night of the disaster. The evidence on this is considered in this Chapter.

Chapter 9

Controversy arose in the course of the hearings as to the circumstances in which statements made to the Gardaí were taken, and verbal remarks made during them. The evidence given by members of the Gardaí was challenged by Gulf during the course of the hearings and serious allegations were made against the Gardaí. These allegations are considered in this Chapter.

Chapter 10

The locations in which the bodies of some of the victims of the disaster were found and the post-mortem evidence raised important inferences which were of significance for indicating whether the initiating event of the disaster occurred on the ship or on the jetty, and also the nature of the disaster in its early phase. These matters are considered in this Chapter.

Chapter 11

The principal facts established by the evidence considered in **Part II** are given in tabular form in this Chapter.

PART III THE TERMINAL

Chapter 12

The Tribunal's terms of reference required it to inquire into the measures taken at the terminal to prevent and minimise fires and explosions. This Chapter considers the evidence relevant to this part of the terms of reference. It is divided into nine sections and gives the Tribunal's conclusions on the fire-fighting systems, escape facilities, hazardous area classification, maintenance and repair procedures, emergency procedures and training of Gulf employees in emergency procedures.

Chapter 13

The tug on emergency stand-by duty was so positioned as to be out of sight of the offshore jetty and the "Betelgeuse" and at such a distance that it took about twenty minutes to reach the scene of the disaster. The evidence on this aspect of the disaster is considered in this Chapter.

Chapter 14

The evidence arising from surveys and examinations carried out on the offshore jetty and its installations was of paramount importance in ascertaining the cause of the disaster. It is discussed in this Chapter.

PART IV THE "BETELGEUSE"

Chapter 15

The ship's method of operating and its pre-disaster history are discussed in this Chapter. It is divided into seven sections, which consider the ship's fire-fighting system, the evidence relating to its repair and maintenance (which is of particular significance to the theory that the cause of the disaster was a failure of the ship's hull), the cathodic protection of the ship, and the ship's permanent ballast tanks. This Chapter also contains sections dealing with the last voyage of the "Betelgeuse" and surveys of the ship carried out on the day prior to the disaster.

Chapter 16

The Tribunal had available to it the results of inspections and examinations of the fore-body and mid-section of the "Betelgeuse", the results of metallurgical examinations,

photographic evidence, video tapes and reports from the salvors of the vessel. This evidence is discussed in this Chapter.

PART V THE CAUSE OF THE DISASTER AND THE RESPONSIBILITY THEREFOR

Chapter 17

Total submitted that the disaster probably happened as a result of a fire in the vicinity of the slop tank pit on the jetty. This theory is considered in Chapter 18. A second theory, which was supported by a very considerable weight of evidence, was that the hull buckled due to bad maintenance and improper ballasting and that this initiated the disaster. This theory is considered in Chapters 19 and 20. This Chapter considers other possible ways in which the disaster might have occurred.

Chapter 18

This Chapter deals with the evidence from which it was suggested that the disaster on the ship was initiated by a fire on the jetty.

Chapter 19

A considerable amount of evidence was given as to the probable amount of ballast which the ship had taken on when the disaster occurred, and its likely distribution. That evidence is examined in this Chapter.

Chapter 20

The hull failure theory is here considered. The Chapter is divided into four sections. Section 1 outlines the hull failure theory and gives the Tribunal's conclusions on it. Section 2 considers the stress calculations given to the Tribunal by naval architects in the course of their evidence. Section 3 deals with the explosions in the permanent ballast tanks, and Section 4 deals with the events of the disaster following the explosions in the permanent ballast tanks.

Chapter 21

It was concluded in Chapter 20 that the initiating event of the disaster was the buckling of the ship's hull. The responsibility for this initiating event is discussed in this Chapter. This Chapter also considers Gulf's responsibility for loss of life and damage to property arising from the absence from the Control Room of the dispatcher when the disaster began, the position of the duty tug, the absence of suitable escape craft on the jetty, and the alterations which had been effected in the fire-fighting systems on the jetty.

PART VI THE ROLE OF THE PUBLIC AUTHORITIES

Chapter 22

The Department of Transport and Power (and later the Department of Tourism and Transport), the Department of Labour, and the Cork County Council (as planning authority and fire brigade authority) had functions in relation to the construction of the terminal and/or its subsequent supervision. Those functions and the manner in which they were fulfilled are discussed in this Chapter.

PART VII RECOMMENDATIONS AND COSTS

Chapter 23

The Tribunal's recommendations are set out in this Chapter.

Chapter 24

The Order made in relation to the costs of the Tribunal is given in this Chapter, as are the reasons for it.

2.2.1 Summary of Tribunal's Conclusions as to the Initiating Event of the Disaster

The initiating event of the disaster was the buckling of the ship's structure at or about deck-level and in way of the permanent ballast tanks forward of the ship's manifold. This was immediately followed by explosions in the permanent ballast tanks and the breaking of the ship's back. These events were produced by the conjunction of two separate factors: a seriously weakened hull due to inadequate maintenance, and an excessive stress due to incorrect ballasting on the night of the disaster.

2.3.1 Summary of the Tribunal's Principal Conclusions on the Evidence Considered by it

(1) The events of the 6th/7th January 1979 (Chapter 4)

- (a) The "Betelgeuse" was moored to the offshore jetty in a normal manner on the evening of the 6th January. Before discharging any cargo, the procedures required by Gulf's Safety-check list were carried out on board by the Pollution Control Officer conscientiously and efficiently. The discharge of the parcel of Arabian Heavy crude began at 23.15 hours and was completed the following day at 18.00 hours.
- (b) A discussion concerning ballasting the vessel took place at 11.00 hours on Sunday 7th January, and as a result ballasting of the PBTs commenced at about 11.30 hours. Ballasting of some of the vessel's centre tanks began at 18.35 hours.
- (c) Transfer operations between the ship and shore were carried out in a normal fashion and without incident.
- (d) The PCO on duty on the 7th January carried out in a proper manner the requirements of Gulf's Manual, including a check of the contents of the centre platform slop tank. When the jetty crew left at 20.00 hours nothing unusual had occurred either on the ship or on the jetty. Had anything of a hazardous nature occurred between then and 23.30 hours, the PPO at Dolphin 22 would have warned the skipper of the "Sea Lance" of its existence when he left returning members of the ship's crew at the offshore jetty.

(2) The events of the disaster, as established by independent eye-witness evidence (Chapter 5)

- (a) *The First Phase* of the disaster began in the morning of the 8th January very shortly after 00.30 hours, in the region of 00.31-00.32 hours, at which time sounds like distant thunder were heard. A fire was observed which appeared to be a small and localised one and to be on the ship just forward of the manifold. It gradually increased in intensity and suddenly spread on both sides of the vessel giving the impression on the starboard side that it had developed aft of the manifold along the whole length of the ship.

The fire was accompanied by a large plume of dense smoke, which was not observed on the north-western coast of the bay, but was clearly visible from the other parts of the bay. The sudden development of the fire occurred at 00.40 approximately. No explosions were observed by those watching the ship and jetty during the first phase of the disaster, other than the initial sound like distant thunder which was heard at the commencement of the casualty.

- (b) *The Second Phase* lasted from 00.40 hours until 01.06-01.08 hours, at which time a massive explosion occurred. During the second phase a number of smaller explosions took place, the first at about 00.50 hours approximately. The fire at the

beginning of the second phase was, for a time, somewhat limited in intensity but it later expanded considerably in size.

- (c) Garda Flynn, who was on duty in the Garda Station in Bantry town, was alerted to the disaster at 00.45 hours approximately. He saw the fire from the entrance to the Station and immediately tried to telephone Gulf Control at Whiddy but he was told by the operator in the Bantry Exchange that all lines were busy and that Gulf Control was aware of the disaster. He radioed for the patrol car which was then at the West Lodge Hotel, outside the town. The fire had been observed at 00.45 hours by Garda Joy and Garda Byrne who were on duty at the hotel. As they were about to make contact with the Station, Garda Flynn came through to them. They returned immediately to the Station.
 - (d) Superintendent McMahon was alerted to the emergency at 00.50 hours and immediately gave instructions that the major accident plan be put into operation. The local fire officer was alerted, and the Bantry town fire-siren was sounded just at the time of the major explosion. This occurred at between 01.06-01.08 hours. The outside fire services at Dunmanway and Skibbereen were alerted.
 - (e) A considerable number of persons gave evidence as to what they had seen and heard on the night of the disaster. Although a few, indeed a very few, were inaccurate or confused about some of the events or the time at which they occurred, nearly all the individual versions were consistent with each other and it was possible to cross-check and confirm important matters of detail from more than one source. As a result, the Tribunal has been able to establish, with a considerable degree of accuracy, the time the disaster commenced, its nature, and its development.
 - (f) Shortly after midnight the post-mistress on Whiddy Island saw the "Donemark" leave the pier at Bantry. This evidence assists in establishing that the "Donemark" did not leave the pier at 00.15 hours as its crew claimed. At 00.50 hours she received a telephone call from the dispatcher at Gulf Control telling her that the tanker was on fire and asking her husband to get help. This assists in showing that the dispatcher was aware of the disaster before 00.55 hours.
- (3) **The events of the disaster as established by Gulf employees on duty on the Island and by other evidence (Chapter 6)**
- (a) Mr. Harris and Mr. Ball (cargo inspectors) left the "Betelgeuse" at about 18.35 hours on the evening of the 7th January and returned to the West Lodge Hotel. Mr. Harris wanted to return to the vessel before ballasting was completed and an arrangement was made before they left the ship by which he would be picked up at Bantry Pier at midnight. This arrangement was communicated to Mr. Connolly, who relayed it to Mr. Tessa-man, the acting coxswain of the "Donemark". The "Donemark" finally berthed at Bantry Pier some time before 19.00 hours and waited there to bring Mr. Harris back to the ship. Mr. Harris and Mr. Ball had dinner together in the West Lodge Hotel and then played a game of snooker until it was time to go back to the ship. At no time during the evening did Mr. Harris contact Mr. Connolly and—contrary to Mr. Connolly's evidence—no change was made in the original arrangement for his journey back to the "Betelgeuse". Mr. Ball brought Mr. Harris by car to Bantry Pier. He left the hotel at 23.55 hours, and arrived at the Pier just before midnight. The "Donemark" left immediately. Mr. Tessa-man and Mr. Hurley (the deck-hand) are wrong in stating that the "Donemark" left at 00.15 hours. In all probability the "Donemark" took the back route to the jetty i.e. around Whiddy Point East (see: *Appendix 7 part 1*). The journey took about 25 minutes and they arrived at Dolphin 22 at 00.25 hours approximately. There was no delay there and they then sailed immediately for Ascon Jetty where it was intended that the "Donemark" would be moored for the night. The "Donemark" arrived at Ascon Jetty at approximately 00.35 hours.

- (b) The dispatcher was on duty in the Control building from 20.00 hours. He is wrong when he states that he never left the Control Room from 22.00 hours until after the disaster. He is wrong when he states that he saw its commencement. The description he gave of the commencement of the disaster was a fabricated one. The disaster did not commence at 00.55 hours, as stated by him, but at some time before 00.35 hours, and probably at 00.31-00.32 hours as stated by independent eye-witnesses to the disaster.
- (c) The dispatcher had left the Control Room and did not become aware of the fire until just before 00.45 hours. It is highly probable that he was then immediately in radio contact with Mr. Kingston (the Pollution Control Officer) who was on the jetty and Captain Warner (the Pilot) who was on the ship. He tried to contact Mr. Ash (Gulf's General Manager in Bantry town) using the emergency telephone to Bantry Exchange, and he succeeded in reaching Mr. William Flynn, Operations Manager. He contacted the "Donemark" on Channel 14 probably at about 00.48 hours. His first message was: "Go to the jetty—we have a fire". This message was overheard on the "Snave", the line-boat then moored at Ascon Jetty. At 00.50 hours he contacted the duty tug, the "Bantry Bay" (moored out of sight of the jetty around Whiddy Point East) using Channel 16, and was overheard by Mr. Wong, the second mate of the "Bilbao", anchored $8\frac{1}{2}$ miles (14 km) down Bantry Bay. He said "Come quick—we have a fire". He telephoned Mr. Downey at 00.50 hours in the office of the power-house and told him: "The ship is on fire—do what you can to help". About one and half minutes after his first call to the "Donemark" he made a second call to her saying "Go as fast as you can, Bruce, to Dolphin 22 and take the lads off". He made a second call to the "Bantry Bay" about $2\frac{1}{2}$ minutes after the first. He said "Are you coming? She has broken her back. She is on fire all over". He telephoned Mrs. Desmond the post-mistress on Whiddy Island and asked her to get help.

He received a call from Garda Flynn from the Garda Station in Bantry enquiring if he wanted help to which he replied: "Send all the help you can". This was at about 00.50 hours, and not after 00.55 hours, as Mr. Connolly claimed.

- (d) At about 00.48 hours Mr. Connolly activated the fire-pumps at Ascon Jetty. Before this there would have been no water-pressure in the fire-fighting equipment on the offshore jetty. At the same time he attempted to close the emergency block valves to cut off any supply of oil to or from the jetty. Whether the mechanism worked or not will be considered in a later chapter. He did not sound the siren either on the Gulf building or on the jetty, as he claimed he did.
- (e) Shortly after 00.50 Mr. Connolly was still in touch on Channel 90 with Mr. Kingston. At this time, Mr. Kingston radioed to him to send out the "Donemark" and Mr. Connolly replied: "she is on her way". Shortly after this Mr. Kingston radioed again: "John, you are on Channel 90" and Mr. Connolly replied "I know, turn on Channel 90 and Channel 14". Some time later Mr. Kingston called for the last time "quick, John, quick". Captain Warner also contacted Mr. Connolly by radio. In his last call he said he was on the poop deck with three or four of the crew, and added "I am going over. Ask the boats to be on the look-out for us". This message was sent before the major explosion at 01.06-01.08 hours, and Mr. Connolly is wrong in stating that it occurred after the major explosion and at about 01.20 hours.
- (f) The "Donemark" left Ascon Jetty to render assistance at 00.51 hours approximately. It arrived too late at the scene of the disaster to save the life of anyone who had been on the jetty or the ship.
- (g) The "Bantry Bay" left its moorings as quickly as it could after it was alerted at 00.50 hours.
- (h) The "Snave" followed the "Donemark" out from Ascon Jetty after an interval of

about four minutes. As it left the Jetty Mr. Connolly contacted it and before he could deliver any message was told "We are on our way". By the time the "Snave" reached the scene of the disaster there was nothing its crew could do to save life.

- (i) Mr. Downey, the pumpman, and Mr. McGee, the assistant pumpman, were in the office of the power-house when contacted by Mr. Connolly. Mr. McGee had arrived first to the power-house. Mr. Downey arrived just seconds before 00.30 and logged the commencement of his time for checking the power-house generators and other equipment at 00.30 hours. The fire had not started when he entered the power-house. He had finished these duties and was seated in the office when the call came from Mr. Connolly. He checked the time: it was 00.50 hours. He and Mr. McGee immediately went to Ascon Jetty. There they ascertained that the electric fire-pumps were working (the diesel pump was not working), and called to the crew of the "Donemark" to go as quickly as they could to the "offshore". They then travelled back by Land Rover to the Control Room. In the Control Room Mr. Downey helped Mr. Connolly by making one, or perhaps two, telephone calls to the mainland, using the emergency telephone for this purpose. Mr. Downey and Mr. McGee left just prior to 01.08 hours to go to the fire station. As they were on their way they heard the major explosion and immediately after it there was a power failure. They went to the power-house and restored power in a very short time. They went to Ascon Jetty and picked up Mr. Kearns and Mr. O'Donnell and then took steps to prevent the fire igniting the storage tanks. They overheard Mr. Kingston's message on Channel 90 to Mr. Connolly in which he requested that the "Donemark" be sent out and was told that it was on its way. They heard this for the first time as they were on their way to Ascon Jetty. They overheard Captain Warner's last message. This was prior to the major explosion and probably whilst they were in the Control Room.
- (j) Mr. Kearns and Mr. O'Donnell had been together in the security hut from about midnight. Mr. O'Donnell left it at 00.25 to go on a tour of inspection. He went first to Harris's Gate, then to the bunker treatment plant, and then to the warehouse. He entered the warehouse before 00.30 hours, at which time the fire had not started. He checked into the clocking-point at the rear of the warehouse at 00.37 hours, and left some time later. Contrary to what he stated, he must have seen the fire when he left the warehouse and it is probable (but a firm conclusion on the point is not possible) that he ran up the nearby steps to the Control Room to render assistance to the dispatcher. It seems likely from the evidence of the telephonist in the Bantry Exchange that there were two persons in the Control Room when he telephoned it just before 00.45 hours; probably one of these was Mr. O'Donnell. Mr. Kearns remained at Ascon Jetty in the security hut.
- (k) Mr. Downey saw the "Betelgeuse" after leaving the power-house at 00.50 hours. The ship had by then broken its back amidships and the fire on the vessel was across its centre. There was no fire on the jetty, but there was on the water below the jetty, and it was not reaching to the height of the catwalk or Dolphin 22 at that time. The dimensions of the fire were such that, at that time, the witness considered that the personnel on the jetty could be saved.

By 00.54 approximately, on his return from Ascon Jetty and his arrival at the Control Room, the fire had developed dramatically. There were then very large flames rising 200 feet (61 m) or so in the sky over the centre platform. The jetty east of the centre platform and the entire ship aft of amidships were enveloped in flames. The flames were on the water spreading in towards the shore of the Island.

(4) The rescue operations (Chapter 7)

- (a) The "Donemark" and the "Snave" were alerted to the disaster at approximately 00.48 hours. The "Donemark" arrived in the vicinity of the offshore jetty at about 00.58 hours, and the "Snave" some four or five minutes later. By this time there

was nothing that the crew of either vessel could do to save the lives of those trapped in the disaster.

- (b) The stand-by tug-boat, the "Bantry Bay", was alerted to the disaster at 00.50 hours. Its crew responded to the emergency with alacrity. It arrived in the vicinity of the offshore jetty at 01.10 hours approximately. There was nothing that it could then do either to save lives or to diminish the scale of the disaster. A second tug arrived in the vicinity of the jetty at about 01.50 hours, a third at 03.20 hours and a fourth at 04.10 hours. These vessels could only assist in the search for bodies.
- (c) The two pumpmen and the two Plant Protection Operators on the Island acted properly in taking action to cool the tanks on the tank farm. They acted with commendable courage in a potentially dangerous situation, as did the crews of the "Donemark", the "Snave" and the "Bantry Bay" who, notwithstanding the existence of a very real risk to their lives, travelled close to a fire of enormous proportions in their efforts to save those trapped in it.
- (d) The members of the Bantry Fire Brigade and the members of the Dunmanway and Skibbereen fire brigades reacted promptly and efficiently to the emergency. They were delayed in getting to the Island owing to lack of proper transportation from the Pier and they were further delayed on arrival at Ascon Jetty because of the breakdown of vehicles on the Island. There was, however, nothing the brigades could have done to minimise the disaster had transportation been available. They acted properly in taking steps to cool the tanks on the tank farm.
- (e) The major accident plan was initiated by Superintendent McMahon at 00.55 hours approximately. It worked efficiently and well.

(5) Steps taken to suppress the truth (Chapter 8)

Active steps were taken by some Gulf personnel to suppress the fact that the dispatcher was not in the Control Room when the disaster began. False entries were made in logs, false accounts were given of the disaster both to the Tribunal and in investigations held before the public hearings, and efforts were made to avoid making statements to the Gardaí who were investigating it (including the making of false accusations against them for the purpose of employing a solicitor so as to justify a refusal to be interviewed by the Gardaí). Incorrect times at which they were alerted were knowingly given to the Tribunal by both Gulf's Operations Manager and its General Manager as well as by the telephonist in the Bantry Exchange. This was deliberately done to lend support to the dispatcher's evidence.

(6) Allegations made by Gulf against the Gardaí in the course of the hearings (Chapter 9)

During the course of the hearings serious charges were made against one particular member of the Gardaí. They were without foundation and should never have been made. Furthermore, it was submitted on Gulf's behalf that the investigation carried out by the Gardaí into the disaster had been inadequate and improper. This submission was equally without foundation. The investigation was carried out with commendable efficiency and complete propriety.

(7) The evidence relating to the victims (Chapter 10)

The bodies of five members of the crew of the "Betelgeuse" were found on the jetty at Dolphin 22. It is extremely unlikely that refuge on the jetty would have been sought by members of the ship's crew had the initiating event of the disaster been a fire on the centre platform, as suggested by Total. The bodies of the other members of the crew were found in the sea and had been clothed when they died. The victims whose bodies were recovered from the sea had died from drowning and not from explosion or fire damage. This evidence confirms the fact that the initial phase of the disaster was such as

to permit at least some of the members of the crew to get dressed and escape from the accommodation area of the vessel.

An attempt to launch the inflatable life-raft at Dolphin 22 had been made. The last certificates of service and testing of the two life-rafts on the offshore jetty were dated October and November, 1976. It is not possible to determine whether the failure to escape in the life-raft arose because it was not serviceable, or because of inadequate training of the jetty crew, or because of the fire on the water when it was launched.

(8) The adequacy of the pre-disaster measures taken by Gulf to prevent or minimise an emergency (Chapter 12)

(a) The original fire-fighting facilities

The fire-fighting system at the terminal and offshore jetty when first commissioned was of good international standard.

(b) The modifications to the original fire-fighting systems

A number of modifications over the years improved the system, but three had the effect of down-grading it. However, at the time of the disaster the rate of delivery of water at the jetty was good and so were the number, size and elevation of the foam monitors in the system.

In 1970 a decision was taken not to keep the fire-mains pressurised. This resulted in the jetty crew being unable to activate the system without the intervention of the dispatcher at Gulf Control. This decision was taken with an inadequate appreciation of its consequences.

The pre-mix fixed foam system on the jetty was also modified in 1970. As a result it ceased to be an automatic one. It would have been preferable to have improved maintenance techniques rather than to modify the system in the way it was done.

In 1971 a decision was taken to decommission the remote control button situated in the Control Room which was designed to start the foam on the four monitors on the centre platform. The original system was superior to the modified one and not enough consideration was given to the re-design of the system.

(c) The modifications to escape facilities from the offshore jetty

The original operational plan made adequate provisions for an emergency evacuation of the jetty.

