

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

For Public Release

ACCIDENT INVESTIGATION REPORT

1. OCCURRED

DATE: **28-APR-2025** TIME: **1022** HOURS

2. OPERATOR: **Murphy Exploration & Production (**

REPRESENTATIVE:

TELEPHONE:

CONTRACTOR: **BW Offshore USA Inc.**

REPRESENTATIVE:

TELEPHONE:

- ☐ STRUCTURAL DAMAGE
☐ CRANE
☐ OTHER LIFTING
☐ DAMAGED/DISABLED SAFETY SYS.
☒ INCIDENT >\$25K **\$50,000**
☐ H2S/15MIN./20PPM
☐ REQUIRED MUSTER
☐ SHUTDOWN FROM GAS RELEASE
☐ OTHER

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

4. LEASE:

AREA: **WR** LATITUDE:
BLOCK: **249** LONGITUDE:

5. PLATFORM: **A (Pioneer)**

RIG NAME:

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

8. OPERATION:

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

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

0

1

Medical Treatment

☐ 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: **8300** FT.

11. DISTANCE FROM SHORE: **160** 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:

Incident Summary:

On April 28, 2025, an explosion and first aid incident occurred on the BW Pioneer FPSO (Floating Production Storage and Offloading) vessel, owned by Murphy Exploration and Production Company (Murphy) and operated by BW Offshore USA Inc. (BW), in the Walker Ridge Area Block 249, of the Gulf of America. Murphy was conducting refilling operations for all of the nitrogen bottles on the facility, which are used for safety device testing. During the refilling operations, one of the nitrogen bottles ruptured resulting in an explosion that caused moderate to severe damage to surrounding equipment. An individual who was located near the area at the time of the incident was struck by small pieces of shrapnel and suffered immediate hearing impairment, which continued into the following day.

Sequence of Events:

Murphy reported to BSEE that at approximately 8:00 a.m. on April 28, 2025, three BW operators were charging nitrogen bottles using a nitrogen booster pump. The bottles being filled were positioned in a bottle rack secured by iron bars, ratchet straps, and a steel door that was bolted closed. The operators connected the booster pump to the involved bottle to begin filling. At approximately 10:30 a.m., the nitrogen bottle being filled exploded and detached from the bottle rack, sending pieces of the rack and other debris flying, which impacted nearby equipment. No personnel were in the immediate vicinity when the incident occurred. However, a BW Crane Operator (Injured Person, IP) was involved in helicopter fueling operations at the time nearby (approximately 18 feet from the bottle rack). The jet fuel storage tanks and fuel pump are located near the area of the nitrogen bottle filling operations. When the explosion occurred, the IP immediately shut the valve to the jet fuel pump and dove to the ground. The IP reported to the medic for evaluation after the incident and was found to have minor bruises on the left arm that were sustained during their spontaneous reaction. The IP also experienced brief tinnitus and impaired hearing immediately after the incident, which persisted in the days following. The IP received first aid treatment to a small skin lesion on his upper neck area, believed to be caused by flying debris, and an ice pack to the bruised arm. The IP was released to normal duty.

BSEE Investigation:

At approximately 8:50 p.m. on April 28, 2025, BSEE Houma District After Hours received an initial phone notification of a nitrogen bottle explosion that occurred on BW Pioneer FPSO. An initial incident report prepared by Murphy was sent via follow-up email, containing a brief explanation of the incident, including the injury, a potential risk calculation, and photographs. The following morning, BSEE investigators were briefed on the incident and determined that an onsite investigation was warranted.

On April 29, 2025, BSEE investigators flew offshore to conduct an Incident Follow-Up investigation aboard the BW Pioneer. Upon arrival, BSEE investigators met with Murphy and BW management to conduct interviews with all personnel involved in the incident, perform a walkthrough assessment of incident location, and take photographs of the affected area. During interviews, the BSEE investigators were informed that two BW operators had been tasked with recharging nitrogen cylinders stationed at control panels for production equipment throughout the facility. The BW Pioneer uses several 2,400 psi and 6,000 psi rated nitrogen bottles that are normally installed throughout the facility connected to process control panels, via high pressure hoses, providing a gas supply for operators conducting quarterly production equipment testing. Recharging of the nitrogen bottles takes place in the module of the facility located towards the stern about 25 feet in front of the living quarters in the center of the ship. In order to service the nitrogen bottles, operators disconnect the bottles from the control panels and the bottles are then moved and secured in a bottle rack located in the center of the ship towards the stern about 25 feet from the living quarters. The

BW Pioneer has its own nitrogen generation system that is used to refill the nitrogen bottles to 5000 psi. The bottles are filled using a two-stage booster pump with a maximum discharge pressure of 9,000 psi. Each nitrogen bottle can take approximately six to seven hours to recharge. The recharging operation typically occurs once per hitch (a five-week rotation) and may take several days depending on the number of bottles requiring recharge, approximately six to seven hours per bottle. The bottles in the rack are connected via a manifold that allows operators to select individual bottles for filling while isolating the others. Each bottle is equipped with two pressure relief devices (Rupture Discs), one on the valve and one on the manifold. Pressure indicators are installed on both the booster pump outlet and the manifold. This area is heavily trafficked, serving as the main access route for the production unit. Pumping operations for the bottle involved in the incident began at approximately 8:00 a.m. and it was the first bottle filled that day. BW operators informed the BSEE investigators that there was no formal procedure in place for nitrogen bottle filling operations. Informal steps were listed on the JSA and work permits, but no official BW or Murphy procedure existed. The two operators began filling the bottle and then left to complete other tasks, and periodically returned to check the pressure gauge. The target fill pressure was 5,000 psi. At approximately 9:50 a.m., one operator checked the gauge and reported to have a pressure of 3,500 psi before leaving the area again. This was the last pressure witnessed on the bottle before the incident occurred. At approximately 10:30 a.m., a loud boom was heard by multiple crew members throughout the facility. They gathered around the area and observed that the bottle being filled had ruptured, causing moderate to severe damage to surrounding equipment. The explosion caused structure damage to the bottle rack that it was placed in, the force also caused the other bottles in the rack to be thrown out. The manifold the bottles were attached to was damaged breaking the connections at the threads. The door to the bottle rack was blown off by the explosion and contacted a diesel day tank for a pump skid approximately 8 feet away. The door severely damaged the tank causing diesel to spill out and on to the deck. A parts building directly behind the bottle rack suffered damage in likes of dents and scratches from the recoil of the bottle rack during the explosion.

At the time of the incident, helicopter operations were also underway, including hot refueling and passenger transfer. The BW Crane Operator (IP) was tasked with operating the jet fuel pumps to refuel the helicopter for this operation. The jet fuel skid, including storage tanks and pumps, is located about 15-20 feet away from where the nitrogen bottles were being filled. The IP explained to BSEE that he was aware of the simultaneous operations occurring at the time and was also aware of the barricades surrounding the area. He started the fuel pump when notified by the Helicopter Landing Officer, and approximately a minute later, the explosion occurred. The IP stated that he initially believed the jet fuel tank had exploded, so his immediate reaction was to shut the pump off and dive to the ground. He reported that he saw white smoke fill the area and immediately lost his hearing following the explosion. He crawled along the deck, staying low to exit the area. Once the smoke cleared, he realized the nitrogen bottle had exploded. After exiting the area, he immediately notified his supervisor of the situation and reported to the medic. It was discovered he had a small lesion on his neck, likely caused by flying debris, and tinnitus, which was reported to last for about three hours after the incident. During the BSEE investigation, the IP explained his hearing had returned the following day but was not yet fully normal. BSEE investigators requested to be kept informed with updates on the IP's condition and any actions taken by Murphy to assist with his recovery.

Murphy Investigation:

Murphy's final investigation report identified several causal factors that led to the incident. The facility had two types of nitrogen bottles on board: DOT-regulated, which contain internal threads to install the valve, and UN-regulated, which contain external threads to install the valve. These bottles had varying maximum pressure ratings, 2,400 psi and 6,000 psi, and were not properly identified or clearly

segregated from one another, making pressure identification difficult. The nitrogen bottle that ruptured had been mistakenly assumed to be rated for 6,000 psi, when in fact it was only rated for 2,400 psi. As a result, it was recharged to more than double its maximum capacity. Further compounding this error, the relief valve installed on the bottle during a preventative maintenance program in December 2023 was rated for 9,000 psi instead of the appropriate 2,400 psi. Murphy also concluded that competency was a contributing factor, as there was no proper training in place for interpreting cylinder markings or understanding overpressure risks. Additionally, a routine inspection and maintenance program was not in place, allowing unsafe conditions to persist undetected. The lack of training also led operators to rely on the type of valve installed on the cylinder to determine its pressure rating. Murphy identified CGA 677 valves with external threads typically indicate a 6,000 psi service, while internally threaded CGA 540 or 580 valves are associated with 2,400 psi service. The bottle that ruptured was DOT-regulated, whereas other bottles used on the facility were UN-regulated. This difference in bottle type led to the installation of the incorrect valve, falsely indicating a higher service pressure. Furthermore, the Job Safety Analysis (JSA) for this operation did not specify the target pressure for charging, nor did it identify hazards related to over-pressurization.

Murphy sent the bottle to an independent third party testing facility to conduct a proper metallurgical failure analysis on the ruptured cylinder. This analysis was performed to evaluate the metallurgical properties of the cylinder material and determine the mode of failure. According to the metallurgical analysis report, the results of the analysis indicate that the cylinder failed due to a ductile overload failure mechanism. Pressurization of the cylinder to a level significantly exceeding its design pressure was identified as the primary cause of failure. Additionally, the installation of a relief device with a burst pressure greater than the cylinder's design pressure contributed to the failure.

BSEE Conclusion:

After reviewing all the evidence gathered during the onsite follow-up, including witness statements, photographs, and the metallurgy report, BSEE investigators conclude that over-pressurization was the root cause of the incident. Had the cylinders been fitted with the correct relief valve, the over-pressurization could have been avoided, assuming the device functioned properly. The absence of a proper training program and detailed procedures contributed to the failure, as employees were not adequately equipped to correctly identify cylinder pressure ratings or the settings of relief devices. Additionally, the JSA did not specify the target pressure or identify hazards related to over-pressurization. This oversight failed to highlight potential causes, such as the installation of an incorrect relief device. Murphy has taken these identified factors into account and has begun drafting new policies and procedures for this operation moving forward. The company also issued a safety alert following the incident, which was distributed companywide, including to assets around the world.

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

Equipment Failure: Capacity of Equipment Exceeded/Inadequate Equipment Used - The incident would have been prevented had the correct pressure safety valve been installed on the bottle. Pending the correct operation of the valve, overpressurization would have been prevented.

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

Human Performance Error: Inadequate Knowledge of Equipment Operation - Personnel failed to identify the proper pressure rating of the nitrogen bottle before the operation allowing for overpressurization.

Management Systems: No or Inadequate Hazard Analysis/Written Job Procedure - The JSA for the operation failed to identify the hazards in conjunction with over

pressurization. Murphy does not have a formal written procedure with detailed guidelines on nitrogen bottle filling operations. A formal procedure as well as proper hazard identification would have allowed for detection of the incorrect valve that was installed.

Personnel Training: Personnel Not Trained on Equipment Used - There is no training program in place for the nitrogen filling operation. Had personnel been properly trained, they would have been able to correctly identify the type of bottle and the pressure rating, as they relied solely on the valve indication.

20. LIST THE ADDITIONAL INFORMATION:

n/a

21. PROPERTY DAMAGED:

NATURE OF DAMAGE:

Bottle rack, diesel fuel tank on nearby pump skid, ruptured nitrogen bottle, parts building

**Structure damage to bottle rack.
Hole in diesel fuel tank.
Complete separation in ruptured bottle.
Small holes and dents in a parts building from the recoil of the bottle rack from the explosion.**

ESTIMATED AMOUNT (TOTAL): **\$50,000**

22. RECOMMENDATIONS TO PREVENT RECCURANCE NARRATIVE:

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

24. SPECIFY VIOLATIONS DIRECTLY OR INDIRECTLY CONTRIBUTING. NARRATIVE:

n/a

25. DATE OF ONSITE INVESTIGATION:

28. ACCIDENT CLASSIFICATION:

19-APR-2025

26. Investigation Team Members/Panel Members: 29. ACCIDENT INVESTIGATION PANEL FORMED:
NO

27. OPERATOR REPORT ON FILE:

OCS REPORT:

30. DISTRICT SUPERVISOR:

Amy Gresham

APPROVED
DATE:

05-NOV-2025