

ACCIDENT INVESTIGATION REPORT

1. OCCURRED

DATE: **05-JUN-2024** TIME: **1538** HOURS

2. OPERATOR: **Kosmos Energy Gulf of Mexico Oper**

REPRESENTATIVE:

TELEPHONE:

CONTRACTOR: **Helix Well Ops Group**

REPRESENTATIVE:

TELEPHONE:

- STRUCTURAL DAMAGE
- CRANE
- OTHER LIFTING
- DAMAGED/DISABLED SAFETY SYS.
- INCIDENT >\$25K **Estimated damage = \$29,000**
- H2S/15MIN./20PPM
- REQUIRED MUSTER
- SHUTDOWN FROM GAS RELEASE
- OTHER **Rupture of nitrogen bottle**

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

4. LEASE: **G24102**

AREA: **MC** LATITUDE: **28.24248324**

BLOCK: **727** LONGITUDE: **-88.82703404**

5. PLATFORM:

RIG NAME: **HELIX Q5000**

6. ACTIVITY: EXPLORATION(POE)

DEVELOPMENT/PRODUCTION (DOCD/POD)

DECOMMISSIONING

8. OPERATION:

- PRODUCTION
- DRILLING
- WORKOVER
- COMPLETION
- HELICOPTER
- MOTOR VESSEL
- PIPELINE SEGMENT NO.
- OTHER
- TEMP ABAND
- PERM ABAND
- DECOM PIPELINE
- DECOM FACILITY
- SITE CLEARANCE

7. TYPE:

INJURIES:

HISTORIC INJURY

OPERATOR CONTRACTOR

REQUIRED EVACUATION

LTA (1-3 days)

LTA (>3 days)

RW/JT (1-3 days)

RW/JT (>3 days)

FATALITY

Other Injury

9. CAUSE:

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

POLLUTION

FIRE

EXPLOSION

LWC HISTORIC BLOWOUT

UNDERGROUND

SURFACE

DEVERTER

SURFACE EQUIPMENT FAILURE OR PROCEDURES

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

10. WATER DEPTH: **4770** FT.

11. DISTANCE FROM SHORE: **164** MI.

12. WIND DIRECTION: **S**
SPEED: **17** M.P.H.

13. CURRENT DIRECTION: **SW**
SPEED: **1** M.P.H.

14. SEA STATE: **4** FT.

15. PICTURES TAKEN:

16. STATEMENT TAKEN:

17. INVESTIGATION FINDINGS:

INCIDENT SUMMARY:

On June 5, 2024, at approximately 15:38 hours, Kosmos Energy (Kosmos) experienced a nitrogen bottle rupture inside a twelve-cylinder bottle rack onboard the Helix Q5000. The Helix Q5000 was conducting workover operations on well number 3 (API# 608174141901, OCSG 24107). Kosmos reported the incident to the Bureau of Safety and Environmental Enforcement (BSEE) New Orleans District (NOD) at 19:39 hours.

SEQUENCE OF EVENTS:

Per Helix Well Operation's investigation report, the sequence of events are as follows:

April 8th, 2024:

Rack of 12 Nitrogen Cylinders arrived aboard the Helix Q5000.

June 5th, 2024:

10:00: Bottle rack was moved via 400 Ton crane from the top of the Subsea Shop to the main deck tagging area.

12:00 - 12:15: Subsea and Helix Control System (HCS) conducted toolbox talk and risk assessment.

12:15 - 14:45: Helix Subsea performed pre-dive checks in preparation of nitrogen precharge.

14:45 - 15:15: Helix Subsea, HCS, a Schlumberger (SLB), staged equipment in preparation for pre-charging of the Intervention Riser System (IRS) 7 (Ruptured bottle rack was not being used for this operation.)

15:23: Nitrogen cylinder ruptured, causing damage to other bottles in the rack and scattering them across the main deck.

16:14: Safety Standdown initiated; all operations suspended.

16:41: General Alarm was sounded; a public announcement was made for personnel to muster at the designated muster point. Full muster recorded at 16:54. Note: Times in this sequence are approximate, based on witness statements, interviews, personnel recollection, and bridge log.

22:16: After risk assessments and job safety analysis (JSA) were completed, the Airgas HAZMAT response team began venting cylinders.

BSEE INVESTIGATION:

The BSEE NOD Accident Investigator (AI) received and reviewed information submitted to BSEE via emails, phone communications, and witness statements regarding the ruptured nitrogen bottle. On June 10, 2024, the AI conducted an onsite investigation at the Helix Q5000 requesting photographs, the pre-charge JSA, the pre-charge check, and the pre-charge and discharge operational procedures. The nitrogen cylinder rack had recently been brought onboard and was successfully relocated from the top of the Subsea Shop to the main deck staging area using a 400-ton crane.

Prior to the incident, several activities took place:

A toolbox talk and risk assessment were conducted by the HCS team.

Helix Subsea Team executed pre-dive checks in preparation for nitrogen pre-charging.

Equipment staging was arranged by Helix Subsea and HCS, and a contractor from SLB, to prepare for the pre-charging of IRS 7 accumulator bottles; notably, the ruptured bottle rack was not involved in this phase.

At approximately 15:23 hours, a nitrogen cylinder ruptured causing damage to other cylinders in the rack and dispersing them across the main deck.

Three personnel in the area, staging equipment in preparation for pre-charging, sustained minor injuries from the shrapnel produced by the rupturing of the nitrogen bottle; all three personnel were evaluated by the rig medic and subsequently cleared to return to work. The three personnel included two from Helix and one from HCS. Following the incident, a safety stand-down was promptly initiated, halting all operations. The general alarm was activated, and personnel were instructed to muster at the designated area. A complete muster was recorded by 16:54 hours.

After completing risk assessments and a JSA for the Airgas HAZMAT response team, the team began venting the cylinders. During the area assessment after the incident, it was noted that the rack containing the ruptured cylinder was not connected to the manifold being used for the IRS 7 nitrogen pre-charge operations. The rack containing the ruptured bottle was a standalone unit, with all cylinder valves closed.

Per the Helix investigation report, the nitrogen cylinder rack adhered to Department of Transportation (DOT) special permit regulations, which mandate a 10-year hydrostatic or ultrasonic examination. However, these inspections failed to identify critical issues such as excessive corrosion with the internal cylinders. Although visual pre-fill inspections were performed prior to deployment of the bottles to offshore locations, they did not involve disassembly of the rack for a comprehensive evaluation of the individual cylinders and manifold components.

The water-based paint coating on the cylinders failed to provide adequate corrosion protection in the marine environment the bottles experienced during their time offshore, accelerating corrosion over time. Additionally, the lack of a protective barrier in the rack's design allowed for metal-to-metal contact between the bottles and the rack, increasing the risk of damage and eventually failure. The lack of drainage in the rack's design left the cylinders exposed to an even greater corrosive environment than the already corrosive marine environment the bottles routinely experienced.

The findings from the analysis of the bottle were that corrosion led to wall loss at the bottom of the bottle. Normal wall thickness should have been 0.25 in, but the wall thickness in the corroded region was as thin as 0.075 in. The bottle contained approximately 2,400 psi at the time of the incident.

CONCLUSIONS:

The incident on June 5, 2024, involving the rupture of a nitrogen cylinder underscores critical safety and operational challenges associated with the use of nitrogen cylinder racks aboard facilities in the Gulf of Mexico.

Despite compliance with DOT special permit regulations, deficiencies in the design and material of the racks contributed to this event, exposing the limitations of current inspection protocols and the susceptibility of cylinder integrity to the marine environment.

