

UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF OCEAN ENERGY MANAGEMENT, REGULATION AND ENFORCEMENT  
GULF OF MEXICO REGION

# ACCIDENT INVESTIGATION REPORT

1. OCCURRED

DATE: **21-MAY-2010** TIME: **1600** HOURS

2. OPERATOR: **McMoRan Oil & Gas LLC**  
REPRESENTATIVE: **Spencer, Blair**  
TELEPHONE: **(504) 582-4241**  
CONTRACTOR: **ISLAND OPERATORS CO. INC.**  
REPRESENTATIVE: **Jarrold Fontenot**  
TELEPHONE: **(337) 233-9594**

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

4. LEASE: **G09529**  
AREA: **VR** LATITUDE:  
BLOCK: **398** LONGITUDE:

5. PLATFORM: **A**  
RIG NAME:

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

STRUCTURAL DAMAGE  
 CRANE  
 OTHER LIFTING DEVICE  
 DAMAGED/DISABLED SAFETY SYS.  
 INCIDENT >\$25K **Dry & Wet Oil Tank**  
 H2S/15MIN./20PPM **Rupture**  
 REQUIRED MUSTER  
 SHUTDOWN FROM GAS RELEASE  
 OTHER

6. OPERATION:

PRODUCTION  
 DRILLING  
 WORKOVER  
 COMPLETION  
 HELICOPTER  
 MOTOR VESSEL  
 PIPELINE SEGMENT NO.  
 OTHER **Construction**

8. CAUSE:

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

9. WATER DEPTH: **381** FT.

10. DISTANCE FROM SHORE: **104** MI.

11. WIND DIRECTION: **SE**  
SPEED: **12** M.P.H.

12. CURRENT DIRECTION:  
SPEED: M.P.H.

13. SEA STATE: **2** FT.

17. INVESTIGATION FINDINGS:

On 21 May 2010, two 500 bbl oil storage tanks exploded/ruptured on McMoran's VR 398 A platform as a result of the ignition of hydrocarbon vapors in the headspace of the tanks. The explosion caused both tanks (wet and dry oil storage tanks) to rupture and immediately discharge the water and crude oil contents of the tanks. The explosion occurred while a McMoran contract construction crew was conducting operations to relocate the platform's LLOG production separator from the southeast portion of the platform's main deck. The BOEMRE investigation of the incident revealed that, at the time of the explosion, the work crew was using an oxy-acetylene cutting torch to remove (for repositioning) an air tugger that had been welded to a main deck I-beam approximately 25 feet from the explosion site. Slag/sparks from the cutting/washing operation is believed to be the source of the ignition in the tanks.

According to McMoran's reconciliation report of the contents of the oil tanks, the 500 bbl dry oil tank contained 34 bbls of crude oil before the explosion, and the adjacent 500 bbl wet oil tank contained from 8 - 25 bbls of crude oil before the explosion, depending on the assumption of the water content in the wet oil tank. Additionally, the report indicated that after the explosion, a total of 18.5 - 29.4 bbls of crude oil were not recovered in platform containment vessels, and this oil was assumed to be spilled overboard. According to McMoran, the dry oil tank had 3 feet of fluid and the wet oil tank had 6 feet of fluid before the explosion.

BOEMRE inspection staff collected the following information regarding the subject incident from , , and of during an interview conducted on 24 May 2010. On 21 May 2010, the construction crew started at 0600 hours with a safety meeting, pre-job planner (discussion of how job is to be conducted) and Job Safety Analysis (JSA). After the morning meetings, the construction crew started work on the top deck to remove piping. After piping was removed, the construction crew blinded open ended piping located above and below the top deck that led to the production separator on the top deck so that the piping would not act as a conduit for ignition of hydrocarbon vapors. The construction crew then removed an additional line from under the main deck using a band saw. A hole was cut in the grating on the main deck where the tugger was welded to an I-beam for stability during the skidding operation. The tugger was welded to the beam in a position that is on the deck above and about 25 feet horizontally from the wet oil storage tank. McMoran's study of the explosion indicated "The last "washing" activity was located above and approximately 12' laterally south/southwest of the southern portion of the wet oil storage tank". The tanks were neither rendered inert nor shielded with metal or fire resistant guards or curtains as required by 30 CFR 250.113(a). The crew then proceeded to wash the separator skid (which was on solid decking) welds with a cutting torch so that the separator skid could be relocated. When the construction crew completed washing the welds on the skid, they attempted to move the separator skid closer to the crane with the tugger so that the lift of the separator could be made within the specifications indicated on the crane's load chart. After this attempt failed, they picked up the front end of the separator skid with the crane in order to help the tugger slide the separator skid. Using this method, they successfully slid the separator skid approximately 35 feet from its original location. After further evaluation, it was determined that the tugger would need to be moved again in order to position the separator skid to the exact location needed to make the separator skid lift with the crane.

