

MIXED LIQUOR SPILL, LIBERTY LAKE WATER RECLAMATION FACILITY

May 18 & 19, 2017

As part of the ongoing upgrade to the facility, Flow Split Box 3, a distribution box feeding Clarifiers 1 through 4, is receiving modifications. The purpose of the modifications is to create an injection point for the addition of treatment chemicals upstream of the secondary clarifiers and to return membrane filter reject flows for added secondary clarification.

Status of the system at the time of the spill:

1. Flow Split Box 3 was dammed to allow installation of slide gates on the incoming flows from Aeration Basins 1 and 2 and flows to Clarifiers 1, 2 and 3 were gated off.
2. The 4" holes for installation of the chemical feed lines had been cored into the outlet boxes that gravity feed the clarifiers.
3. Clarifier 1 was in service and Clarifier 1, 2 and 3 were off. The chemical feed line cored holes were plugged by inflatable test balls in the outlet box for Clarifier 4.

Events of the spill:

1. The facility operators vary the flow through the plant by raising the flow starting in the afternoon to create space in the Equalization basin for the high morning flows by increasing the rate to 650 gpm. In the early morning the flow is reduced to 500 gpm to maintain adequate supplies of influent to dose the facility through the day. The operator accessed the SCADA at 0430 hrs on 5/19/17 for a routine check and observed that the effluent flow rate had decreased to approximately 375 gpm starting at 2130 hrs on 5/18/17.
2. Approximately 2130 hrs on 5/18/17, one of the inflatable test balls deflated and the mixed liquor behind it pushed it out of the hole.
3. The operator arrived at the facility at 0515 on 5/19/17 to examine the cause of the reduced flow and saw that the test ball was out and that the mixed liquor was spilling. He shut the gate to the clarifier and shut the Equalization pumps to stop the flow to the Split Box.
4. The mixed liquor that spilled filled the excavation around the Split Box to the level of the cored holes leading to the Clarifiers that were out of service. The flow entered the exit portions of the split box leading to Clarifiers 1, 2 and 3 and started filling the clarifiers.
5. The soils in the excavation are relatively clean gravel and are capable of rapid percolation of clear liquids. The solids content of the mixed liquor created a seal in the excavation pit and affected the percolation capacity of the soil. The result was that a

portion of the mixed liquor entered the boxes and was diverted into the unused clarifiers. We have calculated the volume of mixed liquor that was diverted into the clarifiers and can estimate the quantity of liquid and solids that were deposited on the ground. The results of the calculations are as follows:

6. The reduction in flow lasted approximately 7 3/4 hrs.
 - a. Initial Effluent Flow: $650 - 375 = 275$ gpm
 - b. At 275 gpm x 7.75 hrs. x 60 mins/hr = 127,875 gals
 - c. Solids content of mixed liquor: 1,210 mg/l (ppm)
 - d. For convenience we use millions of gallons: $123,750/1,000,000 = 0.123750$ Mgal
 - e. Solids spilled: $1,210 \text{ ppm} \times 0.123750 \text{ Mgal} \times 8.34 \text{ lbs/gal} = 1,290 \text{ lbs solids}$
 - f. Flow into Clarifier 1: increased 2 ft. at 14,680 gals/ft. = 29,360 gals
 - g. Flow into Clarifier 2: increased 4 ft. at 9,395 gals/ft. = 37,580 gals
 - h. Flow into Clarifier 3: increased 4 ft. at 9,395 gals/ft. = 37,580 gals
 - i. Total flow into Clarifiers: $29,360 + 37,580 + 37,580 = 104,520$ gals
 - j. Solids into Clarifiers: $0.104520 \text{ Mgal} \times 1,210 \text{ ppm} \times 8.34 \text{ lbs/gal} = 1,054 \text{ lbs. solids}$
 - k. Total solids in spill left in excavation: $1,290 \text{ lbs. solids} - 1,054 \text{ lbs. solids} = 236 \text{ lbs.}$
 - l. Total liquid spilled in excavation: $127,875 \text{ gals} - 104,520 \text{ gals} = 23,355 \text{ gals}$
7. While cleaning the excavation, prior to excavation of the remains of the spill, a pump was utilized returning a slurry of wash down water and solids to the clarifier influent stream. We estimate 50% of the solids were captured from the excavation and pumped back into the clarifier.
8. The contractor excavated 4" to 6" of material containing the remaining mixed liquor solids out of the hole. The mix of soil and solids was placed in a dump truck and stored in one of the existing drying beds at the facility. Approximately 10 yards of material was removed to expose "clean" soil below the solids deposition.
9. The inflatable test balls were replaced with mechanical expandable test plugs. The test plugs were reinforced on the outside of the Split Box with a plank bolted to the wall. This should eliminate the possibility of a "full port" leak in the future until the modifications to the Split Box are finished.













