

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-DEC-2017 TIME: 1845 HOURS

2. OPERATOR: Anadarko Petroleum Corporation

REPRESENTATIVE:
TELEPHONE:

CONTRACTOR:
REPRESENTATIVE:
TELEPHONE:

- STRUCTURAL DAMAGE
- CRANE
- OTHER LIFTING
- DAMAGED/DISABLED SAFETY SYS.
- INCIDENT >\$25K 4700000.00
- H2S/15MIN./20PPM
- REQUIRED MUSTER
- SHUTDOWN FROM GAS RELEASE
- OTHER

3. OPERATOR/CONTRACTOR REPRESENTATIVE/SUPERVISOR ON SITE AT TIME OF INCIDENT: 8. OPERATION:

4. LEASE: G22987

AREA: GC LATITUDE:
BLOCK: 680 LONGITUDE:

5. PLATFORM: A (Constitution)
RIG NAME:

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

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

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

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

9. CAUSE:

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

- 10. WATER DEPTH: 4970 FT.
- 11. DISTANCE FROM SHORE: 134 MI.
- 12. WIND DIRECTION:
SPEED: M.P.H.
- 13. CURRENT DIRECTION:
SPEED: M.P.H.
- 14. SEA STATE: FT.
- 15. PICTURES TAKEN:
- 16. STATEMENT TAKEN:

17. INVESTIGATION FINDINGS:

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On December 27, 2017, an incident occurred on the Green Canyon (GC) 680-A Constitution Spar, Outer Continental Shelf (OCS) Lease Number G22987. The structure is situated 134 miles from shore in approximately 4,970 feet of water. The Designated Operator of Record is Anadarko Petroleum Corporation (APC).

APC reported two related incidents to the Houma District outside of office hours--one on December 27, 2017, and the other on December 31, 2017. The After Hours Engineer noted the following:

Event on December 27:

After the wireline operations crew finished setting a plug in the Well A-1 dry tree, 220 barrels of 10.4 pounds per gallon (ppg) fluid were pumped into the well annulus to kill the well. Once the wireline and pumping operations ended, the crew stood down for a 6:00 pm Simultaneous Operations (SIMOPS) meeting. At that time, a crew member on the workover deck noticed the Well A-1 riser drop three to four feet, coming to a rest on the grating and beams on the deck. All four of the dry tree wells and surface controlled subsurface safety valves (SCSSVs) were shut in, and all affected areas were barricaded. Personnel mustered.

Event on December 31:

While attempting air-up operations on Buoyancy Can Chamber #2, personnel heard what was thought to be a leak below the spar deck. Operators shut down the operation and notified engineers about the situation. The engineers instructed the operators to begin air-up operations on Buoyancy Can Chamber #3. During air-up operations, personnel noticed an air leak on the chamber piping below the casing deck. A platform Emergency Shutdown (ESD) and general alarm were initiated, and personnel mustered. At approximately 3:30 pm, the Well A-1 dry tree descended 28 feet, coming to a stop on the spar deck.

A damage assessment was performed. When Remotely Operated Vehicles (ROVs) were dispatched, pictures were taken, and it became obvious that all of the fill-up lines were extremely corroded.

The buoyancy can consists of seven chambers. The top chamber (#1) is sealed. Chambers #2 through #7 are open ended at the bottom, and each chamber is equipped with a three-inch galvanized air fill-up line. The purpose of the air fill lines are to inject nitrogen into each chamber. The set pressures ranging from 41 pounds per square inch (psi) in Chamber #2 to 84 psi in Chamber #7 are maintained by a U-tube effect, where water is injected into the fill-up line at the U-tube to prevent nitrogen from escaping. This process prevents water from entering the bottom of each chamber, thereby maintaining proper buoyancy to maintain the dry well and riser assembly.