Inadequate consideration, however, was given to the means of escape from the offshore jetty both when the tug moorings were altered and when the personnel transfer facilities from Dolphin I were removed. Gulf should have appreciated that, as there was no direct means of access from the jetty to the Island, the provision of inflatable life-rafts—particularly in view of the danger from the escape of burning oil on to the sea—was an inadequate safeguard. Proper rescue boats or escape capsules should have been provided at each end of the jetty.

(d) Pressurised Personnel Building on the offshore jetty

A pressurised system was introduced in 1972 into the personnel building on the centre platform of the offshore jetty. It was considerably extended in 1978. The system was a highly undesirable and potentially dangerous one. It did not, however, contribute in any way to the disaster.

(e) Hazardous Area Classification

It is good practice to re-assess a plant not less than twelve months after commencement of operations and review it at intervals of one to three years. Gulf failed to do this. Re-assessment was undertaken in 1976 without any proper study having first been undertaken. The re-classification as printed in Gulf's "Policy and

Procedures" Manual was ignored in practice and was admitted in evidence as being inaccurate.

(f) *Maintenance Standards*

Some important items of fire-fighting equipment were allowed to remain inoperable for a time much longer than is desirable. Standards of maintenance had been lowered for some time prior to the disaster. This resulted from economy measures and not through lack of skill or dedication by the maintenance personnel. This lowering of standards, however, did not contribute to the initiation of the disaster or its development.

(g) *Emergency Procedures*

Two major defects in the emergency procedures developed over the years. The first arose from the fact that the duty tug was permitted to moor out of sight of the jetty and at a considerable distance from it; the second from the fact that initiation of the procedures depended entirely on the constant presence of the dispatcher in the Control Room.

(h) *Training and Escape Plan*

A decline in safety standards had taken place. The fact that employees designated "temporary employees" got no formal training in fire-fighting techniques was undesirable. The failure to utilise the fire-fighting system on the night of the disaster was not, however, due to lack of training, but to the nature of the casualty which occurred on the vessel.

No escape plan to evacuate the jetty had been formalised and no training in evacuation had been given. Had proper training been given and had a proper escape craft been supplied at Dolphin 1, then it is possible—although this cannot be concluded with any great degree of certainty—that the lives of most of the jetty crew would have been saved.

(9) The role of the duty tug (Chapter 13)

The duty tug was moored out of sight of the "Betelgeuse" and at a distance of about 2.8 miles (4.5 km) from it. It took about 20 minutes to reach the scene of the disaster after it was alerted at 00.50 hours. Had it been moored in sight of the "Betelgeuse" and in its vicinity it would have observed the fire and it is probable that, notwithstanding the absence of the dispatcher from the Control Room, the lives of those on board the ship and the crew of the jetty would have been saved.

The position of the duty tug on the night of the disaster was not that contemplated in the original operational design of the terminal. Gulf altered the original position of the duty tug as a result of pressure from the company operating the tugs, and in the knowledge that that alteration was undesirable from the point of view of safety.

Gulf's "Policy and Procedures" Manual, up-dated in 1976, gave a wholly misleading description of the role of the tugs in an emergency and was not complied with in practice. The reasons given at the hearing for the removal of the duty tug from the vicinity of berthed vessels were not convincing. The alteration in the original plan seriously weakened the emergency services.

(10) The post-disaster condition of the offshore jetty (Chapter 14)

(a) The structure of the jetty from the west breasting dolphin to Dolphin 22 was completely devastated in the disaster. There was, however, no fire or explosive damage west of the west breasting dolphin. Had any person from the crew of the jetty or of the ship been able to reach Dolphin 1 he would, in all probability, have been saved.

(b) No explosion occurred inside any of the buildings on the centre platform including

the pressurised personnel building, although all were extensively damaged by fire. The air inlet to the pressurised system of the personnel building was not damaged by an explosive force.

- (c) The crude oil valves on the centre platform were closed, indicating that there was no transfer operation between the ship and the terminal taking place when the disaster occurred, and that there could not have been a run-back of oil into the slop tank or the slop tank pit when the disaster occurred. The closed position of the valves also established that no bunkering or ballasting operations from the jetty was taking place.
- (d) There was nothing to indicate that the specified fire-fighting equipment was not on the jetty on the night of the disaster. The fire-fighting system was capable of operation provided (a) the fire-mains had been pressurised and (b) there was sufficient time to operate them. The fire-pumps could have provided sufficient pressure and volume of water to fight the fire had they been started. The foam on the jetty was proper and the quantity adequate.
- (e) The status of the valves of the fire-fighting system established that no attempt to fight the fire was made by the jetty crew.
- (f) There was no evidence to suggest that any item of equipment on the jetty was defective so as to cause an escape of oil or inflammable vapour from the jetty. (The evidence in relation to the slop tank is separately considered later).
- (g) The maintenance of some of the explosion-proof electrical equipment was not adequate, and violations of the original certificates for use in hazardous areas had occurred.

Items of equipment which were not suitable for use in Class 1, Division 1 hazardous areas classification had been installed. However, the violation of the original certificates did not mean that the equipment was defective or that it constituted a source of ignition on the night of the disaster. Similarly, there was no evidence to suggest that the equipment which was unsuitable for a Class 1, Division 1 area was defective or that it had constituted a source of ignition on the night of the disaster. There was no indication from the condition of the electrical apparatus that fire or explosion was initiated at any particular spot.

- (h) The two 42" (1.067 m) crude oil emergency block valves on the jetty were found to be open after the disaster. The dispatcher had stated in evidence that he had pressed the button in the Control Room which should have closed them. It is probable that they failed to close because the fire had damaged the wiring at the centre platform at that time. It is probable that damage was also done at the same time to the wires at the centre platform leading to the telephone kiosk on Dolphin 22 and that this caused a short which was observed by the telephonist in the Bantry Exchange and caused him to telephone Gulf Control just before 00.45 hours.

(11) Conclusions from the evidence relating to the pre-disaster history of the "Betelgeuse" (Chapter 15)

- (a) It is now virtually standard practice for large tankers to have supplied on them an electronic computer known as a "loadicator" or other mechanical means for the calculation of stresses. The "Betelgeuse" had no loadicator or other similar type of equipment. In taking on intermediate ballast (as the ship did on the 7th/8th January) the Master and Chief Officer had available to them only a document known as the "Conditions de Chargement", which, had they consulted it, would have been of little or no assistance to them. Total was aware that the absence of a loadicator (an effective model of which would have cost only a few thousand pounds) caused problems for its Chief Officers. No adequate explanation for this omission was given to the Tribunal. It had most serious consequences.

- (b) The ship's fire-fighting system was a good one, and the crew were well trained in its use.
- (c) The ship's Second Special Survey took place in Singapore in the summer of 1977. A conscious and deliberate decision was taken by Total not to renew certain of the longitudinals and other parts of the permanent ballast tanks which were known to be seriously wasted. In addition, a deliberate decision not to renew the tanks' cathodic protection was taken at the same time. These decisions were taken because it was then considered that the ship would be sold in the near future, and in the interests of economy. Inadequate consideration was given to the effect they would have on the safety of the vessel. They had most serious consequences, as they contributed to the fact that on the 8th January, 1979, the vessel was in a seriously corroded and wasted condition.
- (d) The welding of certain of the longitudinals which were renewed in Singapore was improperly carried out and contributed to the potentially dangerous condition the vessel was in on the 8th January, 1979.
- (e) The repairs to the port permanent ballast tank which were carried out at Jeddah in November, 1978, were properly carried out and it is probable that no leakage of cargo into this tank occurred prior to the disaster. During the lifetime of the ship there had never been a leak into the starboard permanent ballast tank and the Tribunal concludes that it is highly unlikely that one existed in that tank prior to the disaster.
- (f) The vessel was superficially inspected on the 7th January, 1979, by two surveyors on behalf of potential purchasers of the vessel. Neither inspected the permanent ballast tanks or the cargo tanks and neither was in a position to assist as to the internal condition of any of the tanks. The Tribunal is satisfied that the ship's cargo pumps were working satisfactorily and that the vent lines, insofar as a superficial examination could determine, were not corroded. However, the paint-work on the deck was in poor and rusted condition, the deck's steam line was in a poor condition near the cargo room, the electric cable ducting was in a poor condition and considerable sections of the small-bore piping ducting required renewal. Otherwise, from a superficial examination, the vessel appeared to be in reasonably good order.

(12) Conclusions from the evidence relating to surveys and examinations of the "Betelgeuse" carried out after the disaster (Chapter 16)

- (a) There was no explosion in the No. 4 centre tank. Explosions took place in both the port and the starboard permanent ballast tanks.
- (b) A massive explosion took place simultaneously in the No. 5 centre tank and in all three of the No. 6 tanks. This was the explosion that was observed by eye-witnesses at 01.06-01.08 hours.
- (c) The only explosions which took place on the ship were those in the permanent ballast tanks, the No. 5 centre tank and in way of the No. 6 tanks.
- (d) The ship broke its back in two places: (a) at frame 77½ where the explosion in the permanent ballast tanks occurred and (b) in way of the No. 6 tanks where the second explosions occurred.
- (e) The No. 2 wing tanks were undamaged by the disaster and retained their cargo. The No. 1 tanks after the disaster were empty of fluid and contained an over-rich gas mixture. They were undamaged in the disaster.
- (f) The photographic evidence of the deck longitudinals of the permanent ballast tanks in way of the forward bulkhead is strongly persuasive evidence that the deck longitudinals buckled before the explosions in the PBTs occurred.

- (g) The fire-marks on the ship, caused by oil burning alongside the ship and across it, establish that the explosions in the permanent ballast tanks took place before those in way of the No. 6 tanks. They also establish that, after the ship broke its back for the first time, it assumed a position with its deck awash forward of the manifold but with the top of the manifold above the water. The first explosion on the ship (in the permanent ballast tanks) had taken place before the ship took up this position.
- (h) It is probable that the major portion of the fractures of the upper part of the side-shell of the port permanent ballast tank was caused by the explosion in that tank, and not by the buckling of the side-plates, but the metallurgical evidence does not preclude the possibility that some cracks had occurred in the side of the tank following buckling of the deck or sheer strake longitudinals and before the explosions occurred.
- (i) The metallurgical evidence relating to the side-shell of the starboard permanent ballast tank is equally consistent with the fractures having been caused (a) by an explosive force or (b) by buckling which followed an explosion in the port permanent ballast tank. Other non-metallurgical evidence establishes that the explosions in the two tanks were probably simultaneous and so it is probable that most of the fractures were caused by an explosion rather than by buckling. Again, however, the metallurgical evidence is not inconsistent with the fact that some cracks might have occurred in the starboard PBT as a result of buckling of the deck or sheer strake longitudinals prior to an explosion in the tank.
- (j) It is probable that the bottom plates would not have fractured if the explosion in the PBTs had not occurred.
- (k) The fractures in both the lower starboard and port sides of the PBTs were consistent with explosions having fractured the bottom plates and the fractures having propagated through the bilge plates as a result.
- (l) It is possible that at least some of the fatigue cracks in the vessel's side-plating were present prior to the disaster but, because of doubt in the matter, no conclusions on how the disaster occurred will be based on this possibility.
- (m) On the night of the disaster the structure of the vessel was abnormally, seriously and significantly wasted due to corrosion, and wastage was particularly marked in way of the permanent ballast tanks. An important cause of the excessive corrosion was Total's decision not to renew the cathodic protection in the permanent ballast tanks and/or its failure to have the tanks coated with a protective coating.
- (n) The vessel was especially weak in way of strakes R and Q of the permanent ballast tanks owing to Total's failure to renew at Singapore in 1977 longitudinals 43 and 44 which, at that time, were seriously wasted. It was further weakened by the non-renewal of other wasted parts of the vessel.
- (o) A further factor which weakened the vessel's structure and its ability to withstand compressive stresses was the defective manner in which some of the welding was carried out on the PBTs in 1977.
- (p) No part of the deck paint-work in the area of the manifold was affected by fire, although the manifold itself suffered heavy fire damage. This excludes the possibility that the cause of the disaster was a broken Chiksan arm.
- (q) No effort to fight the fire was made by the ship's crew, notwithstanding the fact that the fire-fighting system was a good one, that the crew was properly trained in its use and that the initial fire was in an area close to foam monitors and hydrants.
- (r) It is not possible to conclude that the holes in the gas vent line, which were observed after the casualty, existed in the vessel prior to the 8th January, 1979.

(13) Possible causes of the disaster (Chapter 17)

The Tribunal is satisfied that the casualty did not occur as a result of the ignition either on the ship or on the jetty of flammable vapours emanating from the ship's tanks or from a possible overflow of oil from the ship's tanks. It is satisfied that it did not occur because of any careless act of a member of the crew of the "Donemark", or by sabotage. The possibility that it may have been caused by smoking by a member of the crew of the "Betelgeuse" or of the jetty is so remote that it can be ignored.

(14) Possible causes of the disaster—a fire on the jetty (Chapter 18)

The initiating event of the disaster could not have been the ignition of flammable vapours from either the slop tank on the jetty or from the slop tank pit on the jetty.

All the evidence, both technical and that of the eye-witnesses, points to the fact that the initial fire which was present during the first phase of the disaster took place on the ship and not on the jetty.

This evidence is corroborated by the fact that some members of the crew of the "Betelgeuse" escaped from the ship on to Dolphin 22. It is highly unlikely that they would have sought refuge on the jetty had there been a fire on it.

The Tribunal is also quite satisfied that the initiating event of the disaster was not oil spilled on the ship due to a broken Chiksan arm. The initiating event occurred on the ship and not on the jetty.

(15) Conclusions on the hull failure theory and the ship's ballast at the time of the disaster (Chapter 19)

This theory of the cause of the disaster suggests that excessive compressive stresses were set up at deck and sheer-strake level owing to the manner in which the ship was ballasted, and that the ship longitudinals at deck and sheer-strake level buckled, leading progressively to a total failure of the hull. In considering this possible cause of the disaster, the Tribunal firstly considered the stresses to which the vessel was subjected at the time of the disaster. The amount of Arabian Light crude on board at the time was known, and the main inquiry centred on the amount of ballast taken on board on the 7th/8th January. The ship had the port and starboard PBTs available for ballast, and as the Arabian Heavy crude had been discharged it had available tanks 1 across and tanks 6 across and the centre tanks 2 to 5; it was quite clear that the fore peak and forward deep tanks were not ballasted.

The Tribunal concluded that ballasting of the PBTs began at approximately 11.30 hours on the 7th January and that they probably were ballasted to sea-level only. Ballasting of the centre tanks began at about 18.35 hours on the 7th January. All the ballast taken on was put into Nos. 2-5 centre tanks, and they were about 90% full at 00.30 hours on the 8th January. The No. 6 centre tank was empty—apart from the line flushings, which had no significance for the stress calculations; No. 6 wing tanks were empty and all the No. 1 tanks were empty.

The amount of ballast taken on and its distribution in the PBTs and the Nos. 2-5 centre tanks created sagging conditions in the centre of the vessel and set up very large stresses amidships, where, in fact, the first failure of the vessel's hull occurred.

(16) Conclusions on the hull failure theory—the mechanism of failure (Chapter 20)

(a) The vessel was badly corroded and both the plating and longitudinals were in places very badly wasted. The stresses which were set up were well above the critical buckling stress limits of some of the deck and side-shell longitudinals in the PBTs. Some of these buckled and were torn from their welding. This led to a weakening of the deck and side-shell plating, which in turn buckled, and a progressive failure of the hull developed.

(b) The buckling process caused gas from the No. 3 wing tanks or from the No. 4 centre tank to enter the PBTs. An explosive mixture in these tanks was ignited by

incendive sparks created in the buckling of the longitudinals. Vented explosions in both PBTs occurred in the very early stages of the disaster. They were not very loud. They combined with the tensile force which had been set up by the failure of the hull and resulted in fractures of the bottom plates of the vessel. The initial break in the vessel was at frame 77½.

- (c) The initial break caused the vessel to sink below sea-level at a point not far forward of the manifold. Flammable vapour from oil which escaped from the No. 3 wing tanks was ignited and caused the fire which was seen amidships by the witnesses around the bay. Large quantities of oil escaped on either side of the vessel, and this became ignited at 00.40 hours, and was the beginning of the second phase of the disaster as observed by the eye-witnesses.
- (d) When the vessel broke its back originally it caused the fire-main on the deck of the ship to fracture and as a result the crew were unable to fight the fire from the monitors on the main deck. The fire amidships caused large quantities of smoke to cross the centre platform and caused its evacuation by the jetty crew and inhibited the use of the jetty's fire-fighting equipment at the centre platform.
- (e) The fire developed on the sea and on the vessel and at 01.06-01.08 hours a massive explosion took place in the No. 6 tanks and the No. 5 centre tank.

