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: **22-OCT-2020** TIME: **1359** HOURS
2. OPERATOR: **BP Exploration & Production Inc.**
   REPRESENTATIVE:
   TELEPHONE:
   CONTRACTOR:
   REPRESENTATIVE:
   TELEPHONE:

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

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

4. LEASE: **G09868**
   AREA: **MC** LATITUDE: **28.19060986**
   BLOCK: **778** LONGITUDE: **-88.49558496**

5. PLATFORM: **A(Thunder Horse**
   RIG NAME:

6. ACTIVITY:
- [ ] EXPLORATION(POE)
- [x] DEVELOPMENT/PRODUCTION (DOCD/POD)

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		

- [x] POLLUTION
- [ ] FIRE
- [ ] EXPLOSION

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

COLLISION [ ] HISTORIC [ ] >$25K [ ] <=$25K

8. OPERATION:
- [x] PRODUCTION
- [ ] DRILLING
- [ ] WORKOVER
- [ ] COMPLETION
- [ ] HELICOPTER
- [ ] MOTOR VESSEL
- [ ] PIPELINE SEGMENT NO.
- [ ] OTHER

9. CAUSE:
- [x] EQUIPMENT FAILURE
- [ ] HUMAN ERROR
- [ ] EXTERNAL DAMAGE
- [ ] SLIP/TRIP/FALL
- [ ] WEATHER RELATED
- [x] LEAK
- [ ] UPSET H2O TREATING
- [ ] OVERBOARD DRILLING FLUID
- [ ] OTHER _____

10. WATER DEPTH: **6200** FT.
11. DISTANCE FROM SHORE: **66** 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 22 October 2020, at 13:59, Mississippi Canyon (MC) 778 A (Thunder Horse) experienced a Process Shut Down (PSD) of the air compressor system which then initiated an Emergency Platform Shut Down (ESD). Upon restart of the facility and troubleshooting the event, indications of loss of hydraulic fluid was discovered at Subsea Well MC 776 TG002. It is estimated that 3 to 50 barrels of Transaqua Hydraulic Control fluid and/or hydrocarbon entered the Gulf of Mexico. MC 778 A is owned and operated by BP Production and Exploration. Notification was made to the Bureau of Safety and Environmental Enforcement New Orleans District (BSEE NOD), the United States Coast Guard (USCG), and the National Response Center (NRC #1291012).

SEQUENCE OF EVENTS:

Per BP's report, on Wednesday, 22 October 2020, at 13:59, the line-of-sight gas detectors near the air compressor header activated the Control Room (CR) alarm and a PSD occurred.

At 14:20, CR operators could not find the fault before the automatic activation of the ESD. This signal also shut down the main generators. The platform shut down and personnel mustered.

Next, the auxiliary generator was brought on-line and the safety system was restored. The platform safety system was back in-service by 14:25.

Upon the restart of the facility and troubleshooting the event, indication of loss of hydraulic fluid was detected at Well MC 776 TG002. This was shown by a lower amount of hydraulic fluid in the reservoir. Further troubleshooting indicated a leaking SCSSV (Surface Control Subsurface Safety Valve) rod piston seals. The SCSSV was re-opened and hydraulic control lines were re-pressurized from 23 October 2020 to 25 October 2020 preventing any further loss of containment.

At 21:30 the main generators were put back on-line.

Personnel evacuated for Hurricane Zeta the week of October 24th. The facility re-manning began on 30 October 2020 following Hurricane Zeta. At approximately 17:55 on 31 October 2020 after communications were established with the well, the pressure was bled off in the tubing above the SCSSV. During the pressure bleed off, the pressure at the wellhead reduced to sub-ambient, which BP believes would have prevented any further potential release.

In addition, a vessel was deployed to the field on 1 November 2020 for ROV inspection of the well. The ROV video footage showed no fluid was flowing from the SCSSV vent. The ROV was used to close the SV1 tree isolation valve, which provides isolation of the wellbore to the A side of the SCSSV. Pressure integrity testing of the closed SV1 isolation valve resulted in an increase in the return pressure in the vent line when pressure was bled but fluids were not observed exiting the vent. A pressure cycle was then conducted on the B side and pressure in the return line again increased when pressure was bled followed by venting of fluid from the vent. Samples were taken from the SCSSV control line vent on the tree during functioning of the SCSSV on 5 November 2020. An inverted sample bottle with a funnel attached was placed above the vent to capture any vented fluids during SCSSV function test. The sample bottle was then shipped to ISOTECH laboratory and the gas in the sample bottle was separated from the liquids and sent for analysis (6 November 2020). Results showed the gas to be a mixture of air and hydrocarbons, however no conclusions could be drawn from the analysis regarding source or quantity.

A function test on 21 November 2020 confirmed that the SCSSV failed to function open. The SCSSV is a tubing retrievable type, size 5 1/2". The SCSSV is currently in the closed position with the well secure with the subsea tree valves (production master valve, production wing valve, and production isolation valve) in the closed position. A leak rate test was conducted on the SCSSV on 1 December 2020 which resulted in a 0 cc/ minute recorded leak rate. Notification of the failure has been submitted to the Chief, Office of Offshore Regulatory Programs as required by 30 CFR 250.803. Diagnostics to date have not determined the cause of the failure of the SCSSV to function open. The plan forward is to retrieve the SCSSV during a workover; the workover has not been scheduled at this time. When the SCSSV is recovered, it will be returned to CHPC for analysis.

BSEE INVESTIGATION:

BSEE received notification of the platform shut down and subsequent SCSSV leak on 22 October 2020. The BSEE Accident Investigator (AI) reviewed and acknowledged the incident in eWell. The AI communicated with the BP Regulatory Advisor on 23 October 2020. BP reports indicated that a line-of-sight gas detector for the Instrument Air Header activated a High Alarm (AXT40601) shutting down the air compressors. The Pressure Safety Low (PSL) on the air supply resulted in an ESD and personnel muster. The event is categorized as an unplanned power outage and not a total loss of power or blackout. Personnel evacuation was not required. The line-of-sight gas detectors were suspected of failing. There were no leaking gases detected at that location. The affected detectors were removed and replaced and sent it for testing.

BP suspects the rod pistons seals on the SCSSV failed, allowing the release. Based on BP testing procedure and results, BSEE agrees that the rod piston seals on the SCSSV could have allowed well fluid to release through the hydraulic vent line.

BSEE verified the sample analysis which indicated an amount of methane that would not be expected if only Transaqua fluid had leaked from the vent.

According to BP, during the period 26 October to 31 October, it is possible that additional leaking of Transaqua or oil (or some mixture of the two fluids) could have occurred. If leaking occurred during that time period, BP estimates that the volume of fluid leaked would have been no greater than 10 bbl/24-hour period. It is also possible that the volume of fluid leaked would have been much less than 10 bbl/24-hour period.

CONCLUSIONS:

As a result of the unplanned power outage at MC 778 A, a PSD, ESD, and the discovery of a leaking SCSSV rod piston occurred. The leaking rod piston allowed well fluids to enter the SCSSV hydraulic control line and vent subsea when hydraulic pressure was lost as a result of the ESD. An estimate of 3-50 bbls of hydrocarbon and/or hydraulic oil entered gulf waters.
The probable cause of the incident is equipment failure of the SCSSV rod piston.

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

Equipment Failure: Inoperable equipment or safety devices - The SCSSV rod piston seals leaked.

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

N/A

20. LIST THE ADDITIONAL INFORMATION:

On 26 October 2020, the well was shut-in in preparation for Hurricane Zeta evacuation. Review of pressure data for the event indicates a potential risk for additional leak through the vent line following the shut-in on 26 October 20. BP worked to re-man the facility following evacuation for Hurricane Zeta to deploy a vessel to the field for ROV inspection of the well.

21. PROPERTY DAMAGED:

N/A

NATURE OF DAMAGE:

N/A

ESTIMATED AMOUNT (TOTAL):

22. RECOMMENDATIONS TO PREVENT RECURRANCE NARRATIVE:

NOD recommends that OII collaborate with OSM to create a safety alert to address the following:

1. Raise awareness for SCSSV rod piston seal failures in Gulf.
2. Encourage operators to report known SCSSV rod piston seal failures to BSEE under 30 CFR 250.803
3. Encourage operators to train CRO's to identify rod piston seal failures by monitoring irregular hydraulic pump cycling, irregular hydraulic fluid consumption, and abnormal hydraulic pressure.
4. Before evacuating for hurricanes, operators should bleed all flowlines sub-ambient to prevent rod piston leaks from causing well fluid loss of containment.
5. Explore opportunities for BAST around mitigating pollution risk from sub-sea hydraulic venting.

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

24. SPECIFY VIOLATIONS DIRECTLY OR INDIRECTLY CONTRIBUTING. NARRATIVE:

N/A

25. DATE OF ONSITE INVESTIGATION:

23-OCT-2020

26. INVESTIGATION TEAM MEMBERS:

Gerald Taylor /

27. OPERATOR REPORT ON FILE:

28. ACCIDENT CLASSIFICATION:

29. ACCIDENT INVESTIGATION PANEL FORMED: **NO**

OCS REPORT:

30. DISTRICT SUPERVISOR:

David Trocquet

APPROVED
DATE: **14-JUN-2021**