Due to extreme corrosion in the Air Fill lines for chambers #2 and #3, nitrogen was allowed to escape causing the water level in both chambers to rise. Once both chambers filled with water, the weight of the Well A-1 dry tree and riser overcame the buoyancy of the remaining Chambers #4 through #7. The increased load caused the grating on the workover deck to collapse, allowing the the Well A-1 tree and riser to descend until coming to a stop on the spar deck.

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

Severe corrosion to the buoyancy can air fill-up lines is the most likely cause of this incident.

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

N/A

Per the Constitution Buoyancy Can Technical Discussion, Rev. 0 (1/5/2018): "The Constitution spar is a truss spar which is 98 feet in diameter and has an overall length of 554 feet. It has a draft of 504 feet with a freeboard of 50 feet at its normal operational condition. The spar is divided into three distinct sections. The upper part is a vertically floating circular steel cylinder hard tank structure with a full length free flooding center well. The truss part of the hull is an X-braced space frame constructed of tubular members and horizontal plates. Connected to the truss section is a circular shaped keel tank with a free flooding centerwell. The buoyancy cans are located inside the main cylindrical body of the spar hull and are supported by compliant guides throughout the length of the facility."

The top tensioned production risers (TTRs) are kept in tension by means of the buoyancy can system. "The buoyancy cans are a single piece with individual compartments to reduce tension loss due to the loss of one chamber. The cans are made up of three sections. The Upper Stem is attached at the top of the buoyancy can, includes both the up and down stops, and terminates below the [TTR] work platform. The Can section is made up of six open bottom chambers and one sealed chamber that provides the buoyancy for the top tensioned riser system. The cans are 12 feet in diameter and 190 feet in length."

APC has three other structures with the same type of buoyancy can system installed:

Boomvang - EB 643 (5 buoyancy cans)
Nansen - EB 602 (8 buoyancy cans)
Gunnison - GB 668 (7 buoyancy cans)

The above listed truss spars all have dry trees and riser systems supported by buoyancy cans. Inspections both visually and via mini ROVs in the centerwell are being performed to ensure no other corrosion problems exist.

21. PROPERTY DAMAGED:	NATURE OF DAMAGE:
1. A-1 Wellhead damage	1. Broken bolts--top assembly needs to be replaced
2. A-5 Wellhead	2. Bent/broken choke assembly
3. Workover deck grating	3. Destroyed grating--has been replaced;
4. Well A-1 down stop	bent main deck beam flanges--have been repaired
5. High pressure (HP) nitorgen (N2) hose	4. Slightly bent Well A-1 down stop
	5. Crushed HP N2 hose

ESTIMATED AMOUNT (TOTAL): \$4,700,000

22. RECOMMENDATIONS TO PREVENT RECCURRANCE NARRATIVE:

The Houma District has no recommendation for the Regional Office.

23. POSSIBLE OCS VIOLATIONS RELATED TO ACCIDENT: **YES**

24. SPECIFY VIOLATIONS DIRECTLY OR INDIRECTLY CONTRIBUTING. NARRATIVE:

G-111 Warning issued at the end of the investigation from the Houma District Office on 04-20-2017. The INC states as follows: During the investigation of incidents occurring on 12-27-2017 and 12-31-2017, it was determined the cause of the Well A-1 dry tree and riser drop was due to extreme corrosion to the air-up lines for the #2 and #3 chambers causing the chambers to fill with seawater. This caused the A-1 dry tree/riser to lose buoyancy and descend approximately 30 feet until coming to a stop on the spar deck. The primary causes for the above mentioned incidents were due to inadequate inspection and monitoring

of the air-up lines and excessive corrosion on the air lines due to insufficient protective coating of the field welds.

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25. DATE OF ONSITE INVESTIGATION:

20-DEC-2017

28. ACCIDENT INVESTIGATION
PANEL FORMED: NO

OCS REPORT:

26. INVESTIGATION TEAM MEMBERS:

Scott Thibodaux / David Benoit /
Paul Reeves /

29. DISTRICT SUPERVISOR:

Bryan A. Domangue

APPROVED

DATE: 17-MAY-2018