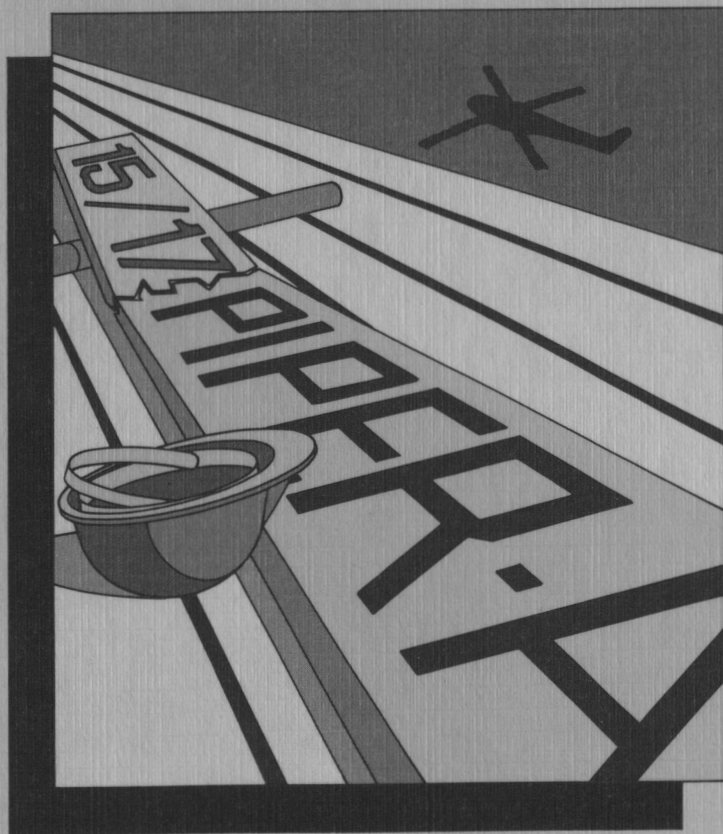


Piper Alpha

Lessons for Life-cycle Safety Management



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Piper Alpha – Lessons for Life-cycle Safety Management

A two-day symposium organised by the Institution of Chemical Engineers and held at the Tara Hotel, London, 26–27 September 1990.

Organising Committee

| | |
|-----------------------|--|
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INSTITUTION OF CHEMICAL ENGINEERS

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Preface

This symposium will be held before the issue of Lord Cullen's Report into the Piper Alpha Disaster of July 1988. Although this may have restricted the scope of the papers, it is hoped that their contents and the discussion that will be generated will help you to understand the issues which will be raised in the final report. For many reasons I would like to think that the main theme of this symposium is LEARNING as it was on the night of 6th July 1988 when the Institution of Chemical Engineers held a meeting entitled "Teaching Safety to the Teachers".

It is unfortunate that society seems to need major events to remind it of its duty and the continuing need for attention to safety. Let us hope we will all learn from both this symposium and the Cullen Report and not forget the need for diligence in the future.

I would like to thank all of our Presenters and Session Chair Persons; without their efforts there would be no symposium. I would like to welcome all our delegates and more particularly those who have travelled from abroad.

Welcome, Learn, Participate and Enjoy the discussion.

F. Crawley
(Chairman)

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Causation

The symposium will be held before the issue of Lord Cullen's report into the Piper Alpha Disaster of July 1988. Although this may have restricted the scope of the paper, it is hoped that the paper contents and the discussion that will be presented will help you to understand the issues which will be raised in the final report. For many reasons I would like to think that the main theme of this symposium is LEARNING as it was on this morning on July 1988 when the explosion of Chemical Engineering had a meeting which was held at the University of Leeds.

It is important that society seems to need major events to remind it of its duty and the continuing need for attention. Papers in this book will illustrate from both the symposium and the Piper Alpha report that the need for diligence in the future. Catlin (*British Gas plc, UK*)

I would like to thank all of our speakers and session Chair persons for their efforts. There would be no symposium if it were not for those who have travelled from abroad.

The application of risk assessment to existing installations. Welcome! Join in the discussion.

The Norwegian regulations concerning risk assessment and their implications in emergency planning. I. E. Aarstad (*Norwegian Petroleum Directorate, Norway*)

The role of HAZOPs in getting it right first time. D. A. Lihou (*University of Strathclyde, UK*)

An investigation of the mitigation of gas cloud explosions by water sprays. M. R. Acton, P. Sutton and M. J. Wickens (*British Gas plc, UK*)

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HYDRATES, - THE START OF A CHAIN REACTION LEADING TO THE PIPER ALPHA DISASTER?

Hans K. Johnsen, Gen.Mgr. PETRECO A/S, Norway.

At a certain time point, Cremer & Warner, the technical adviser to the Inquiry, had constructed several possible scenarios linking hydrates to process upsets or hydrocarbon leakage.

PETRECO evaluated these scenarios and performed relevant laboratory tests to minimize the number of likely scenarios and produce more detailed insight into the physical behaviour of hydrates in a few of the scenarios.

SUMMARY

From evidence given by survivors of the Piper Alpha disaster as well as the technical evidence collected or produced during the following public inquiry, it is very possible that Hydrates played a major role as an initiator of the Disaster.

Hydrates, in this context, means a solid substance formed by water and light hydrocarbon molecules at elevated pressures and temperatures well above normal freezing conditions for water.

Hydrates in general pose a threat to hydrocarbon process systems due to the fact that they are solid materials within systems essentially designed for fluids.

On Piper Alpha they had just a few days ahead of the disaster, altered the normal process to perform maintenance on equipment for removing water from the produced condensate stream. This would imply that there was a good possibility of hydrate formation within certain parts of the process. Subsequently there were actions taken to prevent this formation by injection of considerable quantities of hydrate inhibitor, e.g. Methanol. Certain parts of the evidence however, suggests that the amount of inhibitor not was sufficient for extended periods of time.

To investigate the behaviour of process fluids under physical conditions as given in evidence, a series of physical laboratory simulations were performed by PETRECO. These involved forming and observing hydrates in a test facility using correctly composed fluids as well as actual process conditions such as temperature, pressure and flow.