(17) Conclusions on the responsibility for the disaster (Chapter 21)

- (a) The seriously weakened hull of the vessel was the result of deliberate decisions taken at different times by the management of Total. In particular, deliberate decisions were taken not to renew certain of the vessel's longitudinals and not to renew the ship's cathodic protection at the time of its last major dry dock in the summer of 1977. Neither the Master nor the Chief Officer could have been aware on the night of the disaster how seriously weakened the vessel was. They were, however, responsible for the manner in which ballasting was carried out. Had the vessel been properly maintained it is probable that its structure would not have failed, but the decisions taken resulted in very large stresses being placed on the centre of the ship and the Master and Chief Officer should have been aware that potentially dangerous sagging conditions could result. Had Total supplied the ship with a loadicator—as it should have—the ballasting error would not have been made. The major share of the responsibility for the loss of the ship must lie on the management of Total.
- (b) Had the dispatcher in the Control Room observed the initiation of the disaster it is probable that the lives of both the jetty crew and those on board the ship would have been saved.
- (c) Had Gulf maintained the stand-by tug close to, and in sight of, the Jetty, it is probable that, notwithstanding the absence from the Control Room of the dispatcher on the night of the disaster, the lives of the jetty crew and those on board the vessel would have been saved.
- (d) Had Gulf supplied suitable escape craft at the jetty it is probable that, notwithstanding the absence from the Control Room of the dispatcher and notwithstanding the absence of the stand-by tug from the vicinity of the jetty, the lives of the jetty crew and those on board the vessel would have been saved.
- (e) Had access to the sea from Dolphin 1 been maintained and had the jetty crew been properly trained in emergency procedures so that they would run up-wind of a fire, then it is possible—but no certain conclusions on this point can be arrived at—that the jetty crew on the centre platform would have been saved.
- (f) Had the decision to discontinue the automatically pressurised fire-main not been

taken it is possible—but again no certain conclusions on this point can be arrived at—that the jetty crew might have been able to contain the fire from the eastern breasting dolphin so that it would not develop in the manner in which it did and so as to permit the rescue of the jetty crew and those on board the vessel by the “Donemark” and the “Snavé”.

- (g) Had the alert been raised at the beginning of the disaster or had the stand-by tug been closer to the jetty, it is probable that the fire would have been contained and that the contents of No. 5 wing tanks (as well as those in No. 2 wing tanks which were saved) would have been saved.
- (h) Had the tug been moored in sight of the jetty and close to it, it would have been able to contain the fire and probably extinguish it before it spread on either side of the ship, and it would then have been able to remove the ship from the jetty. The damage to the jetty would then have been minimal in comparison to that which it, in fact, suffered.

(18) Conclusions on the role of the public authorities (Chapter 22)

- (a) The failure to establish a Harbour Authority with jurisdiction over Whiddy Island meant that Gulf itself was responsible for drafting bye-laws under the Petroleum Act, 1881, which would make provision for the safe handling of petroleum products and which would have to be approved by the Minister. This was a highly anomalous situation and contributed to the fact that no bye-laws were ever made under the Act of 1881. After a decision was announced in 1972 that safety regulations would be made under the Dangerous Substances Act, 1972, considerable delays occurred and no Regulations had been made under that Act before the disaster in January, 1979.
- (b) The failure to establish bye-laws under the provisions of the Petroleum Act, 1881, or to introduce regulations under the Dangerous Substances Act, 1972, had serious consequences. The statutory obligations placed on Gulf in relation to the maintenance of proper safety measures and standards and the provision of effective fire-fighting systems (particularly in relation to the position of the duty tug) were wholly inadequate. There was a correspondingly inadequate requirement on the public authorities, both at government and local level, to supervise and inspect the safety measures and fire-fighting systems at the terminal. Such supervisory functions as were imposed by law on the public authorities were properly carried out by the officials responsible for fulfilling them.
- (c) In Chapter 12 it is pointed out that modifications were made in the fire-fighting system which was originally introduced at the terminal which had the effect of down-grading it (see: Section 3 of Chapter 12); that inadequate consideration was given to the means of escape from the offshore jetty (see: paragraph 12.5.2); that the pressurisation system in the personnel building on the jetty was undesirable (see: paragraph 12.6.5); that breaches of the hazardous area classification of the jetty had occurred (see: section 6 of Chapter 12); that standards of maintenance of important equipment had been lowered (see: paragraph 12.9.5). In Chapter 13 the evidence relating to the mooring of the duty tug is considered and it is concluded that the alteration in its position seriously weakened the emergency service to the jetty (see: paragraph 13.7.1). Furthermore, Gulf’s “Policy and Procedures” Manual was seriously inaccurate in relation to the role of the tugs in an emergency and the classification of hazardous areas at the jetty.

Had the Dangerous Substances (Oil Jetties) Regulations, 1979, been in force prior to the disaster it is very likely that at least some of these deficiencies would not have occurred, or, if they had, that they would have been observed by a Departmental inspection and remedied.

- (d) A highly anomalous legal situation existed in that the jurisdiction of the Cork

County Council both as a planning authority and as a fire brigade authority did not extend to the offshore jetty at the terminal; its jurisdiction ended at low water mark at the Island. This legal situation, however, was in practice not relied on by Gulf. Gulf did not seek permission in relation to alterations in the personnel building on the jetty because it did not occur to it that permission might be necessary.

- (e) The Cork County Council could not reasonably be expected to know of the changes in the personnel building on the jetty or in the alterations to the escape routes from the jetty, or of the changes in the fire-fighting systems. Both from the correspondence it had with Gulf and from the "Policy and Procedures" Manual which was forwarded to it, it was entitled to have assumed that no changes in the position of the tugs' moorings had occurred.

(19) **Recommendations**

The Tribunal's Recommendations are contained in Chapter 23.

(20) **Costs**

The Tribunal's conclusions on the question of the costs of the Inquiry are given in Chapter 24.