Lionel RAMAT
J0024256

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AUTHENTIFICATION INTERNE
Date: 2020.08.06 17:16:04 +01'00'

Spill Event Summary

Event & Response:

On the 31/07/2020, about 7:00 AM, Oil sheen was observed at the S6-S7 starboard side of the Egina FPSO, Akpo confirmed the sheen was visible at the same time. Oil bubbles were immediately observed on surface water along the FPSO at S6-S7. As precaution, produced water treatment was rerouted to Continuous Settling Tank. Hydrocyclone outlet was fine. CFU outlet was dirty.

On the 31/07/2020, about 7:30, upon identification of the spill, Tango Delta was informed. Surfer boat survey was done but did not confirm the source of the sheen. Sampling at sea level was taken.

On the 31/07/2020, about 10:30, Helicopter Over Flight confirmed the sheen and established sighting the sheen at 3-4 miles NE of Egina up to 3-4 Miles NE of Akpo covering an area of 100m by 10Nm. Oil color was discontinuous metallic and true sheen (50% each). Based on Bonn Agreement Calculation, the spill was calculated as 40 barrels. Also, at Onshore OSRA modelling for spill drift was done and this indicated that the spill was drifting North Easterly but with no potential to impact any coastal area. A second modelling considering the current and wind speed also confirmed the initial spill direction.

Based on observation, Site continued investigation suspecting a loss of control of the Produced water Treatment during the night. Site issued incident notification report.

On the 01/08/2020, about 10:30, a second Helicopter Over Flight was performed, around 20NM at NE far from EGINA. No sheen was longer noticed and hence no active oil spill response was deployed.

Regarding FPSO investigation, presence of oily water at the top of the discharge caisson after 24hours of decantation confirmed the PWT was the source of the pollution.

Till the 03/08/20, PWT was maintained rerouted to Continuous Settling Tank. The discharge caisson was skimmed. Maintenance Team performed a review of the control of the degazing drum level transmitter. Production Team issued standing instruction to reinforce the monitoring and the control of the PWT (refer technical part). During this 3 days, quality of produced water was confirmed at acceptable quality (TPH < 30 ppm).

On 03/08/20 afternoon Discharge oversea was resumed, after TPH confirmed at 12 ppm.

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Technical Explanation

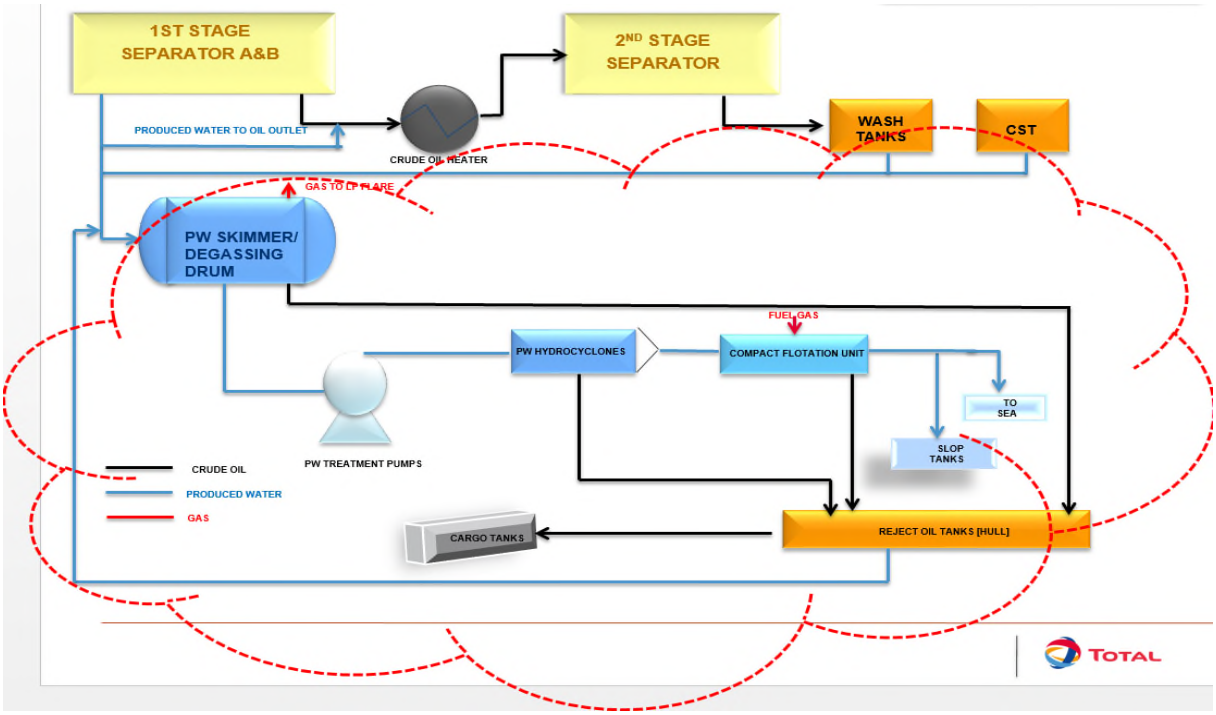

Figure 1: PRODUCED WATER TREATMENT SYSTEM

After the shutdown on 11th July, there has been accumulation of deposits (analysed as Calcium Naphthenates) in the 1st Stage separators which rapidly clogs the strainers on the water recycle line to oil outlet (See Fig. 1). In order to continue operating the separators in 3-phase and not transfer the deposits to the oil outlet, the 1st Stage Separators water outlet to degassing drum was opened as per design. However, due to the presence of naphthenates, the quality of water from the separators was quite poor, but still within the treatment capacity of the degassing drum (designed to treat up to 2000ppm at inlet), hence, the discharge water overboard was still within specification.

