

Assuming a break in the D6 brace - wouldn't the other five intact braces be sufficient to ensure that the rig did not lose the D leg?

The Norwegian Commission claims that the break in the D6 brace immediately led to the collapse of the other five braces.

"The final fracture of brace D-6 occurred within 0.001 to 0.01 seconds. Thereby, the remaining intact structural components were subjected to an almost instantaneous additional load." ⁷⁹

Neither the Norwegian nor the French Commission has assessed whether there may have been a break in one or more other braces before the D6 brace broke off. Since all witnesses experienced a rapid collapse of the D leg, it is assumed that the five remaining braces did not have the residual strength to prevent an immediate collapse. Two of the alternative theories – explosion in the D4 brace and rupture in the DE brace – imply that it was the collapse of two braces that led to the collapse of the four remaining braces. There is obviously a need for specific scientific calculations that can confirm or deny that a break in one brace led to the immediate collapse of the entire structure.

If one of the other braces had already broken, it is more understandable that the D6 break led to a rapid and complete collapse.

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In what order did the braces collapse?

Many of those affected ask questions about the causes of the accident. The Office of the National Auditor demonstrated in its report from 2021 that many bereaved and survivors have little confidence in the answers from the Norwegian Commission. Several alternative theories have been put forward about the causes of the accident, and it is important to try to clarify as much as possible.

The sequence of fractures can clarify whether the explosion theory, which assumes that the first fracture was in the brace D4, can be rejected or confirmed. The same applies to the theory that brace D-E was the first breach (see chapter 9).

⁷⁹ NOU 11:1983, p 58

The Kielland Network has been concerned that a technical analysis of the breach order must be carried out. This is necessary in order to be able to give a more reliable answer to the question. The Documentation Project at the Oil Museum continues to work on this.

It shouldn't be too difficult to find an answer to this question. All brace breaches are documented, photographed and measured. It will require independent experts to analyze the breaches. Modern computer simulations should be able to provide good answers.

The Norwegian Commission writes:

“Available information indicates that failure of the braces D-3 and D-4 probably followed the failure of brace D-6. The overloading of D-3 and D-4 occurred in axial tension and bending, respectively; and axial pressure and bending. At about the same time, brace D-E suffered a significant crack near the D leg.”⁸⁰

After the turning operation in 1983, the Kielland Foundation's technical advisers believed that the D4 brace broke first, as a result of an explosion. Since the D6 brace was already weakened, it quickly broke off, followed by the other braces.

The French Expert Commission agrees with the Norwegian Commission that the breach in D6 came first. While the Norwegian Commission believes that the D4 brace was breach number two or three, the French believe that the D4 brace was the last breach. But none of the Commissions presents theoretical calculations or analyzes that can substantiate these assumptions.

There is also a theory that the D-E brace broke first – and before the 27th of March. This is supported, among other things, by a witness observation, where crane operator Leif Reve believed he observed that the D leg was in a different position in the time before the accident. We will return to this in a later chapter.

Tilting to 180° - open doors

After around 20 minutes, the rig suddenly overturned completely, with fatal consequences for many who had survived the first phase.

⁸⁰ NOU 11:1981, p 58

Could this have been avoided? Would our brother or son or father be alive today if the rig had been lying on its side for more than 20 minutes? No answer can change the reality. Good answers will not bring them back. But for those who have lost their loved ones, it is important to know as much as possible, to know what is true, and what has been covered up and tried to be kept hidden.

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- What effect did water ingress into the E leg have on stability?

- Why was the door to the pump room E leg open?

- Was the opening of the door to the E leg – and the rubber stopper in the control panel – connected to the work carried out by the two welders unknown to the crew?

- When and with what justification was the rubber plug that turned off the alarm installed?

- Without water ingress into the E leg, how long is it likely that the rig would have been left with a 35° tack?

- If the deck openings had been closed in accordance with the regulations, how long is it likely that the rig would have been left with a 35° tack?