In response to this incident, actionable steps have been outlined to enhance safety and operational efficiency moving forward. The operator plans to install a nitrogen generation system to eliminate the reliance on external rental systems. The transition to a nitrogen generation system, which will be included in the 2025 budget, represents a significant shift in Helix's approach. Furthermore, Helix plans to install a physical barrier and hard piping to mitigate exposure to personnel and equipment during potential future failures, thereby ensuring a safer working environment.

Additionally, Helix elected to change their vendor as one of the corrective actions, demonstrating Helix's commitment to accountability and quality assurance. The selection of a new vendor and adhering to an elevated inspection process informed by lessons learned from this incident, is a critical measure to restore confidence in operational safety.

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

The water-based paint coating on the cylinders did not effectively prevent corrosion in the marine environment. The inadequate integrity of the cylinder coating allowed for corrosion over time.

Visual pre-fill inspections were conducted prior to mobilization offshore, but the rack was not disassembled for a thorough inspection of the individual cylinders or manifold components. This type of inspection did not allow for the bottom of the cylinders to be inspected for corrosion.

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

The nitrogen cylinder rack is designed to securely hold multiple nitrogen cylinders in place, ensuring safety and preventing accidents during storage and handling. However, the absence of a material barrier between the cylinders and the rack presents several significant safety concerns. This can include dents, scratches, or other forms of wear that may compromise the integrity of the cylinder, potentially leading to leaks.

The rack does not allow for proper drainage, which caused prolonged exposure of the cylinders to corrosive elements.

20. LIST THE ADDITIONAL INFORMATION:

21. PROPERTY DAMAGED: NATURE OF DAMAGE:

2 Nitrogen Racks and an Umbilical
ESTIMATED AMOUNT (TOTAL): \$29,000

22. RECOMMENDATIONS TO PREVENT RECURRENCE NARRATIVE:

The BSEE New Orleans District recommends the Office of Incident Investigations to consider a Safety Alert to warn industry about the risk that these bottle racks pose as indicated in our findings.

23. POSSIBLE OCS VIOLATIONS RELATED TO ACCIDENT: NO

24. SPECIFY VIOLATIONS DIRECTLY OR INDIRECTLY CONTRIBUTING. NARRATIVE:

25. DATE OF ONSITE INVESTIGATION:

10-JUN-2024

28. ACCIDENT CLASSIFICATION:

For Public Release

26. Investigation Team Members/Panel Members:

29. ACCIDENT INVESTIGATION PANEL FORMED:

NO

27. OPERATOR REPORT ON FILE:

OCS REPORT:

30. DISTRICT SUPERVISOR:

David Trocquet

APPROVED

DATE:

05-DEC-2024

INJURY/FATALITY/WITNESS ATTACHMENT

For Public Release

OPERATOR REPRESENTATIVE

INJURY

CONTRACTOR REPRESENTATIVE

FATALITY

OTHER _____

WITNESS

NAME :

HOME ADDRESS :

CITY :

STATE :

WORK PHONE :

TOTAL OFFSHORE EXPERIENCE : 18 YEARS

EMPLOYED BY :

BUSINESS ADDRESS :

CITY :

STATE :

ZIP CODE :

OPERATOR REPRESENTATIVE

INJURY

CONTRACTOR REPRESENTATIVE

FATALITY

OTHER _____

WITNESS

NAME :

HOME ADDRESS :

CITY :

STATE :

WORK PHONE :

TOTAL OFFSHORE EXPERIENCE : 20 YEARS

EMPLOYED BY :

BUSINESS ADDRESS :

CITY :

STATE :

ZIP CODE :

OPERATOR REPRESENTATIVE

INJURY

CONTRACTOR REPRESENTATIVE

FATALITY

OTHER _____

WITNESS

NAME :

HOME ADDRESS :

CITY :

STATE :

WORK PHONE :

TOTAL OFFSHORE EXPERIENCE : 20 YEARS

EMPLOYED BY :

BUSINESS ADDRESS :

CITY :

STATE :

ZIP CODE :