On 28th July, the Process & Safety LDT's (Guided Wave Radar Type which actually measures the level in the drum than the interface) started malfunctioning, giving spurious readings, deviations and sometimes loop fault resulting in complete loss of readings. The Maintenance Instrument team began troubleshooting and logged data from the transmitters, hence the operator had to rely on LT in the vessel oil compartment and local level gauge on the vessel when there is complete loss of readings.

On the 30th night, the level indication in the degassing drum zeroed out and it was assumed that the transmitters were faulty again so the operator regulated the flow through the degassing drum using the LV's downstream the hydrocyclone. It is believed that either of the following may have actually occurred:

- The degassing drum level may have actually been very low at this point and there was no sufficient residence time for the oily water in the vessel OR

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- The quality of oily water from 1st Stage Separator B deteriorated, hence water with high concentration of oil was sent to the degassing drum which exceeded the treatment capacity of the vessel.

It is difficult to ascertain the real cause of the poor water quality discharged as the online analysers across the treatment system are not reliable. Similarly, the complexity of regulating the vessel pressure manually due to lack of automatic pressure regulation further complicates the operation of the produced water treatment system. The vessel pressure is controlled manually by adjusting the valve on the line to flare to prevent exceeding the operating pressure and yet maintain sufficient pressure at the suction of the produced water treatment pump. Along the night, the online analyzer at discharge line reported a constant value around 28 ppm.

The following mitigations have since been implemented to prevent reoccurrence:

- Wash water flow to 1st Stage Separator B has been reduced to minimize quantity of oily water sent from the Separator to the produced water degassing drum
- Standing Instruction issued on the operation of the produced water treatment system which includes maintaining a high level in the drum, operating the drum level permanently on AUTO mode, frequent backwash of the hydrocyclones per shift, etc.
- Collection of reject water samples during night shift for visual checks until the online analysers are fixed.
- Instruction to divert produced water flow to Slop tank / CST's if the Degassing drum level transmitters goes faulty or indicates doubtful readings.

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Action Summary (Synergi Extract)

No.	Action description *	Urgency (priority) *	Actions taken/Comments (including effectiveness)
1	Produced water discharge was stopped.	1- to be done asap	Produced water discharge was stopped. PWT discharge has returned to normal. Quality of discharge 12ppm.
2	Perform survey with surfer boat and collect sample from forward starboard side for analysis.	1- to be done asap	Survey by boat done and sample collected.
3	Monitor the starboard area, OLT line and SBM.	1- to be done asap	The starboard area, OLT line and the SBM was monitored.
4	Conduct Aerial surveillance with helicopter.	1- to be done asap	Aerial surveillance conducted. Confirmed no further sheen.
5	Skim the oil in the disposal casing and flush all produce water lines.	1- to be done asap	The oil in the disposal casing was skimmed and all produce water lines flushed.
6	Calibrate the level transmitter and issue standing instruction for proper control of the produce water treatment.	1- to be done asap	Level transmitter calibrated and standing instruction issued.
7	Re-route the produce water treatment to the CST. Also test run the system in a close loop .	1- to be done asap	The produce water treatment was re-routed and tested in a close loop with quality of discharge below 20 ppm.

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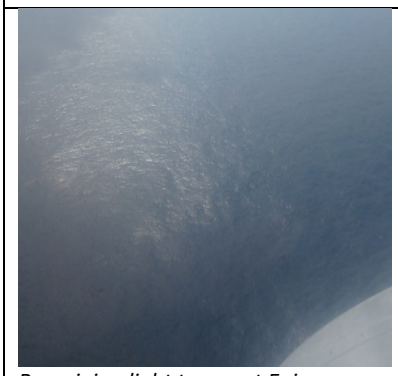
Event Pictures

Sheens at EGINA

Sheens at AKPO

Front end of the Sheen

Pictures of 31st July 2020 (10:30 AM)

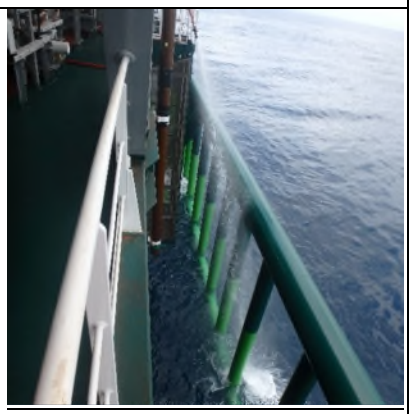


Remaining light traces at Egina

Remaining light traces at Egina

No longer sheen at 10NM NE from Akpo

Pictures of 1st August 2020 (10:00 AM around EGINA)



Pictures of 3rd August 2020 (Afternoon from EGINA)

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