Timeline and Actions Taken – WWTF Upset

Springdale Water Utilities – AR0022063

August – September, 2018

August 30, 2018

Laboratory staff reported that the NH3-N in the 24-hour composite sample of facility effluent for August 29 was much higher than usual. An occasional spike in the 1 to 2 mg/L range had been seen earlier in 2018 and very rarely before that, but this sample was reported to be 8.47 mg/L. A grab sample was immediately collected and found to be even higher than that – around 11 mg/L. A toxic event was suspected, so a sample of return activated sludge was collected and viewed under the microscope. The analysis showed a few living rotifers and crawlers, some testate amoebae and a poor floc. The population seemed small, and no stalked ciliates were present, only shells of many once-living microorganisms. Clearly a toxic event had occurred.

A "fishing hole" downstream from the facility outfall was checked. Fish and minnows were visible, active and appeared normal. No apparent environmental impact was observed. (Operations staff continued to check along the stream and at the same site at least once every 12-hour shift throughout the upset event, and saw no apparent impact.)

Wasting of activated sludge from Springdale's WWTF was halted in order to preserve any remaining bacteria, hoping that the toxic material was not persistent in the system. Staff from Fayetteville's WRRFs were contacted and arrangements made to have them bring semi-truckloads of 18% thickened sludge from their facility and dump them into the process trains. Two loads were brought in the afternoon of August 29 (followed by 4 on the 30th and 2 final loads on the 31st).

Pretreatment staff started looking for possible sources of toxicity, including phone calls to all permitted industrial users, site visits, and more. This will be detailed further as this report is revised and finalized for attachment to the September 2018 DMR.

Operations staff started running a colorimetric (process control) test on facility effluent samples every 2 hours around the clock to track NH3-N. Although not a very accurate test, it was used to indicate whether discharge concentrations were trending higher or lower. (These tests are ongoing to date.)

August 31, 2018

NH3-N for August 30 was reported to be 11.4 mg/L, higher than the previous day. A second microscopic analysis showed a few older looking stalked ciliates present, likely from Fayetteville's sludge. This indicated that acute toxicity was no longer present, as the ciliates survived.

The search for the source of toxicity continued with on-site reviews of online pH meters at industrial users and a thorough inspection of one of the possible sources. No definitive results were obtained.

Composite samples from August 29 were sent off to American Interplex to be analyzed for Table II and III, along with a few common disinfectants known to be used by industrial facilities in Springdale. (These results have not yet been received as of 9/10/2018).

(August 31, 2018, cont.)

Layne Pemberton, ADEQ, was called and told about the event by Heath Ward, Executive Dir., and Jennifer Enos, WWTF Dir.. The conversation was followed up with an Upset Report being submitted on the same date.

September 1, 2018

NH3-N concentration (operator tests) appeared to drop all day. Monitoring procedures and sludge addition continued this date as indicated above.

September 2, 2018

Laboratory staff ran NH3-N and obtained 13.4 mg/L for 8/31 and 11.2 mg/L for 9/1. The seven day average for the week ending 9/1 was 6.68 mg/L, with a limit of 2.3 mg/L.

Monitoring continued this day, but no additional sludge was brought in as the operator tests showed very low NH3-N results.

September 3, 2018 (Labor Day)

Again low NH3-N results were shown on operator grabs.

September 4, 2018

Composite NH3-N results were 0.13 mg/L for 9/2 and 9/3. Microscopic analysis showed young stalked ciliates developing in the sludge. Wasting started but the target mixed liquor number was increased to help select for improved NH3-N removal (and less optimal T. Phos removal, but within permit limitations).

Jennifer Enos called Richard Healey, ADEQ to go over the events of the previous week and report that as expected the 7 day limit for August 26 – September 1, 2018 was exceeded but the 30 day limit for August 2018 was not exceeded. A report and copies of the sludge tickets for Fayetteville will be attached to the August 2018 DMR (on CDX) for the record.

September 5, 2018

Low results were again seen for 9/4 at 0.21 mg/L. However, operator tests on grab samples showed a slow increase in NH3-N starting that afternoon.

September 6, 2018

9/5 test result was 3.25 mg/L. However, this time the microorganisms continued to look good. It was decided to allow the plant to try to recover on its own rather than add more sludge from Fayetteville.

Tests on the three process trains in service showed much higher results from the old (5 stage) Bardenpho train than from the newer (3 stage) trains. (19 mg/L vs. approx. 6 mg/L). This was opposite of what was expected.

September 7, 2018

9/6 NH3-N was 6.89 mg/L. Operator monitoring continued.

Jennifer Enos called Richard Healey, ADEQ, to report that the original upset or a new one was continuing to affect the WWTF's nitrification. It was agreed that since the upset report submitted on August 31 was open-ended that an additional report was not required. This summary was suggested to be sent to ADEQ staff on 9/10.

Facility effluent CBOD results for the week of the upset were elevated, but peaked below 6 mg/L, far below permit limits.

Plans were made to possibly put the facility's 4th process train into service to try to increase the resiliency of the plant. The small amount of rain water in the train was pumped out and treated over the weekend.

September 8 – 9, 2018

Operations staff continued to monitor grab samples over the weekend. Levels continued to drop.

September 10, 2018

NH3-N results were: 9/7: 11.1 mg/L, 9/8: 7.37 mg/L, 9/9: 2.26 mg/L. Values below 1 mg/L are expected for today. 7 day NH3-N for the week of September 2 – 8, 2018 was 4.15 mg/L, again in excess of the 2.3 mg/L limitation.

Staff found that excessive flow (about ½ rather than 1/3 of the total flow) was being sent to the 5 stage Bardenpho system, stressing it more than the other two trains. This was corrected. Grab samples from all three trains before the change was made showed equally good results, however, reducing the stress on the train may help it to operate better. It was decided to hold off on starting up the 4th train to see if this change alone allowed the system to handle more toxic material or an ongoing system recovery (if any is observed this week.)

Ongoing visual monitoring downstream of the outfall continues to show no appearance of environmental impact.

Conclusion

To date, there are two 7 day average NH3-N violations. Operations staff continues to monitor facility effluent grab samples for NH3-N every 2 hours, and check the receiving stream for environmental impact if it increases. American Interplex' report will be reviewed when it is received to help look for or rule out sources of toxicity. Pretreatment staff continues to aggressively search for possible industrial sources of toxicity. Operations staff is actively attempting to further optimize the treatment process to make it more resilient. Microscopic analysis shows continuing improvement in the indicator microorganisms present in the system. Correspondence with ADEQ will continue as further information is obtained. Staff is on high alert waiting for any future loss of nitrification (if it occurs). This report will be refined and finalized to be attached to Springdale's September 2018 DMR.