Work was stopped to hold a pre-job meeting on deck to discuss the relocation of the tugger and separator skid. At the conclusion of the meeting, went downstairs to monitor for any signs of gas using a portable gas detector, and to wet down the area with a water hose. At this point, started cutting/washing the tugger welds using an oxy-acetylene cutting torch.

was on the cellar deck and equipped with a dry chemical extinguisher and a potable water hose in order to perform the fire watch duty. Mr. said that he heard a small rumbling noise, and then started walking around the backside of the production separators on the cellar deck to evaluate the situation. Mr. then heard a louder popping noise and became covered in oil. Mr. said that there

was no sign of fire, and the smoke cleared fairly fast from the tank area after spraying down the area with water. After all was clear, , production operator with Island Operators, called the field foreman and then shutdown the platform generator.

The Oil Storage Tanks Explosion Analysis performed by McMoran's consultant, Engineering Systems, Inc, found that several deficiencies existed in the tank system including: 1) the rubber flange gasket below the thief hatch was deteriorated and could have allowed gas leakage, 2) the flame arrestor was occluded with corrosion which resulted in a diminished flow to the extent that an application of a pressurized air stream didn't result in the detection of an air flow through the arrestor 3) the 8-inch, Enardo 600-lb thief hatch was not adequately sized for this application and 4) the storage tanks' bottom-to-shell connection was not welded according to applicable API standards. Although the study was not able to reach a conclusion as to the precise cause of the explosion, it did not discount the adjacent cutting operation as the source of ignition of the explosion and stated, "Sparks/spray normally associated with oxygen/acetylene torch cutting activities could have a casual relationship with the ignition of ignitable liquid vapors and/or flammable gas exterior to and in the vicinity of the oil storage tanks on the platform's cellar deck".

Independent observations of oil sheens made within several days of the subject incident are consistent with the expected trajectory of the spilled oil based on wind direction. An e-mail from Wyatt Tate of McMoran on 7 June 2010, stated that the wind at the platform on 21 May 2010, was out of the south/southeast with a velocity of 8-15 mph. On 22 May 2010, a Mariner employee reported to the NRC (NRC # 941264) that he observed a 10 mile x .75 mile, dark brown sheen located approximately 10.5 miles north/northwest from the platform. On 24 May 2010, BOEMRE inspectors observed a 3 mile x 3 mile, barely discernable sheen located about 18 - 20 miles north/northwest of the platform. McMoran's report (NRC # 941198) to the NRC on 21 May 2010, made after the explosion, stated that they observed a .001 gallon oil spill from the subject platform with dimensions of 100 feet x 50 feet and a silvery color.

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

The probable cause of the incident was the propagating combustion reaction of the volatile vapors and air mixture within the headspaces of the tanks and the torch cutting operation, as a result of the vapors not being properly vented through the flame arrestor. cursory evaluation of the flame arrestor indicated the presence of corrosion deposits and occlusion of the arrestor, resulting in insufficient venting of the volatile vapors and air mixture. The most likely scenario for the volatile vapor/air mixture resulted from the "breathing" of the tanks through the thief hatch. This breathing allowed gas to escape during hot daytime hours and allowed air to enter the tanks during the cooler nighttime hours.

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

N/A

20. LIST THE ADDITIONAL INFORMATION:

1) McMoran should move any equipment containing hydrocarbons or other flammable substances at least 35 feet horizontally from the welding/hotwork area. On decks lower than where hot work is performed, such as in the subject incident, McMoran should move tanks (containing flammable materials) at least 35 feet from the point of impact where slag, sparks or other burning material could fall. If McMoran felt that moving the tanks was not practical, they should have protected the tanks with flame-proofed covers, rendered them inert or shielded them with metal or fire resistant guards or curtains as required by 30 CFR 250.113 (a).

2) McMoran should have serviced the flame arrestor on the oil storage tanks' vent according to the manufacturer's recommendations. McMoran's engineering investigation of the subject incident revealed that the flame arrestor on the oil storage tanks' vent system was occluded with corrosion which resulted in a diminished flow to the extent that an application of a pressurized air stream didn't result in the detection of an air flow through the arrestor. The flame arrestor was equipped with a placard that read "this device must be periodically serviced for continued safe operation"

21. PROPERTY DAMAGED:

NATURE OF DAMAGE:

(2) oil tanks  
piping  
Wet oil pump  
Instrumentation/electrical equipment  
AFFF Unit

Explosion of tanks destroyed the listed equipment.

