

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: 17-JAN-2019 TIME: 0930 HOURS

2. OPERATOR: Renaissance Offshore, LLC

REPRESENTATIVE:  
TELEPHONE:

CONTRACTOR:  
REPRESENTATIVE:  
TELEPHONE:

- STRUCTURAL DAMAGE
- CRANE
- OTHER LIFTING
- DAMAGED/DISABLED SAFETY SYS.
- INCIDENT >\$25K \$500,000
- 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: G01604

AREA: WD LATITUDE: 28.587231  
BLOCK: 152 LONGITUDE: -89.6998

5. PLATFORM: A  
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: 373 FT.
- 11. DISTANCE FROM SHORE: 28 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:

On January 17, 2019, at 0930 hours, a fire occurred in the vicinity of the glycol dehydration unit on the Renaissance Offshore, LLC (Renaissance) facility West Delta (WD) 152-A, Lease OCS-G 01604. Renaissance reported no pollution and no injuries associated with this incident.

On the day of the incident, the Operators conducted a Job Safety Analysis (JSA) for a field startup to return to producing after an extended shutin. The Operators and a Mechanic on the platform began the process to bring the platform back online.

During the platform startup process, the Field Foreman visually inspected the glycol unit. Next, the Field Foreman started the glycol unit around 0800 hours. The Field Foreman ignited the glycol reboiler and initially set the temperature to 200 degrees Fahrenheit (F). Then, he began to increase the temperature to 250 degrees F. While in the process of increasing the temperature, the # 1 compressor shut down due to high pressure. The Field Foreman left the glycol unit unattended while the temperature was increasing from 200 degrees F to 250 degrees F. Then, the Field Foreman and the Operators began refilling the diesel fuel tank on a temporary diesel generator while the platform was in the final stages of startup.

While the Operators filled the temporary diesel generator on the top deck, the Mechanic prepared to perform an inspection and repair of an intake valve on the #3 compressor. At approximately 0930 hours, the Mechanic witnessed a large flame emanating from the north side of the platform. He alerted the Operators of a fire and pulled the Emergency Shutdown (ESD).

The Person In Charge (PIC) activated the fire alarm and manned the #4 fire reel on the west side of the upper deck. The Operator manned the # 9 fire reel on the east side of the lower deck. The Field Forman manned the # 8 fire reel located on the east side of the lower deck.

The Mechanic and the Night Operator donned their life jackets and went to the primary muster area located on the south side of the lower deck. The Mechanic started the life capsule engine, preparing to launch. The A-operator alerted the personnel on the WD 133-F platform to shut in due to the fire on the WD 152-A platform.

After personnel extinguished the fire, they assessed the damage and reported the fire to the Renaissance Production Superintendent.

Renaissance isolated the glycol system from the production system. Next, Renaissance shipped damaged components onshore to perform a fit for service inspection and Non-Destructive Examination (NDE) on the components. Renaissance also tasked third-party contractors to remove and replace asbestos panels on the north side of the compressor building damaged in the fire.

The Bureau of Safety and Environmental Enforcement (BSEE), New Orleans District, Accident Investigator (AI) contacted the Renaissance Production Superintendent after receiving notification of a flash fire on the WD 152-A platform. BSEE requested pictures of the Glycol Reboiler Unit fire to determine the level of investigation needed. After receiving the pictures, BSEE determined that the incident was more serious than a "flash fire" as originally reported. The AI and Supervisor Inspector (SI) issued a preservation order.

On January 22, 2019, the AI and a BSEE Office of Safety Management (OSM) Engineer began the initial onsite investigation. Upon arrival, BSEE personnel took aerial photographs showing evidence that the fire reached above the compressor building, located on the upper deck around the glycol reboiler unit. After landing, the investigation team collected documents, took photographs, and interviewed several personnel. The BSEE team conducted a hazard assessment in the vicinity of the glycol unit. Next, the Field Foreman verbally provided the sequence of events. BSEE then gave permission for Renaissance to clean up the affected area to avoid marine debris and pollution.

On January 23, 2019, due to weather, the AI and a Production Inspector conducted phone interviews of the personnel involved in the fire.

On January 24, 2019, the AI returned to the platform to conduct further interviews and take additional videos and photographs to document the condition of the glycol reboiler unit.

Investigators observed several temperature safety elements (TSE) associated with the glycol unit burned out by the fire. The AI observed the Glycol Reboiler's fire-damaged aluminum shell, broken sight glass, melted pressure gauges, burned heat exchanger insulation, heat-damaged electric motor/belt, and fire-damaged electrical wiring. The AI also observed several components covered with black soot, the glycol containment skid half filled with burnt glycol, and fire damaged asbestos panels around the compressor building with large sections missing. The AI observed fluid residue 20-30 feet above the glycol unit indicative of a pressure release.

BSEE agrees with Renaissance's determination that no continual fuel sources contributed to the fire, and the fire was exclusively external to the reboiler because there was no damage to internal components.

BSEE determined the fuel source was a release of glycol and hydrocarbon condensate out of the reboiler's still column onto the stack. The stack is a probable ignition source due to high operating temperatures. The TSE on the stack melts at 1170 degrees F which implies that the operating temperature may reach temperatures greater than 660 degrees F. The ignition temperature of Triethylene Glycol (TEG) is 660 degrees F. Therefore, it is likely that the glycol ignited upon contact with the stack.

Rapid temperature rise during boiler start up likely caused an overpressure and subsequent release of glycol and liquid contaminates out of the stack. The Operator increased the temperature from 200 to 250 degrees F without circulating glycol and allowing enough time to boil off water. According to Gly-Tech's TEG Systems Manual (an industry recognized training manual), "heat the reboiler to no more than 220 degrees F before start up circulation." The TEG Systems Manual also states, "While circulating, the temperature should be increased slowly to avoid flooding the still column with excess water vapor that could result in eruption of glycol from the still."

The high water content of 21% exacerbated the overpressure. The typical water content of the reboiler is 5-10%. Water and other contaminates changed phase so rapidly that the pressure build up within the vessel opened the Pressure Safety Valve (PSV) and forced TEG out of the still.

The Renaissance Glycol start up procedure did not provide specifics on the rate of temperature increase when starting the reboiler after an extended shut in. The Glycol start up procedure also directed to not circulate glycol until the temperature reached

350-375 degrees F. Renaissance identified deficiencies in training and supervision. Renaissance failed to provide training which would have allowed Operators to understand characteristics of phase vaporization and handling contaminated or saturated glycol.

In addition, Glycol operations experts from the company Gly-tech recommend that operators continuously attend Glycol start-ups. However, Renaissance Operators left the glycol skid unattended during start-up. BSEE recognizes the failure to attend the start up as a contributing cause of the incident.

BSEE determined that the most likely cause of the fire is the glycol stack igniting TEG and other contaminants exiting the glycol still. The rapid temperature build up in the boiler during startup caused overpressure, forcing TEG of out the still. Renaissance failed to provide specific glycol startup procedures specifying circulation time before raising the temperature above 220 degrees F. Renaissance also failed to provide proper glycol training.

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

- Management Systems: Inadequate job procedures - The Renaissance operating procedure did not provide specific glycol startup procedures specifying circulation time before raising the temperature above 220 degrees F.
- Equipment Failure: Lack of Insulation - Lack of insulation on the Reboiler Stack allowed an ignition source as TEG exited the still.

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

- Management Systems: Lack of Training - Renaissance failed to provide training which would have allowed Operators to understand characteristics of phase vaporization and handling contaminated or saturated glycol.
- Management Systems: Lack of Maintenance - Renaissance did not maintain the glycol system properly such that the water content of the glycol reached 21%.
- Human Performance Error: Inattention to Task - Renaissance operators left the glycol skid unattended during startup.

20. LIST THE ADDITIONAL INFORMATION:

Corrective Actions:

Renaissance will insulate the glycol stack as part of the corrective action. This will eliminate hot surfaces, which are a potential ignition source, especially in areas of possible release of produced hydrocarbons or other flammable liquids from the vent less than 5 feet away.

Enhance training for personnel to understand chemical and effluent characteristics during liquid to gas phase vaporization and handling contaminated or saturated glycol.

Improve glycol startup and shutdown procedures to define operations in place of reference thresholds, (i.e. temperature set points versus "bringing up slowly", etc.)

Ensure that Operators are trained and familiar with the specific glycol reboiler startup and shutdown procedures.

Utilize third-party expertise to conduct onsite operator competency assessments.

Conduct a Hazard Analysis on all glycol reboilers at Renaissance's facilities to ensure they are in a safe working condition and train personnel on the equipment.

DATE OF ONSITE INVESTIGATION: 22-JAN-2019 and 24-JAN-2019

21. PROPERTY DAMAGED: NATURE OF DAMAGE:

GLYCOL REBOILER UNIT, COMPRESSOR BUILDING FIRE

ESTIMATED AMOUNT (TOTAL): \$500,000

22. RECOMMENDATIONS TO PREVENT RECCURANCE NARRATIVE:

New Orleans District recommends that OII coordinate with OSM to create a Safety Alert or Safety Bulletin to address the following concerns:

- Ensure operators provide advanced training to personnel who work with glycol that addresses the liquid to gas phase vaporization and handling of contaminated or saturated glycol.
- Ensure that company's procedures specify that the Startup of Glycol systems should be a manned operation.
- Ensure that company's procedures provide specific glycol startup procedures specifying circulation time before raising the temperature of the Reboiler.
- Recommend that companies review their Reboiler Stack installations for the consideration of adding insulation on the Reboiler Stack to prevent an ignition source if TEG exits the still.

23. POSSIBLE OCS VIOLATIONS RELATED TO ACCIDENT: YES

24. SPECIFY VIOLATIONS DIRECTLY OR INDIRECTLY CONTRIBUTING. NARRATIVE:

G-110 DOES THE LESSEE PERFORM ALL OPERATIONS IN A SAFE AND WORKMANLIKE MANNER AND PROVIDE FOR THE PRESERVATION AND CONSERVATION OF PROPERTY AND THE ENVIRONMENT?

- Renaissance Operators left the glycol skid unattended during startup.

25. DATE OF ONSITE INVESTIGATION:

22-JAN-2019

28. ACCIDENT CLASSIFICATION:

26. INVESTIGATION TEAM MEMBERS:

Pierre Lanoix (Accident Investigation Specialist) / Jason Bowens (Production Inspector) / James "Max" Carrier (Office of Safety Management) /

29. ACCIDENT INVESTIGATION

PANEL FORMED: NO

OCS REPORT:

30. DISTRICT SUPERVISOR:

David Trocquet

27. OPERATOR REPORT ON FILE: