Incident Investigation Findings Summary

Incident Date(s): May 22 and May 31, 2021
Incident Title: Sheen on Sand Creek
Executive Summary   Two small sheen events occurred on May 22 and May 31 near the Suncor outfall pipe in Sand Creek. Suncor responded to mitigate the issues and conducted a thorough investigation of potential causes. Based on information gathered during the investigation, Suncor believes the separate sheen events were caused by two separate, small onsite spills where the spilled material flowed into an aeration basin that connects to the outfall discharge pipe.
Incident Summary   On May 22, facility personnel observed a transient sheen in a section of Sand Creek near the refinery. Upon this observation, Suncor activated the site Emergency Response Team and installed sorbent and hard boom to contain the sheen. During this initial response, Suncor personnel noted that the oil sheen was coming from the outfall pipe but did not locate a specific fuel spill. Suncor notified regulatory agencies and conducted frequent inspection walks along Sand Creek. Suncor performed air monitoring in conjunction with the inspection walks and did not detect benzene. Suncor also began collecting and sampling water from the outfall pipe, Sand Creek surface water, and nearby groundwater   On May 31, personnel conducting inspection walks along Sand Creek observed a second transient sheen in the same area as the May 22 transient sheen. Again, similar to the May 22 sheen, personnel observed oil sheen coming from the outfall pipe. Containment booms Suncor previously deployed contained the May 31 sheen and allowed recovery of the sheen using vacuum trucks.   Starting on May 22, Suncor began collecting surface water, groundwater, and outfall water samples and shared the results of the analysis with the Colorado Department of Public Health and Environment (CDPHE). During this period, surface water samples indicated no benzene, toluene, ethylbenzene and xylene (BTEX) concentrations above the respective Colorado Surface Water Standards. One outfall sample collected the morning of May 31 contained concentrations of benzene and total BTEX above the refinery's permit limits. Samples collected the evening of May 31 indicated that benzene and total BTEX were well below the refinery's permit limits.   To date, aside from the one outfall sample on May 31, the samples of the refinery's outfall water have not exceeded the permit limits for benzene and total BTEX. Surface water samples, collected from Sand Creek and the South Platte River, analyzed to date, have been below the respective Colorado Surface Water Standards for BTEX compounds.   As of July 6, and in response to actions taken by Suncor, CDPHE has allowed Suncor to remove the containment boom, reduce ground and surface water sampling, and reduce the walks down Sand Creek. CDPHE also has closed the compliance advisory sent to Suncor on May 25.
Investigation for May 22 Sheen Event   For the May 22 sheen event, Suncor identified and investigated three credible causes: (1) a potential fuel spill reaching the aeration basin; (2) power loss on May 20 to groundwater pumps that resulted in groundwater elevations briefly overtopping a segment of the Sand Creek barrier wall; and (3) compromised integrity of the outfall piping.

Information in this report is based on the facts known to Suncor Energy (U.S.A.) Inc. at the time of preparation. We may update or change the information contained herein if and to the extent additional facts become available.

(1) Onsite fuel spill

During the deployment of containment boom on May 22, response personnel observed that sheen was coming from the outfall discharge pipe. Given the layout of the outfall piping (with one end open at the aeration basin and the other at Sand Creek) and the observation from response personnel that the sheen was noted coming from the outfall pipe, the likely cause for the sheen would be from a spill or material entering the pipe at the aeration basin. Suncor checked upstream of the aeration basin and found nothing abnormal in the water flowing into the aeration basin.

(2) Loss of power to pumping wells

Power loss to the groundwater wells could result in groundwater levels rising and overtopping the barrier wall (which could cause a sheen). Data obtained during well groundwater level monitoring did show groundwater levels rising and overtopping the wall. However, the location and intermittent nature of the observed sheen do not support the theory that power loss was the cause of the sheen. Water overtopped the barrier wall slightly to the east of the outfall pipe which was not in the location of the observation of sheen coming from the end of the outfall pipe. If increased groundwater elevations inside the barrier wall due to a power loss were causing the issue, then the sheen would have occurred for a longer period of time and to the east of the outfall pipe.

(3) Integrity of outfall piping:

If the outfall pipe had integrity issues, there is a possibility that contaminants could enter the pipe between the aeration basin and the end of the outfall pipe in low discharge flow conditions. Suncor recreated similar low discharge flow conditions through the outfall pipe and collected several sample sets from the aeration basin and the end of the discharge pipe. During this test, no sheen was observed coming from the end of the outfall pipe. Suncor also collected and analyzed samples at the aeration basin and the end of the outfall discharge pipe for multiple weeks which indicated benzene levels at the end of the pipe matched the levels at the aeration basin. Based on these results, the outfall piping integrity is not believed to be the cause for the sheen events.

Given the elimination of both the outfall piping integrity and the loss of power to the pumping wells as potential causes for the sheen on May 22, the likely cause of the sheen on May 22 is a spill of oil migrating into the aeration basin.

Investigation for May 31 Sheen Event

For the May 31 sheen event, Suncor identified and investigated two credible causes: (1) A potential fuel spill reaching the aeration basin; and (2) compromised integrity of the outfall piping. Suncor did not investigate a power loss for the May 31 sheen event, as power was restored on May 20 and groundwater levels did not go above the barrier wall after May 21.

(1) Onsite fuel spill

On May 31 a small onsite fuel spill was observed near the aeration basin. This spill was related to filling a fuel tank providing fuel to generators in the area. Heavy precipitation from May 30-31 produced stormwater that carried the small fuel spill into the aeration basin. Booms were already in place within Sand Creek near the outfall pipe and downstream, which allowed for containment of the sheen. Suncor cleaned up the spill with absorbent materials and the soil near the aeration basin was removed. Suncor placed additional berms around the aeration basin to prevent any spills from reaching the water, and the generators and fuel tank were also removed once all work was completed in the area.

(2) Integrity of outfall piping

As stated in the May 22 investigation, the integrity of the outfall piping was evaluated and found to not be a likely cause for the May 31 sheen event.

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Given the elimination of the outfall piping integrity as a potential cause for the sheen on May 31 and the direct observation of the fuel spill migrating into the aeration basin, the cause for the May 31 is attributed to the fuel spill.

Recommended Actions to Prevent Recurrence

In response to the sheen events on May 22 and May 31, Suncor is improving protections to the outfall aeration basin to prevent any spills from entering the basin. Additionally, Suncor removed all loose soil around the aeration basin which will prevent further materials from entering the basin during storm events.