

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: 09-SEP-2019 TIME: 2300 HOURS

2. OPERATOR: Castex Offshore, Inc.
REPRESENTATIVE:
TELEPHONE:
CONTRACTOR:
REPRESENTATIVE:
TELEPHONE:

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

4. LEASE: G05431
AREA: VR LATITUDE:
BLOCK: 252 LONGITUDE:

5. PLATFORM: A
RIG NAME:

6. ACTIVITY: EXPLORATION(POE)
 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

POLLUTION
 FIRE
 EXPLOSION

LWC HISTORIC BLOWOUT
 UNDERGROUND
 SURFACE
 DEVERTER
 SURFACE EQUIPMENT FAILURE OR PROCEDURES

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

STRUCTURAL DAMAGE
 CRANE
 OTHER LIFTING
 DAMAGED/DISABLED SAFETY SYS.
Stack Arrestor on Heater Treater
 INCIDENT >\$25K Heater Treater Inspection and
 H2S/15MIN./20PPM
 REQUIRED MUSTER
 SHUTDOWN FROM GAS RELEASE
 OTHER

8. OPERATION:
 PRODUCTION
 DRILLING
 WORKOVER
 COMPLETION
 HELICOPTER
 MOTOR VESSEL
 PIPELINE SEGMENT NO.
 OTHER

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

10. WATER DEPTH: 150 FT.
11. DISTANCE FROM SHORE: 67 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:

On September 9, 2019, Castex's Vermilion 252-A facility experienced a production process alarm at approximately 11:00 pm. The facility does not have a night crew; therefore, the day operators (one Lead Operator/Person in Charge and one A-Operator) responded. On the facility, the Burner Safety Low (BSL) safety device for the fired component of the heater treater activated causing the alarm to indicate. The normal operating temperature of the liquid media in the Heater Treater is approximately 140° Fahrenheit to aid in water separation from oil. Due to the burner being offline, the liquid media's temperature cooled down to approximately 115° Fahrenheit according to the vessel's temperature indicator. As a result, the amount of water emulsified in the oil increased to above 1%, causing the Basic Sediment and Water (BS&W) monitor on the Heater Treater oil outlet to alarm and divert oil flow to the Wet Oil Tank instead of the Dry Oil Tank/Lease Automatic Custody Transfer unit. The alarms indicated a process upset; however, the two alarms alone did not cause the facility to shut-in. The operators relit the burner in efforts to reestablish heat and lower the BS&W to under 1%. Although the burner was back online, the Heater Treater's liquid media's temperature indicator never increased to above 120° Fahrenheit and the BS&W content had climbed to just under 3%, for unknown reasons.

At approximately 2:00 am, September 10, 2019, the operators noticed abnormally high heat radiating from the Heater Treater's fire tube exhaust stack, reporting it was "glowing cherry red" and taking pictures at the time. The heat from the stack was so intense that it melted the stainless steel fastening wire, which secures the insulation blankets around the exhaust stack. The blankets separated exposing the extremely hot stack to potential ignition sources in a Class 1, Group D, Division 2 area. The operators attempted to use an infrared heat gun to take a temperature reading of the exhaust stack; however, the heat gun could not register an accurate temperature due to the exhaust stack exceeding the heat gun's maximum temperature reading of 1,000° Fahrenheit. The two Temperature Safety High (TSH) safety devices (liquid media's TSH set point of 205° Fahrenheit and exhaust stack's TSH set point of 1,300° Fahrenheit) for high temperature protection did not activate on the Heater Treater panel. The operators manually manipulated the main burner isolation valve by partially closing the valve to decrease the stack's temperature and continued with normal oil production rates, as well as circulating processed oil from the Wet Oil Tank back through the Heater Treater. The operators discussed the stack's temperature issues with the Production Superintendent at approximately 5:45 am, and then discussed the issues with a third-party technician at approximately 7:00 am. Subsequently, a Construction Foreman arrived at the facility around 10:45 am. Upon the Construction Foreman witnessing the stack "glowing cherry red", he called the Production Foreman. At approximately 11:00 am both the Construction Foreman and the Production Foreman decided to manually shut-in the Heater Treater and all production.

The Lessee surveyed the damage and determined that the excessive exhaust stack's temperature caused the metal stack to become malleable to the point that the weight of the vertical pipe collapsed the ninety-degree elbow that connects the stack to the fire tube flange. The heat in the stack also melted the Heater Treater Stack Arrestor, a required safety device. The Lessee mobilized a construction crew to the platform to begin removal of the damaged components. Upon opening the Heater Treater, they discovered a significant amount of solids, primarily on the grid side of the vessel. The Lessee ordered cutting boxes and dispatched a cleaning crew to the platform. The cleaning crew removed approximately (50) barrels of solids from the Heater Treater and (80) barrels of oil from the Heater Treater and Wet and Dry Oil Tanks. A third-party analysis concluded, "the majority of the deposits from the fire tube and grid side are comprised of carbamate floc from the incumbent water clarifier used". This could be an indicator of an ineffective or noncompatible chemical treatment program, which may have limited the vessel's processing performance causing some of the initial process alarms. Although the Heater Treater's fire tube did not appear to be damaged, the Lessee decided to replace it and reuse the original fire

tube flange.

On September 16, 2019, a Castex Representative verbally communicated with the Bureau of Safety and Environmental Enforcement (BSEE) inquiring if the facility's alarm, indicating Heater Treater problems, followed by an above normal stack temperatures was a reportable event. At the time, the severity was unknown to BSEE. Therefore, BSEE requested follow-up information to assist with an official well-informed determination. Upon receipt of follow-up information, it was determined that the abnormal stack temperature caused deformation of the metal exhaust stack causing the BSEE to question whether the safety devices functioned as required. After BSEE received information that the damaged fire tube was removed and replaced and that the facility was engaging in start-up activities to reestablish production, BSEE ordered the facility to shut-in until given permission to return to service. BSEE discussed preliminary findings and concerns related to the Heater Treater incident with the Lessee and specified requirements prior to obtaining permission to return to production.

On September 23, 2019, BSEE Lake Charles District conducted an onsite incident follow-up investigation. Although the Heater Treater's exhaust stack, fire tube, Stack Arrestor and Flame Arrestor were replaced, and the unit's manway hatches were reinstalled, the investigation team was able to identify several questionable items, as follows: the original Flame Arrestor element was discolored and partially plugged; most likely due to backdraft conditions occurring inside the fire tube, the newly installed Flame Arrestor housing was damaged, a valve flange on top of the Heater Treater had significant metal loss, a one inch gas supply line upstream of the Heater Treater Fuel Gas Scrubber had severe corrosion on a ninety degree fitting and nipple, and the thermowells for the liquid media TSH and temperature indicator/gauge did not extend past the vessel nozzles and into the media, preventing them from detecting media temperature accurately. A review of records identified that the operators failed to inspect the Heater Treater burner's Stack Arrestor as required. Documents obtained indicate the last inspection date was April 27, 2018.

BSEE evaluated photographs and investigative findings and noted additional causes to the incident, as follows: A third-party fired vessel technician determined the Heater Treater burner nozzle assembly fuel adjustment needle backed out all the way and set improperly, resulting in a rich soot producing flame. He also discovered soot build-up on the end of the main burner mixer tube and top portion of the fire tube from the burner assembly to the entrance of the exhaust stack. This is evident of the main burner flame burning too rich which eventually caused plugging of the Stack Arrestor not allowing heated gasses to escape. The excessive heat conditions ultimately distorted the metal stack and melted the Stack Arrestor element. Also, the operators replaced the Heater Treater Fuel Gas Scrubber approximately four months prior to this event. This incident prompted a survey of the scrubber's internal high liquid level shutoff device which identified that the float assembly was missing. The missing float could potentially allow condensate to fill the scrubber and feed the Heater Treater burner with condensate, instead of natural gas, altering its flame properties.

A third-party lab conducted an analysis of the two TSH devices and reported the stack's TSH device was roughly nine years old and "is extremely corroded inside and out. This sensor has been melted out allowing air pressure to escape. The internal plunger is seized to the sensor itself due to rust and corrosion." The third-party lab also reported that the TSH device reached its set point of 1,300° Fahrenheit and worked as intended. The BSEE concluded from this report that when the stack temperature reached 1,300° Fahrenheit, the stack TSH device failed to signal the panel and initiate a facility shut-in for unknown reasons. The third-party lab also reported that the media TSH device was roughly ten years old and "is very corroded inside and out. This sensor has not been melted out as all the fuse metal is still complete. I am

not sure this would have tripped if it reached the 205 degrees. The internal plunger was seized up with rust and corrosion. I had to use a hammer and punch to get the plunger out. It should have slid out freely. There is Teflon tape on the threads. The threads are part of the heat sink process and Teflon tape will reduce the heat sink. The melted fuse metal that was in the thermowell is not from this sensor. The vent valve still functions but is very corroded. The adapter is still good but is also corroded". BSEE determined the media TSH most likely did not melt out due to being too short and therefore not sensing internally within the oil media. The third party Lab Tech Lead also stated that both TSH devices "are old and should be cleaned and reloaded every 1-2 years regular basis due to the type of environment they are being used in".

BSEE's investigation concluded the events that took place between September 9, 2019 and September 10, 2019 ultimately led to greater than \$25,000 worth of equipment damage including a destroyed safety device. Due to the destroyed safety device this incident required an immediate verbal notification, however; Castex did not notify BSEE until September 16, 2019. Upon initial discovery of the Heater Treater's exhaust stack operating at abnormal temperatures and "glowing cherry red", the operators failed to exercise stop work authority and take immediate action by shutting in the facility. The Heater Treater has a maximum allowable working pressure of 100 pounds per square inch at 200° Fahrenheit; however, the operator operated the Heater Treater with a 205° Fahrenheit TSH in the liquid media. In addition, the exhaust stack TSH set point of 1,300° Fahrenheit is higher than the standard 1,100° Fahrenheit. BSEE also recognized the Lessee did not perform a thorough internal investigation to fully understand causal factors and implement proper mitigations to prevent a future reoccurrence, prior to resuming production following an event. Furthermore, upon completing all repairs and receiving permission to return to production, the operators brought the facility back on-line and at some point, upon start-up, the Heater Treater media TSH device set at 150° Fahrenheit activated. Subsequently, the operators installed a 162° Fahrenheit device and brought the system back on-line. Days later the TSH device activated again. At this point, further investigation determined the liquid level in the vessel was likely too low, allowing the fire tube to overheat and activate the TSH device. The operators adjusted the liquid level including raising the Level Safety Low, required safety device, approximately one and a half inches. Upon implementing corrective actions, the operators brought the facility back on-line and all system parameters remained within the safe normal operating ranges.

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

A combination resulted in abnormally high heat conditions inside the fire tube and exhaust stack which ultimately destroyed the exhaust stack and Stack Arrestor; including:

- The Heater Treater main burner nozzle assembly fuel adjustment needle set improper and backed out all the way possibly causing the burner to run rich, soot-up the Stack Arrestor, and retain heat within the fire tube and exhaust stack
- The Level Safety Low was set inadequately to maintain effective fire tube protection against hot spots/tube failure
- The Heater Treater liquid media's and exhaust stack's TSH shutdown devices did not function as required

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

- The missing internal high liquid level shutoff float lever in the Heater Treater Fuel Gas Scrubber may have allowed liquid carryover into the Heater Treater burner assembly
- The operators failed to initiate stop work authority and take immediate action by

shutting in the facility upon discovery of the exhaust stack operating at abnormal temperatures and, "glowing cherry red"

- A plugged-up Stack Arrestor not allowing heat to escape
- The Heater Treater burner Flame Arrestor plugged up not allowing proper airflow
- Possible ignition of excessive soot build-up within the Heater Treater Fire Tube and Stack
- Heater Treater filled with approximately (50) barrels of solids possibly due to an ineffective or noncompatible chemical treatment program, which may have limited the vessel's processing performance, thus leading to high BS&W
- The thermowells for the liquid media's TSH and temperature indicator/gauge did not extend past the vessel nozzles and into the media, preventing the TSH and temperature indicator/gauge from detecting media temperature accurately

20. LIST THE ADDITIONAL INFORMATION:

21. PROPERTY DAMAGED:

NATURE OF DAMAGE:

Heater Treater fire tube	potential fire tube fatigue
Heater Treater exhaust stack	destroyed exhaust stack
Heater Treater Stack Arrestor	destroyed Stack Arrestor

ESTIMATED AMOUNT (TOTAL): \$192,721

22. RECOMMENDATIONS TO PREVENT RECCURANCE NARRATIVE:

The Lake Charles District recommends a Safety Alert for the Agency shared with the Oil and Gas Operators in efforts to heighten the awareness to prevent a reoccurrence.

23. POSSIBLE OCS VIOLATIONS RELATED TO ACCIDENT: YES

24. SPECIFY VIOLATIONS DIRECTLY OR INDIRECTLY CONTRIBUTING. NARRATIVE:

G-892:The Lessee failed to immediately notify the District Manager following the Heater Treater incident that began on September 9,2019 and concluded on September 10,2019.

P-523:The Heater Treater exhaust stack TSH (X-line) failed to signal the panel and initiate a facility shut in.

P-524:TSH (X-line) in the Heater Treater process fluid (liquid media) is inadequately installed and did not function as required.

G-110: The lessee failed to perform operations in a safe and workmanlike manner.

S-001: BSEE's district investigation indicates that Castex Offshore Inc, has failed to fully implement and comply with their SEMS program at VR 252 A between September 9, 2019 and September 10, 2019 by not addressing the SEMS elements described in §250.1902, American Petroleum Institute's Recommended Practice for Development of a Safety and Environmental Management Program for Offshore Operations and Facilities (API RP 75) (as incorporated by reference in §250.198) as required by 30 CFR 250.1900. Specifically, Castex Offshore Inc, failed to comply with 30 CFR 250.1900 at VR 252 A, as a result of not meeting specific requirements.

25. DATE OF ONSITE INVESTIGATION:

23-SEP-2019

26. INVESTIGATION TEAM MEMBERS:

Roger Major / Scott Mouton / Darron Miller/

28. ACCIDENT CLASSIFICATION:

29. ACCIDENT INVESTIGATION

PANEL FORMED: **NO**

OCS REPORT:

30. DISTRICT SUPERVISOR:

Osterman, Mark

APPROVED

DATE: **15-JAN-2020**

27. OPERATOR REPORT ON FILE: