

UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF SAFETY AND ENVIRONMENTAL ENFORCEMENT  
GULF OF MEXICO REGION

ACCIDENT INVESTIGATION REPORT

For Public Release

1. OCCURRED

DATE: 27-NOV-2015 TIME: 1115 HOURS

2. OPERATOR: Shell Offshore Inc.

REPRESENTATIVE:

TELEPHONE:

CONTRACTOR:

REPRESENTATIVE:

TELEPHONE:

- STRUCTURAL DAMAGE
- CRANE
- OTHER LIFTING DEVICE
- DAMAGED/DISABLED SAFETY SYS.
- INCIDENT >\$25K APV bottle failed
- H2S/15MIN./20PPM
- REQUIRED MUSTER
- SHUTDOWN FROM GAS RELEASE
- OTHER

3. OPERATOR/CONTRACTOR REPRESENTATIVE/SUPERVISOR  
ON SITE AT TIME OF INCIDENT:

6. OPERATION:

4. LEASE: G17001

AREA: WR LATITUDE:

BLOCK: 508 LONGITUDE:

- PRODUCTION
- DRILLING
- WORKOVER
- COMPLETION
- HELICOPTER
- MOTOR VESSEL
- PIPELINE SEGMENT NO.
- OTHER

5. PLATFORM:

RIG NAME: NOBLE JIM DAY

6. ACTIVITY:  EXPLORATION(POE)  
 DEVELOPMENT/PRODUCTION  
(DOCD/POD)

8. CAUSE:

- EQUIPMENT FAILURE
- HUMAN ERROR
- EXTERNAL DAMAGE
- SLIP/TRIP/FALL
- WEATHER RELATED
- LEAK
- UPSET H2O TREATING
- OVERBOARD DRILLING FLUID
- OTHER \_\_\_\_\_

7. TYPE:

- HISTORIC INJURY
  - REQUIRED EVACUATION
  - LTA (1-3 days)
  - LTA (>3 days)
  - RW/JT (1-3 days)
  - RW/JT (>3 days)
  - Other Injury

- FATALITY
- POLLUTION
- FIRE
- EXPLOSION

- LWC  HISTORIC BLOWOUT
- UNDERGROUND
  - SURFACE
  - DEVERTER
  - SURFACE EQUIPMENT FAILURE OR PROCEDURES

9. WATER DEPTH: 9560 FT.

10. DISTANCE FROM SHORE: 163 MI.

11. WIND DIRECTION:  
SPEED: 31 M.P.H.

12. CURRENT DIRECTION:  
SPEED: 3 M.P.H.

13. SEA STATE: 11 FT.

COLLISION  HISTORIC  >\$25K  <=\$25K

On November 27, 2015, while performing completion operations for Shell Offshore Inc., the Noble Jim Day experienced an incident in which one of the rig's riser tensioning bottles failed and was ejected into the Gulf of Mexico.

The Noble Jim Day had been performing completion operations on Shell Offshore's 006 well located in Walker Ridge Block 508, Lease G17001. The rig had just finished fracking the HU-5 zone of the well and was monitoring weather conditions to determine a plan forward. Based on the high winds, sea state, and currents at the time, the decision was made to put all well operations on hold and wait for weather conditions to improve before proceeding with fracking operations.

At approximately 11:15 hours, a loud noise was heard and a heavy vibration was felt throughout the rig. Alarms sounded that notified the crew of the source of the problem and personnel were sent out to investigate the issue. Upon arriving at the ship's Air Pressure Vessel (APV) Deck, it was observed that extensive damage had been sustained to the surrounding piping, supply lines, and electrical equipment located on that deck. It was also found that APV bottle '5B' was missing and had been the cause of the damage. Riser Tensioners #5 and #8 were rendered inoperable due to the extent of the damages, and an investigation into the cause of the incident was started.

The APV Deck for the Noble Jim Day is located on the aft side of the rig, just off of the main deck. The purpose of this deck is solely to house the APV bottles for the rig's riser tensioning system. Each of the rig's 66 APV bottles measure 18 feet long with a 22 inch diameter. Each bottle contains a mixture of approximately 95% nitrogen and 5% air and has a system rated working pressure of 2,200 psi. At the time of the incident, the internal working pressure of the bottle system was set to 1900 psi.

The initial investigation confirmed that the cause of the incident had originated from a failure of the '5B' APV bottle. Two pieces of the ruptured bottle remained on the deck, while the rest of the bottle was ejected off of the rig into the Gulf of Mexico. Operations onboard the rig remained shut down so that the damages could be assessed and repaired, while the remaining pieces of the APV bottle were sent in for further analysis.

Although an in depth examination of the bottle fragments failed to identify a specific failure point, all test results seem to point toward 'stress corrosion cracking'. Stress corrosion cracking is a process where fatigue stress in a metal is accelerated by the introduction of a contaminate, in this case it is chlorides. Traces of chlorides were found in samples that were taken from the cracks of both bottle fragments and are known to contribute to 'stress corrosion cracking'. Chlorides are present in all offshore environments and are believed to have contributed to the bottle's failure. It was also stated in the operator's report that the initial stress points of the bottle are believed to have originated from the bolt holes in the flange on the neck of the bottle, although chlorides were also present in the head-to-shell welds of the bottle. The chlorides are believed to have been deposited into the bolt holes and exposed welds of the bottle due to the splash and spray of seawater onto these surfaces. Possible sources of the stress points that were identified at the bolt holes and welds could have been caused by vibration, pressure fluctuations, bolt torque, or a combination of any of these. The APV bottles are exposed to all of these conditions throughout the course of normal operations.

Additional tests were performed on the remaining APV bottles onboard the facility. Of the 65 bottles that remained, 9 were removed from service due to similar defects that were found during the test performed on the ruptured bottle. All of the defects were located on the necks of the bottles and all on their inside surfaces. The other

bottles in the system were determined to be in good condition and each met or exceeded the manufacturer's specifications. More frequent inspections and an improved inspection procedure, utilizing ultrasonic testing, was put into place in an attempt to prevent a reoccurrence. In addition, Noble issued a safety alert to all rigs utilizing similar equipment which prevented any personnel from accessing the APV bottle area and required that ultrasonic testing be performed on all bottles in service.

18. LIST THE PROBABLE CAUSE(S) OF ACCIDENT:

'Stress corrosion cracking' was determined to be the leading cause of the incident. Stress Corrosion Cracking is a process where fatigue stress within a metal is accelerated by the introduction of a contaminate.

19. LIST THE CONTRIBUTING CAUSE(S) OF ACCIDENT:

'Stress points' exerted onto the bottle from normal operations are believed to have been what initially began the "stress corrosion cracking" process. These "stress points" could have been caused by vibration, pressure fluctuations, bolt torque, or a combination of any of these.

20. LIST THE ADDITIONAL INFORMATION:

The APV Bottles in question are unique to Noble Drilling and are currently deployed on four of Nobles rigs. The rigs that are using these types of bottles are the 'Noble Danny Adkins', the 'Noble Jim Day', the 'Noble Dave Beard', and the 'Noble Clyde Boudreaux'. All of the rigs mentioned are not currently engaged in any well operations and Noble Drilling has since made the decision to replace all of the aluminum APV Bottles with steel APV Bottles due to steels ability to better resist stress corrosion cracking.

21. PROPERTY DAMAGED:

APV Bottle and surrounding piping,  
supply lines, and electrical equipment.

NATURE OF DAMAGE:

Lost overboard or destroyed.

ESTIMATED AMOUNT (TOTAL):                    \$355,000

22. RECOMMENDATIONS TO PREVENT RECURRANCE NARRATIVE:

The Houma District Office has no recommendations for the Office of Incident Investigations at this time.

**For Public Release**

23. POSSIBLE OCS VIOLATIONS RELATED TO ACCIDENT: **NO**

24. SPECIFY VIOLATIONS DIRECTLY OR INDIRECTLY CONTRIBUTING. NARRATIVE:

**N/A**

25. DATE OF ONSITE INVESTIGATION:

**30-NOV-2016**

26. ONSITE TEAM MEMBERS:

**Clint Campo / James Richard /**

29. ACCIDENT INVESTIGATION

PANEL FORMED: **NO**

OCS REPORT:

30. DISTRICT SUPERVISOR:

**Bryan Domangue**

APPROVED

DATE:

**30-JUN-2016**