EXECUTIVE SUMMARY

The Deepwater Horizon disaster of April 20, 2010, resulted from a catastrophic failure to properly interpret a critical safety test—the negative pressure test. This test was designed to verify well integrity by confirming that the cement and mechanical barriers could withstand pressure differentials that would occur during temporary abandonment operations. The investigation reveals that despite clear indications of well integrity failure during the negative pressure test, BP and Transocean personnel incorrectly deemed the test successful and proceeded with operations that placed the well in an underbalanced condition.

The misinterpretation of the negative pressure test directly caused the blowout by allowing operations to continue despite compromised well integrity. The test showed anomalous pressure readings of 1,400 psi on the drill pipe while 0 psi was observed on the kill line—a clear indication that hydrocarbons were entering the wellbore. Instead of recognizing this as a failed test, personnel accepted an implausible "bladder effect" explanation with no technical basis. This misinterpretation represents a gross departure from industry standards and good oilfield practice. Had the test been properly interpreted, remedial actions could have been taken that would have prevented the blowout, the tragic loss of eleven lives, and the subsequent environmental disaster.

The evidence demonstrates multiple violations of regulatory requirements and industry standards. BP failed to provide detailed written procedures for the negative pressure test, a safety-critical operation. Both BP and Transocean failed to ensure proper training and supervision of personnel conducting the test. The investigation reveals a pattern of decisions that consistently prioritized operational expediency over safety, including last-minute changes to temporary abandonment procedures without adequate risk assessment. These actions constitute negligence and, in some instances, rise to the level of gross negligence given the catastrophic consequences that resulted from the failure to properly conduct and interpret this critical safety test.

TECHNICAL BACKGROUND

Negative Pressure Test Definition and Purpose

A negative pressure test is a critical safety procedure designed to verify well integrity by simulating the conditions that will exist when the well is temporarily abandoned. The test involves removing heavy drilling mud from the wellbore and replacing it with lighter seawater, creating an underbalanced condition where the pressure inside the well is less than the pressure of the formation fluids outside the well. This deliberately creates a pressure differential that would allow hydrocarbons to flow into the well if any barriers (such as cement or mechanical seals) have failed. In simple terms, the test deliberately creates conditions that would cause the well to flow if there are any leaks, allowing operators to detect problems while the blowout preventer is still connected and operational.

For the Macondo well, this test was particularly critical because the well was to be temporarily abandoned with the heavy drilling mud removed and replaced with seawater. The test was the last opportunity to verify that the cement job and mechanical barriers could withstand the pressure from the hydrocarbon-bearing formations before the rig disconnected from the well. The Macondo well had experienced drilling complications, including lost circulation events, and had been described by some personnel as the "well from hell," making the integrity of the barriers especially important.

Successful vs. Failed Test Indicators

A successful negative pressure test would show:

Zero pressure on the drill pipe after **bleeding** pressure down

- No flow or minimal, explainable flow when the well is opened
- Consistent pressure readings between the drill pipe and kill line (both should read zero)
- Stable conditions maintained over the monitoring period (typically 30 minutes)

A failed negative pressure test would show:

- Pressure building back up on the drill pipe after bleeding it down
- Unexplained flow when the well is opened
- Inconsistent pressure readings between the drill pipe and kill line
- Inability to maintain stable zero pressure conditions

For the Macondo well, the expected outcome of a successful test would have been 0 psi on both the drill pipe and kill line. Instead, the test showed 1,400 psi on the drill pipe while the kill line showed 0 psi—a clear indication of failure. Additionally, when the drill pipe was bled down, approximately 15 barrels of fluid returned, significantly more than the 3.5 barrels that calculations indicated should have returned if the well was secure.

CHRONOLOGY OF EVENTS

Evolution of Temporary Abandonment Plans

BP's temporary abandonment plans for the Macondo well underwent multiple revisions in the days leading up to the disaster:

April 12, 2010: Initial plan called for setting the cement plug in seawater less than 1,000 feet below the mud line after setting the lockdown sleeve.

April 14, 2010: Plan revised to set the cement plug in mud before displacing the riser with seawater.

April 16, 2010: BP submitted an Application for Permit to Modify (APM) to MMS for the Macondo well temporary abandonment, which stipulated that the negative pressure test should be conducted by monitoring the kill line.

April 20, 2010 (morning): Plan changed to remove 3,300 feet of mud from below the mud line and set the cement plug after the riser had been displaced to seawater.

April 20, 2010 (final version): The "Ops Note" finalized the procedure, calling for displacement to seawater before setting the cement plug at a depth of 3,000 feet below the wellhead. This depth was determined by the need to have sufficient weight from drill pipe below the running tool to install the lockdown sleeve.

These changes, particularly the decision to displace the well to seawater before setting the cement plug, significantly increased risk by removing the hydrostatic pressure provided by the heavy drilling mud earlier in the abandonment process.

April 20, 2010 Negative Pressure Test Timeline

15:00 - Preparations for the negative pressure test began.

16:53 - Pumped spacer (a mixture of lost circulation materials FORM-A-SET and FORM-A-SQUEEZE) followed by seawater to displace mud.

16:54 - Closed the annular preventer on the BOP.

16:58-17:27 - Prepared for the negative pressure test. The annular preventer initially failed to seal properly, allowing spacer to leak below it. After increasing the closing pressure, an effective seal was established. The drill pipe pressure of 1,260 psi was bled off, resulting in approximately 15 barrels of fluid returns (calculations indicated only 3.5 barrels should have been expected).

17:27-18:00 - Continued the negative pressure test. The drill pipe was monitored for flow.

18:00-18:35 - The drill pipe pressure increased from approximately 50 psi to 1,400 psi while shut in.

18:35-19:55 - The test was shifted to the kill line at the well site leader's instruction. After bleeding the kill line, 0.2 barrels flowed, and no further flow was observed during a 30-minute monitoring period. However, the drill pipe pressure remained constant at 1,400 psi.

19:55 - Despite the anomalous pressure readings (1,400 psi on drill pipe, 0 psi on kill line), the test was deemed successful after discussion between BP well site leaders and Transocean personnel. The explanation offered was a phenomenon referred to as "annular compression" or "bladder effect," which has no technical basis.

20:00 - The annular preventer was opened, and the crew began displacing the riser with seawater, placing the well in an underbalanced condition.

20:52 - According to modeling, this is approximately when the well began to flow on its own. Coincidentally, at this time, BP Well Site Leader Don Vidrine called BP shore-based engineer Mark Hafle to discuss the upcoming surface cement plug. During this call, Vidrine mentioned the pressure differential observed during the negative test. Hafle reportedly stated, "you can't have pressure on the drill pipe and zero pressure on the kill line in a test that is properly lined up," but no action was taken to reassess the test.

21:08 - Analysis of fluid volumes shows an approximate gain of 39 barrels, indicating hydrocarbon influx, but this was not detected by the crew.

21:40-21:49 - First well control actions taken after hydrocarbons had already entered the riser.

21:49 - Explosion occurred.

PROCEDURAL FAILURES

Missing or Inadequate Written Procedures

The investigation revealed a critical absence of detailed written procedures for conducting the negative pressure test at the Macondo well:

1. BP did not provide a detailed, engineered procedure for how the negative pressure test was to be performed for the specific situation (deepwater, lock down sleeve not installed, testing seal assembly and float/cement in shoe track simultaneously, multiple fluid densities in the well, temperature effects).
2. The guidelines provided by BP for the negative pressure test were broad operational guidelines that did not specify expected bleed volumes or success/failure criteria. This placed higher reliance on the competency and leadership skills of the BP and Transocean personnel.
3. BP Well Site Leader Don Vidrine stated that there was "no standard procedure on how to do these…leave to rig on how to do procedure."

4. John Guide, BP Wells Team Leader, acknowledged in testimony that there was no written procedure for the negative pressure test.

5. The Task Specific THINK Procedure (TSTP) for BOP testing on the Deepwater Horizon was printed out but left on a desk in the Subsea office during testing and was not reviewed by anyone involved in the task.

Comparison to Industry Best Practices

Industry best practices for negative pressure tests include:

1. Detailed written procedures specific to the well conditions
2. Clear success/failure criteria
3. Contingency plans for failed tests
4. Risk assessments for safety-critical operations

BP's approach deviated significantly from these practices. According to expert testimony, a detailed written negative pressure test procedure with risk assessment and mitigation decision trees would have:

1. Prevented the displacement of the spacer during the negative test, which complicated interpretation
2. Encouraged more thorough investigation of anomalous readings
3. Ensured proper verification that the kill line was not plugged and that spacer was displaced above the BOP

Regulatory Violations

The investigation identified violations of the following regulatory requirements:

1. 30 C.F.R. § 250.401 - Requires operators to take necessary precautions to keep the well under control at all times
2. 30 C.F.R. § 250.420 - Requires operators to follow sound engineering practices
3. 30 C.F.R. § 250.428 - Requires remedial action when cement job is inadequate

Additionally, BP's Application for Permit to Modify (APM) to MMS stipulated that the negative pressure test should be conducted by monitoring the kill line. However, the test was initially conducted on the drill pipe, contrary to the approved permit.

Expert Testimony on Procedural Inadequacy

Multiple experts have testified that the procedures were grossly inadequate:

1. Dr. John Smith, a well control expert, stated that the negative pressure test was "a gross and extreme departure from the standards of good oil field practice."

2. Pat O'Bryan, BP's Vice President of Drilling and Completions in the Gulf of Mexico, expressed frustration with the "bladder effect" explanation, indicating it was "silly" to rely on such an explanation to justify that the negative test was good when it was not.

3. Expert witness Steve Heenan testified: "The negative test was a safety critical test and the last diagnostic test of the integrity of the well prior to placing it into an underbalanced situation in which hydrocarbons could flow into the wellbore. The conclusion of both BP and

Transocean personnel that the negative-pressure test was successful lacked any justification based on basic principles of well control or physics."

TEST EXECUTION AND INTERPRETATION FAILURES

Anomalous Readings and Their Significance

The negative pressure test conducted on April 20, 2010, produced several clear anomalous readings that should have been recognized as indicators of a failed test:

1. Drill pipe pressure of 1,400 psi while the kill line showed 0 psi - This fundamental inconsistency violated basic principles of fluid mechanics. If the well was secure and properly lined up, pressures throughout the connected system should have equalized.
2. Excessive fluid returns - When the drill pipe pressure was bled down from 1,260 psi, approximately 15 barrels of fluid returned. Calculations indicated that only about 3.5 barrels should have been expected if the well was secure. This excess flow, with the well in an underbalanced condition, was a clear indication of communication with the reservoir through failed barriers.
3. Pressure rebuilding - After bleeding the drill pipe pressure down to approximately 50 psi, the pressure increased to 1,400 psi over a 35-minute period (from 18:00 to 18:35 hours). This pressure build-up was a classic sign of fluid influx from the formation.
4. Inconsistent test results - The test on the kill line showed no flow after an initial 0.2 barrels, while the drill pipe maintained 1,400 psi. This inconsistency should have prompted further investigation rather than acceptance.

The "Bladder Effect" Explanation

When confronted with the anomalous pressure readings, the toolpusher proposed that the pressure on the drill pipe was caused by a phenomenon referred to as "annular compression" or "bladder effect." This explanation was accepted by both BP and Transocean personnel without proper verification.

Expert testimony has unanimously rejected the validity of this explanation:

1. BP's investigation team could find no evidence that this pressure effect exists.
2. BP Vice President Pat O'Bryan expressed his frustration with this explanation by inserting 560 question marks in an email, stating it was "silly" to rely on such an explanation.
3. Expert Steve Cowie stated: "I couldn't understand the physics behind it" and "We couldn't find anyone that was familiar with bladder effect as an explanation for pressure differential during a negative pressure test."
4. The Chief Counsel's team concluded: "There is no such thing as a 'bladder effect' that could account for the pressures the rig crew was observing. There was no apparent explanation for the 1400 psi on the drill pipe other than that the well was flowing."

Personnel Acknowledgment of Problems

Despite recognizing anomalies, personnel proceeded with operations:

1. BP Well Site Leader Don Vidrine called BP shore-based engineer Mark Hafle at 20:52 hours to discuss the upcoming cement plug. During this conversation, Vidrine mentioned that "the crew had zero pressure on the kill line, but that they still had pressure on the drill pipe." Hafle responded, "you can't have pressure on the drill pipe and zero pressure on the kill line in a test that is properly lined up." Despite this acknowledgment of the inconsistency, no action was taken to reassess the test.
2. According to BP's James Dupree, Senior Vice President for the Gulf of Mexico, the test result was "not satisfactory" and "inconclusive" with "significant pressure discrepancies recorded."
3. BP Well Site Leader Bob Kaluza noted in an email that they "decided we would do the displacement and the negative test together. Don't know why. Maybe trying to save time."

The decision to accept the negative pressure test as successful despite these clear warning signs represents a catastrophic failure in judgment that directly led to the blowout. Had any of the involved personnel insisted on resolving the pressure anomalies before proceeding, the disaster could have been averted.

ORGANIZATIONAL FAILURES

Management Structure and Reorganization

BP's management structure for the Macondo well project exhibited several critical weaknesses:

1. Engineering Team Leadership: The Macondo Engineering Team Leader was unclear about roles and responsibilities during the execution phase. When asked during an interview who was responsible for designing or amending the temporary abandonment procedures, he stated he would need to look at the company's chart of roles and responsibilities.
2. Drilling Engineer Experience: Brian Morel was relatively new to drilling engineering and BP. He was assigned to the exploration team in 2008 and had helped plan only two wells before being transferred to Macondo. In contrast, Mark Hafle, the senior drilling engineer, had been involved with deepwater drilling since 1993 and had personally been involved in between 20 and 50 wells. However, Hafle was on vacation during much of the week leading up to the blowout.
3. Well Site Leadership: Bob Kaluza was on his first hitch as a Well Site Leader on the Deepwater Horizon and was not fully familiar with the rig's procedures. Don Vidrine, the other Well Site Leader, was more experienced but failed to consult with onshore engineering when anomalous test results were observed.
4. Workload Issues: Both John Guide (Wells Team Leader) and Brian Morel were potentially overworked. In Morel's 2009 performance evaluation, David Sims wrote that Morel "wants and needs a high work load" and described all the different projects he was involved with. BP operations engineer Brett Cocales testified, "I would say with the kind of load that a wells team leader is undertaking, that additional resources would be of benefit to that person."

Qualification Deficiencies

Several key personnel lacked appropriate qualifications or experience for their roles:

1. The Halliburton Cementer involved in the BOP testing on February 9, 2010, was new to the vessel and was unaware of the volumes required for the BOP test. Had the Cementer been aware of the historical volume averages, he would have been able to stop the test prior to an incident occurring.

2. Bob Kaluza was on his first hitch as a Well Site Leader on the Deepwater Horizon and was not fully briefed on the well's history or the specific challenges it presented.

3. The investigation revealed that BP did not adequately train its personnel in negative pressure testing procedures. There was no standardized training or certification process for this critical safety test.

Financial and Schedule Pressures

The Macondo well was significantly behind schedule and over budget:

1. The well was originally planned to take 51 days and cost approximately $96 million. By April 20, 2010, the well was on day 80, with costs exceeding $159 million.

2. The Deepwater Horizon rig was costing BP approximately $1 million per day in operational costs.

3. The rig was already scheduled for its next assignment at the Nile well, creating additional time pressure to complete operations at Macondo.

4. Bob Kaluza's notes indicated they "decided we would do the displacement and the negative test together. Don't know why. Maybe trying to save time."

Communication Failures

Critical communication failures occurred between onshore and offshore teams:

1. The BP Macondo well team did not confirm that all relevant lab test results for the cement had been obtained and considered by the Halliburton in-house cementing engineer before cement placement proceeded.

2. BP did not share important information about the difficulty of the primary cement job with its contractors or even with members of its own team on the rig.

3. When Don Vidrine called Mark Hafle about the pressure anomalies during the negative pressure test, Hafle identified the inconsistency but did not insist on further investigation or remedial action.

4. Transocean failed to adequately communicate lessons from an eerily similar near-miss drilling incident in the North Sea four months prior to the Macondo blowout. In December 2009, gas entered the riser on a Transocean rig while the crew was displacing a well with seawater. The rig's crew had already run a negative pressure test and declared it successful, but the barrier nevertheless failed during displacement. Transocean created an internal PowerPoint presentation warning that "tested barriers can fail" but only sent it to its North Sea fleet, not to the Gulf of Mexico.

These organizational failures created an environment where critical safety decisions were made without proper oversight, procedures, or communication, directly contributing to the disaster.

CAUSATION CHAIN

Sequence from Test Misinterpretation to Blowout

The causation chain from the misinterpretation of the negative pressure test to the blowout follows a clear sequence:

1. Failed Cement Barrier: The cement job at the bottom of the well failed to isolate hydrocarbons in the formation.
2. Negative Pressure Test Misinterpretation: Despite clear indications of well integrity failure (1,400 psi on drill pipe, 0 psi on kill line), the test was incorrectly deemed successful at approximately 19:55 hours on April 20.
3. Displacement to Seawater: Based on this incorrect interpretation, at approximately 20:00 hours, the crew opened the annular preventer and began displacing the heavy drilling mud in the riser with seawater, reducing the hydrostatic pressure on the well.
4. Well Underbalanced: At approximately 20:52 hours, according to modeling, the well became underbalanced, allowing hydrocarbons to flow up through the production casing.
5. Undetected Influx: Flow increase from the well was discernible in the real-time data after approximately 20:58 hours, but went unnoticed. By 21:08 hours, analysis of fluid volumes shows an approximate gain of 39 barrels, indicating significant hydrocarbon influx.
6. Late Detection: The rig crew's first apparent well control actions occurred at approximately 21:40 hours, after hydrocarbons had already passed through the BOP and entered the riser.
7. Diversion to Mud Gas Separator: Rather than diverting flow overboard, the crew routed the fluids to the Deepwater Horizon mud gas separator system, which was quickly overwhelmed.
8. Explosion: At approximately 21:49 hours, the first explosion occurred as hydrocarbons reached the rig floor and found an ignition source.

Window of Opportunity for Prevention

The window of opportunity to prevent the disaster existed from the time of the negative pressure test (completed around 19:55 hours) until the well became severely underbalanced (around 20:52 hours). During this approximately one-hour period, proper interpretation of the test would have led to:

1. Maintaining the well in an overbalanced condition by keeping heavy mud in the wellbore
2. Investigating the cause of the pressure anomalies
3. Implementing remedial actions to address the compromised barriers

Additionally, a secondary window existed between the initial influx (20:52 hours) and the explosion (21:49 hours). During this approximately one-hour period, proper monitoring of well conditions would have detected the influx earlier, allowing more time for emergency response actions.

Expert Testimony on Prevention

Multiple experts have confirmed that proper interpretation of the negative pressure test would have prevented the incident:

1. Dr. J.J. Azar, a BP expert, testified: "QUESTION: The negative test had been correctly interpreted by BP and Transocean, and a determination was made that the cement job was not a good job. Remediation work could have been done that would have resulted in this blowout not occurring. Would you agree with that? ANSWER: I agree with that, sir. QUESTION: And if, in fact, that remediation work was done and the blowout didn't occur, we wouldn't be sitting here today and 11 men would not have lost their lives. Would you also agree with that? ANSWER: I agree with that."

2. Pat O'Bryan, BP's Vice President of Drilling and Completions in the Gulf of Mexico, testified: "QUESTION: Had the negative test been correctly interpreted, there would not have been a blowout, would there? ANSWER: That is correct. Well integrity would have been established."

3. Mark Bly, BP Group Head of Safety and Operations, testified that the negative pressure test was one of the critical factors that, if eliminated, "would have either prevented or changed the circumstances" of the accident.

Duration of Hydrocarbon Flow Before Detection

Hydrocarbons flowed undetected into the wellbore for approximately 48 minutes before the first well control actions were taken:

1. Initial flow began at approximately 20:52 hours according to modeling
2. First well control actions occurred at approximately 21:40 hours
3. Explosion occurred at approximately 21:49 hours, just 9 minutes after initial response actions

During this time, indications of influx with an increase in drill pipe pressure were discernible in real-time data from approximately 40 minutes before the rig crew took action to control the well. The investigation team's analysis of fluid volumes shows an approximate gain of 39 barrels by 21:08 hours, indicating significant hydrocarbon influx that went undetected.

EVIDENCE OF NEGLIGENCE

Safety Systems Bypassed or Compromised

Several critical safety systems were bypassed or compromised during operations:

1. Negative Pressure Test Procedure: No detailed written procedure was provided for this safety-critical test, and the results were misinterpreted despite clear indications of failure.

2. Well Monitoring Systems: The investigation team did not find evidence that either the Transocean rig crew or the Sperry-Sun mudloggers monitored the pits from 13:28 hours (when offloading to the supply vessel began) to 21:10 hours (when returns were routed overboard).

3. Flow Monitoring: Once the spacer arrived at surface and the sheen test was performed, the Sperry-Sun flow sensor was bypassed. Thus, there was no permanent record of the flow from the well in the last 40 minutes before the explosion.

4. Closed System Monitoring: A "closed system" was not used to displace the well, which would have facilitated accurate monitoring while displacing to an underbalanced condition. This could have been done relatively easily with the equipment on board and would have provided early warning of an influx.

5. BOP Testing: On February 9, 2010, a Level II Investigation revealed that the BOP test rams were left open during a high-pressure test of the BOP. The investigation found that "the written THINK plan was performed in the Subsea office at 06:00 without a visit to the worksite" and "at no point did the personnel involved review the THINK plan as a group."

Cost/Time Prioritization Over Safety

Multiple instances demonstrate prioritization of cost and time savings over safety:

1. Bob Kaluza's notes indicated they "decided we would do the displacement and the negative test together. Don't know why. Maybe trying to save time."
2. The decision to use leftover lost circulation material (FORM-A-SET and FORM-A-SQUEEZE) as spacer rather than standard spacer fluid was made to avoid disposal costs, as these materials would be classified as hazardous waste if brought back to shore.
3. The temporary abandonment procedure was changed multiple times in the days leading up to April 20, with the final version being more complex and riskier than earlier versions, but potentially saving rig time.
4. BP's decision to proceed with the displacement after the failed negative pressure test saved time but directly led to the blowout.

Damning Conversations and Knowledge of Problems

Several conversations indicate knowledge of problems that were not properly addressed:

1. During a call at 20:52 hours on April 20, BP Well Site Leader Don Vidrine told BP shore-based engineer Mark Hafle that "the crew had zero pressure on the kill line, but that they still had pressure on the drill pipe." Hafle replied, "you can't have pressure on the drill pipe and zero pressure on the kill line in a test that is properly lined up." Despite this acknowledgment of the inconsistency, no action was taken.
2. BP Vice President Pat O'Bryan expressed his frustration with the "bladder effect" explanation in an email where he inserted 560 question marks, stating it was "silly" to rely on such an explanation.
3. Natalie Roshto, widow of rig worker Shane Roshto, testified that her husband had described the Macondo as the "well from hell" and said "Mother Nature just doesn't want to be drilled here."
4. John Guide, BP Wells Team Leader, was informed about a hydraulic leak on the rig's blowout preventer but did not report it to the federal government as required, stating: "We did not feel the leak affected functionality of the BOP and therefore it did not rise to the level it needed to be reported to the MMS."

Data Withheld from Key Personnel

Critical information was withheld from key personnel:

1. Halliburton's internal laboratory tests showing the cement slurry design was unstable were not shared with BP before the cement job was pumped.
2. BP did not share important information about the difficulty of the primary cement job with its contractors or even with members of its own team on the rig, particularly Bob Kaluza, who was on his first hitch as a Well Site Leader.
3. Transocean failed to share lessons learned from a similar near-miss incident in the North Sea with its Gulf of Mexico fleet. In December 2009, gas entered the riser on a Transocean rig after a negative pressure test had been declared successful. Transocean created an advisory warning that "tested barriers can fail" but only sent it to its North Sea fleet.
4. The BP Macondo well team did not confirm that all relevant lab test results had been obtained and considered by the Halliburton in-house cementing engineer before cement placement proceeded.

These instances of bypassed safety systems, prioritization of cost and time over safety, knowledge of problems without appropriate action, and withholding of critical information demonstrate a pattern of negligence that directly contributed to the disaster.

CONCLUSIONS AND LIABILITY

Most Egregious Failures and Legal Violations

1. Misinterpretation of the Negative Pressure Test: The most critical failure was the misinterpretation of the negative pressure test despite clear indications of well integrity failure. This represents a gross departure from industry standards and good oilfield practice, violating 30 C.F.R. § 250.401 (requiring operators to take necessary precautions to keep the well under control at all times) and 30 C.F.R. § 250.420 (requiring operators to follow sound engineering practices).
2. Lack of Written Procedures: BP failed to provide detailed written procedures for the negative pressure test, a safety-critical operation. This violated industry best practices and BP's own management of change (MOC) processes, which require formal risk assessment for high-consequence activities.
3. Failure to Respond to Warning Signs: Multiple warning signs of hydrocarbon influx were missed or ignored during the final hour before the explosion, violating fundamental principles of well control that require continuous monitoring and prompt response to anomalies.
4. Inadequate Cement Job: The cement job failed to isolate hydrocarbons in the formation, and BP proceeded with temporary abandonment without adequate verification of cement integrity, violating 30 C.F.R. § 250.428 (requiring remedial action when cement job is inadequate).
5. Inadequate Training and Supervision: Both BP and Transocean failed to ensure proper training and supervision of personnel conducting the negative pressure test, violating their duty of care to provide competent personnel for safety-critical operations.

Potentially Liable Parties and Their Contributions

1. BP Exploration & Production Inc. (Operator):

- Failed to provide detailed written procedures for the negative pressure test
- Failed to properly interpret test results and take appropriate action
- Made last-minute changes to temporary abandonment procedures without adequate risk assessment
- Failed to ensure proper supervision and training of personnel
- Failed to verify cement integrity before proceeding with temporary abandonment

1. Transocean Ltd. (Drilling Contractor):

- Failed to properly train crew in negative pressure test interpretation and kick detection
- Failed to share lessons learned from similar near-miss incident in the North Sea
- Failed to ensure proper monitoring of well conditions during displacement
- Proposed and accepted the implausible "bladder effect" explanation for anomalous pressure readings

1. Halliburton Energy Services Inc. (Cementing Contractor):

- Failed to properly design and test cement slurry
- Failed to communicate test results showing cement instability
- Failed to adequately supervise cementing personnel

1. BP and Transocean Management Personnel:

- Don Vidrine and Bob Kaluza (BP Well Site Leaders): Misinterpreted the negative pressure test and authorized proceeding with displacement
- John Guide (BP Wells Team Leader): Failed to ensure proper procedures were in place and failed to respond to concerns raised about test results
- Jimmy Harrell and Jason Anderson (Transocean): Participated in the misinterpretation of the negative pressure test and proposed the "bladder effect" explanation

Expert Opinion on Standard of Care Violations

Expert testimony confirms that the standard of care was violated in multiple ways:

1. Dr. John Smith stated that the negative pressure test was "a gross and extreme departure from the standards of good oil field practice."

2. Steve Heenan testified: "The conclusion of both BP and Transocean personnel that the negative-pressure test was successful lacked any justification base [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38]