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Why are these important questions? If the rig had stayed longer without overturning completely, many more of the oil workers would have survived. That is why the questions are important.

When the rig tilted to 35°, it was the E leg that positioned deepest in the water. The door to the tower house was locked in an open position, and the water flowed in. With the doors closed, the E leg, together with closed doors in the deck structure, would be an important floating element.

The Norwegian Commission has indicated in a table that the door to the tower house was closed. *"Door pillar shaft closed."*⁸¹ The diving film from *Blom's Survey* in April 1980 clearly shows that the door was open. It also shows that a fire hose has been pulled through the

⁸¹ NOU 11:1981, table 3.5.1, p 249

doorway. The Norwegian Commission believes that this hose was inserted into the doorway after the accident to pump air into the E leg.

"However, under any circumstances, the Commission believes that it can be ruled out that the fire hose was placed there before the accident." ⁸²

Jan-Egil Pettersen was dive supervisor in April 1980. He firmly rejects the Commission's claim.

"- What type of hose did you use to fill with air?

- Compressor hoses from an air compressor.

- So, you did not under any circumstances use fire hoses as the Commission of inquiry suggests?

- No, no. They would have been squeezed completely flat, says Pettersen." ⁸³

When the doors to one or more of the five legs are open, the alarm goes off in the control room. The manual stated that these doors should never be left open in open sea. A separate push button had to be held down to make the alarm stop sounding. Therefore, they settled for a rubber stopper. The Norwegian Commission confirms this in its additional statement from 1983: *"After the turning operation it has been possible to establish that the alarm had been disabled by the stop button being pressed in and held in place by a rubber stopper."* ⁸⁴

The new control room operator Magne Sildelid arrived at Kielland for the first time just a few hours before the accident. He had no experience with oil rigs at all, but as an experienced naval officer he reacted to cables going through the storm doors. He had to step over gas lines and electric cables. In his world, blocking storm doors was taboo. He also saw a lot of cargo on deck, pipes and other drilling equipment, heavy underwater equipment, oil drums, gas cylinders, containers and wire coils. Everything was loose. ⁸⁵ Reference is also made here to the questions 9-13.

Loose drilling equipment, welding on the structure, open doors to the deck and the E leg - all this confirms one of the French Commission's main points: Incorrect and irresponsible operation of the rig over time was one of the triggering causes of the disaster.

⁸² NOU 53:1983, p 11

⁸³ Aftenbladet 8.3.2021

⁸⁴ NOU 53:1983 p 10

⁸⁵ Skretting, *Alexander Kielland*, p 16-17

The Norwegian Commission also does not correct the allegation of a closed door to the E leg, when they inspected the rig after it was turned. And in their report, the French experts accept the Norwegian Commission's claims about a closed door at the top of the E leg.

As we have seen, the Commission obtained a stability assessment from Professor Dr.Eng. Emil Aall Dahle. He stated at the Kielland Network conference in May 2017 that the platform *"lay stable and fine at 35 degrees"*, but that the open doors led into large rooms. Two of them accounted for 70% of the water inflow. *"The open doors broke the stability of the rig. Several doors on the platform were permanently open, which was against the regulations."*⁸⁶ Would closed doors have prevented the second phase of the disaster, where the rig completely overturned? *"If the deckhouse had been closed, it would have been enough to hold the platform and postpone the capsize."* Aall Dahle estimates that the capsize could have been delayed for an hour or more.

The French report agrees with Aall Dahle and estimates that the rig would have remained in a "stable lateral position" for at least two hours, perhaps longer. This would undoubtedly have led to many more workers surviving. Reference is made here to question 7, which touches on the same topic.

Many object to the term "stable lateral bearing" being used. That's understandable. But it must be stated that the Norwegian and French Commissions agree on this use of the term.

The official Norwegian investigation report supports Aall Dahle's view that the disaster could have been avoided:

"... The breaking away of the D leg did not need to have led to a disaster. Had the platform, after the loss of one of the main elements, had sufficient ability to remain afloat in a stable position, at least for a little longer than was the case, the accident would still have had a limited scope", states the Commission of inquiry.⁸⁷ I

understand that the course of the disaster is described as two different phases. But when we know that many workers were killed already in the first phase, it becomes completely unreasonable to describe this as anything other than what it was: the first phase of the disaster.

⁸⁶ Kielland conference report 2017, p 12-13

⁸⁷ Aftenbladet «Secret Kielland report», 2.12.2018

But why was the door to the E leg open?

Here too, we are not informed by Stavanger Drilling's archives, and we are again referred to Phillips and Veritas' closed archives.

It is reasonable to assume that the door was open because work was being done on the brace structure and in the E leg. By all accounts, there had been welders inside the E leg only a short time before the accident. The fire hose that was detected may have been a safety measure for the welders.

We know that the doors to the C-leg and the E leg were open. The only possible reason for this was that there was work going on down in the legs - work which, by all accounts, was connected to the conversion of the rig from residential to drilling rig. Several of the mobilized welders may have had assignments in this context.

Stavanger Drilling's cleansed archives do not provide information. Again, we are referred to two private companies that have not given access to the archives: Phillips and Veritas.

The **Office of the National Auditor** comments on the rapid turning operation in its report. The Norwegian Commission concluded that the stability of the platform during normal operation was good. The Office of the National Auditor refers to the Commission's assessment:

“However, due to damage to the doors and hatches during the accident and the attempts to turn around, it was not possible to determine with certainty whether they were open or closed at the time of the accident. This applied to doors and hatches in the platform legs, which, according to the Commission, were not of significant importance for how quickly the platform was filled with water.”⁸⁸

Here we could have expected a more critical approach from the Office of the National Auditor. The rig was turned, facilitating physical inspection that would secure more certain knowledge of which doors were open. That the door to the E leg was open before the accident is evident from three factors.

Firstly, there is visible damage to the door frame.

⁸⁸ National Audit Report, p 140

Secondly, the tower house walls here have not been pushed in by the water pressure, as is the case with the tower house walls where the doors were properly closed.

And thirdly, a fire hose was - as we have seen - pulled through the door before the accident. The Office of the National Auditor writes that there *"is still uncertainty about the conditions mentioned above. These are questions to which it is not possible to get certain answers today."*⁸⁹ On the contrary, I would like to state that there are already clear answers here: The Commission was wrong.

The only unresolved question is whether somebody misinformed the Commission to cover up the facts. More thorough studies of all photos and films of doors and openings after the turning operation in 1983 will also be able to provide an even greater degree of security.

Where were the Police?

Open safety doors in open sea and in bad weather. One must ask: Why were these facts not reported to the Police - or followed up by the Police themselves? Here we are talking about obvious violations of basic safety rules. The Commission "was aware" of this, without reacting.

Both the Commission and the Police were and are public bodies, and the Office of the National Auditor was set out to review the authorities' handling of the accident. Why is this not properly done by the Office of the National Auditor?

Did the closing of the alarm occur regularly? Or was this linked to necessary inspections in the legs? The surviving crew members must here be invited to elucidate the question in more detail.

An additional question must also be asked here: How deep was Kielland when the accident happened? The Norwegian Commission believes it was at depth 21.5 metres, which would also be in accordance with the technical manual. Several photos of Kielland when it was connected to the Edda platform may indicate that it was higher in the water, perhaps at 17-18 metres. This was a more comfortable depth if you wanted to ensure that the footbridge was approximately horizontal.

⁸⁹ National Audit Report, p 140

The difference in depth means a lot for where the center of gravity was. If it lay deep in the water, the center of gravity would be correspondingly lower. When it lost the D leg, the bank angle would be lower with a lower center of gravity. In short, it would have remained longer in a "stable lateral position" with a lower angle of inclination.

Neither the Norwegian nor the French Commission have raised this question.