ESTIMATED AMOUNT (TOTAL): \$498,000

22. RECOMMENDATIONS TO PREVENT RECURRANCE NARRATIVE:

The Lake Charles District recommends the Regional Office of Safety Management issue a Safety Alert to address the importance of periodically inspecting flame arrestors as well as any such device that has the tendency to become plugged over time. The proper placement of flame arrestor should also be considered during the design phase to aid in the inspection of this safety device. In this instance the flame arrestor was installed on the end of the flare boom section with no easy access.

23. POSSIBLE OCS VIOLATIONS RELATED TO ACCIDENT: YES

24. SPECIFY VIOLATIONS DIRECTLY OR INDIRECTLY CONTRIBUTING. NARRATIVE:

G-303 - 1) McMoran did not move equipment containing hydrocarbons or other flammable substances at least 35 feet horizontally from the welding/hotwork area. In addition, McMoran did not move tanks at least 35 feet from the point of impact where slag, sparks or other burning material could fall. If McMoran felt that moving the tanks was not practical, they should have protected the tanks with flame-proofed covers, rendered them inert or shielded them with metal or fire resistant guards or curtains as required by 30 CFR 250.113 (a).

G-110 - McMoran failed to maintain the flame arrestor on the oil storage tanks in

a safe manner. The flame arrestor was equipped with a placard that read "this device must be periodically serviced for continued safe operation". The oil tank explosion analysis report revealed the flame arrestor was obstructed and would not allow air flow through the arrestor.

E-100 - McMoran did not prevent unauthorized discharge of crude oil into the offshore waters. McMorans's reconciliation of the tank contents showed that, after the explosion, a total of 18.5 bbls to 29.4 bbls of crude oil were not recovered in platform containment vessels, and this crude oil volume is assumed to be spilled overboard.

25. DATE OF ONSITE INVESTIGATION:

24-MAY-2010

26. ONSITE TEAM MEMBERS:

Marcus Mouton / Mark Osterman /  
Wayne Meaux / Cody LeBlanc /

29. ACCIDENT INVESTIGATION

PANEL FORMED: NO

OCS REPORT:

30. DISTRICT SUPERVISOR:

Williamson, Larry

APPROVED

DATE: 07-SEP-2010

# FIRE/EXPLOSION ATTACHMENT

1. SOURCE OF IGNITION: **Unknown**

2. TYPE OF FUEL:
- GAS
  - OIL
  - DIESEL
  - CONDENSATE
  - HYDRAULIC
  - OTHER

3. FUEL SOURCE: **Dry Oil and Wet Oil Tank**

4. WERE PRECAUTIONS OR ACTIONS TAKEN TO ISOLATE  
KNOWN SOURCES OF IGNITION PRIOR TO THE ACCIDENT ? **NO**

5. TYPE OF FIREFIGHTING EQUIPMENT UTILIZED:
- HANDHELD
  - WHEELED UNIT
  - FIXED CHEMICAL
  - FIXED WATER
  - NONE
  - OTHER

# INJURY/FATALITY/WITNESS ATTACHMENT

OPERATOR REPRESENTATIVE

CONTRACTOR REPRESENTATIVE

OTHER \_\_\_\_\_

INJURY

FATALITY

WITNESS

NAME:

HOME ADDRESS:

CITY:

STATE:

WORK PHONE:

TOTAL OFFSHORE EXPERIENCE:

YEARS

EMPLOYED BY:

BUSINESS ADDRESS:

CITY:

STATE:

ZIP CODE:

OPERATOR REPRESENTATIVE

CONTRACTOR REPRESENTATIVE

OTHER OTHER \_\_\_\_\_

INJURY

FATALITY

WITNESS

NAME:

HOME ADDRESS:

CITY:

STATE:

WORK PHONE:

TOTAL OFFSHORE EXPERIENCE:

YEARS

EMPLOYED BY:

BUSINESS ADDRESS:

CITY:

STATE:

ZIP CODE:

# INJURY/FATALITY/WITNESS ATTACHMENT

OPERATOR REPRESENTATIVE

INJURY

CONTRACTOR REPRESENTATIVE

FATALITY

OTHER OTHER

WITNESS

NAME:

HOME ADDRESS:

CITY:

STATE:

WORK PHONE:

TOTAL OFFSHORE EXPERIENCE:

YEARS

EMPLOYED BY:

BUSINESS ADDRESS:

CITY:

STATE:

ZIP CODE:

