



CASE STUDY

OISD/CS/2023-2024/P&E/13

Dt.:24/01/2024

INTRODUCTION

Title: Oil Ingress into waterbodies outside Refinery premises.

Location: Refinery

Loss/ Outcome: Loss of Aquatic life, Water contamination, Soil contamination.

BRIEF OF INCIDENT:

Severe flooding occurred in the Refinery premises due to 36 hours of incessant rain caused by effect of a cyclone. Discharge of 48000 cusecs of water from the nearby reservoirs aggravated the flood situation. The level in the outside canal increased by around 1 meter, above normal storm water level, causing hindrance in water evacuation from refinery area/reverse flow. Consequently, it is suspected that floodwater mixed with contaminated rainwater system of the refinery. Water level receded and normalized inside the refinery after 2- 3 days of the incessant rain.

OBSERVATIONS / SHORTCOMINGS

- A considerable quantity of floating oil was observed in the storm water channels in the Refinery area, few of the process units and upstream of sluice valves of Pond -A, C in Refinery – phase 1 area and Pond-E in Mandatory Tank farm.
- In Mandatory tank farm area, oil accumulation was observed in the ETP inlet sump that feeds to ETP. It was also observed that there was lot of oil spillage in the storm channel due to overflow of ETP inlet sump. This storm water channels routes to Pond – E.
- ETP/ OWS inlet sump at Refinery & Mandatory tank farm are designed as open system, which is prone to oil overflow from the sump/ system and release of volatile organic compounds to the environment.
- No analyzer was installed in the Storm Pond -A, C & E to ascertain the storm water quality before routing to outside canal.
- The water level at the downstream increased above the gradient of sluice valves at Pond- C, which resulted in stoppage of gravity flow from inside refinery premises to outside canal. Outside canal level raised due to opening of nearby reservoirs.
- All the storm water pond level was considerably on higher side, inspite of running of the evacuation pumps.

*This Case study is based on the Investigation report submitted by committee and published for information purpose only.
This information should be evaluated to determine if it is applicable in your operations, to avoid recurrence of such incidents.*

- Refinery convened a meeting 3 - 4 days prior to the incident regarding the “Monsoon preparedness”. However, no document was evident depicting the compliance of the points recommended in the said meeting.
- No SOP was evident for handling the situation of oil spillage into the storm channel.
- Level instrument with auto start/stop provision was not available for ETP inlet sump and any of the storm water ponds.
- Issues pertaining to oil accumulation in the storm channel had been highlighted in the previous ESA & SSA. However, the issues were not highlighted in the safety committee meeting, internal safety audit or not reported as unsafe condition.
- Storm water system adequacy was not carried out by Refinery despite the same was highlighted in External Safety Audit report, carried out by OISD.
- Refinery has submitted the pipeline integrity report, stating that leak was not observed/ reported in any of the hydrocarbon lines inside the refinery and there was no pressure drop observed.
- It was learned that oil slick had formed near the creek area and oil contaminated flood water had inundated houses near the creek area, which is about 10 KMS from Refinery.
- There are many other industries in the vicinity of the Refinery whose water draining is also done through the same canal. Oil traces were also observed upstream of the Refinery in the said canal.
- As per State Pollution Board report submitted to NGT, 105.28 KL of oily water was skimmed, and 393.7 tonnes of oily sludge was removed.

CONCLUSION / ROOT CAUSE

Likely Source of Oil Ingress into Storm Water Channel Inside Refinery:

- Due to Ground water level rise, oil might have overflowed from the Oil Water Sewer, Contaminated Rainwater Sewer Pit from Process units and offsite tank farm.
- Oil might have overflowed from ETP inlet sump (near Oil Water Sewer -1 Pump house) due to unprecedented water flooding inside refinery.

Likely Source of Oil Spill to Outside Canal:

- Floating oil accumulated in the storm channel leading to Storm Pond A & C and from there oil might have escaped into the outside canal due to unprecedented water flooding inside refinery.
- Oil ingress from other industries in the vicinity cannot be ruled out.

RECOMMENDATIONS

- Storm water channel located across refinery shall be maintained ‘oil free’. Industry shall review the requirement of an SOP that should cover all the operational and HSE aspects to prevent oil spillage into the storm channel.

- All contamination and odorous wastewater streams shall be handled in closed system from the source to the primary treatment stage. Receiving sump, Oil-water separators, slop oil sump and equalization tanks shall be provided with floating/ fixed covers. The off gas generated shall be treated to remove at least 90% of VOC and eliminate odour. The collection system shall be covered with water seals (traps) on sewers and drains and gas tight covers on junction boxes as per as per OISD-STD-108.
- Oil Analyzers shall be installed at the outlet of storm water pond to ascertain the oil content on real time basis. Periodical laboratory test of all parameters, as per statutory requirement, shall also be done particularly before discharge of water out of the premises.
- Industry shall conduct a feasibility study to isolate gravity flow of Storm Water from Pond- C to outside canal and to provide pump discharge line from Storm Pond -C to outside canal/ sea, so that the outside canal level rise/ water flooding does not have any impact inside Industry. (Sealing of all external entry points into Industry premises)
- Pre-monsoon/upon-cyclone-warning inspection of ETP and its connected sump & Storm water channel/ Pond shall be carried out with checklist. Matters should be reviewed at appropriate level ensuring implementation of mitigation measures and proper records should be maintained of action plan as well as the implementation.
- Unprecedented water flooding/ cyclone related scenarios shall be included in ERDMP. Appropriate response plan and mitigation measures by the respective department/ individual shall be formulated for the identified scenario. Industry shall practice the same in the mock drill to be ready to tackle the real scenarios.
- Operation manual of the storm water system should be developed, and obsolete documents should be discarded. Operation manual of functional systems of Industry should be updated.
- All actions taken should be properly recorded in logbook to ensure that the incoming group is aware of the activities and their progress.
- Industry should review installing level instruments with auto start/stop provision for the pumps located at ETP inlet sump.
- All the safety related issues should be highlighted in the sectional safety committee meetings and the same should be addressed within the stipulated time period. If the same is not addressed, it should be escalated to the apex level.
- Industry shall motivate their employees to report near miss, unsafe act/ condition promptly and appropriate action shall be taken. The compliance of the same shall be monitored through safety meetings as per clause 5.1.3 of OISD-GDN-206.
