City of Lima, Ohio

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David J. Berger, Mayor

May 30, 2019

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Re: Nitrification Towers Sampling

Dear Ladies and Gentlemen:

In accordance with Paragraph (A) of Appendix C of the Consent Decree among the United States, the State of Ohio and the City of Lima, the City hereby requests that EPA and Ohio EPA approve a one-year extension of the sampling period, from August 1, 2019 through July 31, 2020 to determine compliance with the Performance Criteria applicable to the Nitrification Towers. The basis for this request is provided below.

Appendix C prescribes a one-year sampling period, from July 2018 through July 2019, to determine the effectiveness of the Nitrification Towers during wet weather events but notes that, if this initial sampling period is insufficient to determine whether the Towers can comply with the

Performance Criteria due to inadequate sampling events, the sampling period may be extended. For various reasons, described below, the amount of sampling that has been able to be performed when the Towers were fully operational has not been sufficient to evaluate their ability to consistently achieve the Performance Criteria.

Tower Seeding

- Seeding of the towers was scheduled to be initiated in the first quarter of 2018. However, in February, the City discovered that the bearing on one of the tower rotary distributors had failed. The process of obtaining and installing a replacement bearing—which requires a crane—was completed on May 23, 2018 and seeding was initiated.
- Another complication also arose in early 2018: the WWTP began having issues with solids handling and recycle loading, which adversely impacted the quality of the seed to the towers. To work around this complication, the plant changed the seed source to the effluent from primary tanks 5-7 which do not receive recycle loads.
- In mid-June 2018, due to an unusually high solids load at the WWTP, seeding was interrupted because of the potential for fouling the towers.
- In July, a problem arose with the gate used to seed the towers.
- In mid-July, the plant experienced unusually high BOD loadings to its headworks. To avoid risking performance of the towers, seeding was suspended the last two weeks of the month.
- Seeding from primary tanks 5-7 resumed the first part of August through mid-August.
- By mid-August, the City's recycle stream issues had been resolved and the plant began re-using the original seed source.
- As a result of the issues noted above, the plant made limited progress in seeding the towers until mid-August 2018.
- On October 22, 2018, growth on the tower media was observed and samples of the material were analyzed, confirming the presence of microorganisms.
- After October 22, the plant was prepared to test the towers for treatment of peak wet weather flows.

Peak Wet Weather Events

- Peak wet weather mode was attempted for the first time in late October 2018. Early in the test, plant staff visually observed degraded effluent quality in the tower effluent. Peak wet weather mode was terminated to investigate the cause. Due to the short duration of the test, no tower sampling was performed.
- Investigation of the cause of the tower effluent quality determined that the tower seed flow, being much less than the wet weather flows, was sitting in the large sewer leading to the tower pump station for an extended period causing settling of solids and septic conditions. This condition was not apparent until the peak wet weather flow mode was engaged. The decision was made to not implement peak wet weather mode until this issue was resolved.
- Through November and December 2018, alternatives for solving the sewer detention time matter were developed, evaluated, and discussed with Ohio EPA. The selected option—the "flushing" strategy—was manually "pilot tested" during January-March 2019, and it proved successful in preventing the settling and septic conditions in the seed flow. Over the following two months, a control algorithm was developed to automate the flushing sequence. Circa May 10, the plant automation was updated to incorporate the flushing strategy.

- On February 7, 2019, during the pilot test period, peak wet weather flow mode was again attempted. During the test, total flow peaked at approximately 60 mgd, of which approximately 20 mgd was routed through the towers. The data on effluent quality is shown below. (Station 001 contains tower plus secondary effluent.)

	601/Influent	Primary Effluent	603/604	001
CBOD mg/l	36		5.3	-
TSS mg/l	50.8	46.5	11.0	14.1
Ammonia mg/l	1.6	2.9	0.25	0.07

- On April 19, 2019 peak wet weather mode was used again. Peak flows to the plant during the test went up to about 54 mgd. The effluent quality was as shown below.

	601/Influent		Primary Effluent	Tower Effluent (grab)	603/604	001
CBOD mg/l	66.7		30.0	6.4	2.8	-
TSS mg/l	68.5		52.0	14.8	8.5	-
Ammonia mg/l	0.93		2.78	0.026 detection limit	0.026 detection limit	0.026 detection limit

- On April 26, 2019 peak wet weather mode was used. Peak flows to the plant went up to about 67 mgd.

	601/Influent	Primary Effluent	Tower Effluent (grab)	603/604	001
CBOD mg/l	50.0	60.0	3.0	3.1	-
TSS mg/l	43.4	57.0	19.8	16.2	-
Ammonia mg/l	1.00	3.20	-	0.26	0.026 detection limit

- May 1, 2019 peak wet weather mode was used. Peak plant flow was approximately 50 mgd.

	601/Influent	Primary Effluent	Tower Effluent	603/604	001
CBOD mg/l	53.5	-	-	4.0	-
TSS mg/l	37.5	66.0	52.8	10.8	-
Ammonia mg/l	2.78	6.01	7.66	0.46	0.36

Path Forward

- The nature of wet weather is largely unpredictable. Plant staff has been diligent about recording issues when the peak wet weather system is being used and working to resolve them. However, development and testing of possible solutions can take several weeks since the occurrence of the next wet weather event is, obviously, out of the control of the plant staff.

- The protocol for disinfection during peak wet weather operations requires adjustment. The data indicates that the disinfection system reacts differently in peak wet weather mode than it does during dry weather and some adjustments are being considered.
- As increased flows are pushed through the plant, flow meters have become more critical. Some of the meters have not reacted as expected during wet weather. Because of uncertainty regarding the accuracy of the meters, the City has been reluctant to push the flow to the maximum. The accuracy of the flowmeters is currently under evaluation.
- The flow from the Baxter Street pump station's screw pumps does not appear to be as much as expected. It has yet to be determined if this is attributable to the pumps or a metering inaccuracy. This issue was not observed previously because in the past the station was not typically used at its maximum capacity.
- The complexity of wet weather operations, as noted above, has made training of the staff far more problematic than anticipated. "Classroom" training of staff is being done, but additional wet weather events are needed before all three shifts have sufficient "hands-on" training in wet weather conditions.

Conclusion

To date the City has operated in peak wet weather mode successfully in winter and spring of 2019 on only a handful of occasions, and none during the summer and fall. Although the initial results are promising, additional sampling events during all four seasons are necessary to be assured that all the outstanding issues are satisfactorily resolved and that the nitrification towers are consistently capable of meeting the Performance Criteria year-round under a variety of flow conditions.

Thank you for your consideration of this request. Please do not hesitate to contact me if you require further information or have any questions.

I certify under penalty of law that the information contained in or accompanying this (submission/document) is true, accurate and complete. As the (the/those) identified portion(s) of this (submission/document) for which I cannot personally verify (its/their) truth and accuracy, I certify as the official having supervisory responsibility for the person(s) who, acting under my direct instructions, made the verification, that this is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Very truly yours,

Michael H. Caprella
Director of Utilities
City of Lima, Ohio