Tontitown Sewer Evaluation Report

Prepared for:

City of Tontitown

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Date: 8-28-2025

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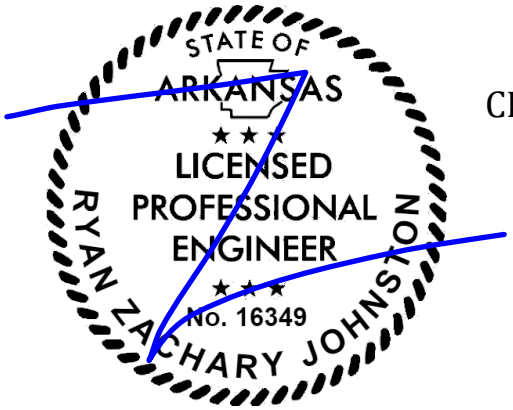


08/29/2025

Table of Contents

Executive Summary

The City of Tontitown in Washington County, Arkansas owns and operates a municipal sewer collection system. The system includes 7 lift stations, approximately 750 manholes, 38 miles of sewer mains, and 6 miles of force mains.

On June 13th, 2025, the City of Tontitown was sent a formal request from the Arkansas Division of Environmental Quality, Office of Water Quality, to perform a comprehensive evaluation of the sanitary sewer collection system. The purpose of the evaluation was to investigate levels of ammonia (NH_4-N) and ammonium hydroxide (NH_4OH) and their possible contribution to the degradation or breakdown of the collection system.

The Office of Water Quality has received multiple complaints of possible chemical odor from the lift station at Pianalto Road to the lift station at Barrington Road. The Office of Water Quality has reviewed the lab reports of the leachate samples and identified ammonia concentrations that exceed 1,000 ppm. In accordance with the Arkansas Water and Air Pollution Control Act, the City of Tontitown was directed to conduct a comprehensive evaluation of the collection system, focusing on the segment extending from the Pianalto Lift Station to the Barrington Lift Station.

The evaluation plan required professional engineering and the inclusion of five key components: ammonia monitoring, structural condition review, odor and safety investigation, corrosion mitigation recommendations, and structural remediation planning.

1. **Ammonia Characterization** – Measure and assess the concentrations of NH_4-N and NH_4OH in the collection system and evaluate the potential for these compounds to contribute to structural deterioration.
2. **Structural Condition Assessment** – Inspect manholes, lift stations, and sewer mains for evidence of corrosion, infiltration, cracking, and other deficiencies.
3. **Odor and Safety Review** – Document and investigate odor complaints and assess potential safety concerns related to sewer gases and chemical byproducts.
4. **Mitigation and Remediation Planning** – Identify strategies for controlling ammonia-induced corrosion, evaluate pretreatment opportunities, and outline a conceptual repair and replacement schedule for deficient infrastructure.
5. **Regulatory Compliance** – Provide ADEQ with a professionally prepared report that addresses all elements of the June 13, 2025, directive and positions the City of Tontitown to implement corrective measures in a timely manner.

To fulfill this directive, the city retained CK Civil Engineering to conduct the evaluation and prepare a sewer health report for ADEQ. The scope of services emphasized field inspections, including visual documentation of manholes and lift stations, odor complaint investigations, and compilation of water quality data. The project also incorporated analysis of video footage, manhole condition grading, and the development of recommendations to address corrosion and infiltration risks.

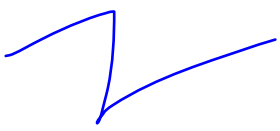
Field evaluations were completed across more than 70 manholes within the study area, and a detailed manhole condition grading rubric was applied to standardize observations. Grades ranged from “Excellent” to “Failing,” capturing conditions such as corrosion, buildup, cracking, and infiltration potential. In many locations, white and black residue was noted on manhole interiors, rims, and lids, with some structures exhibiting rim deterioration or compromised seals. In addition to structural findings, residents near certain manholes reported intermittent chemical and sewer odors, consistent with ADEQ’s initial concerns.

This report presents the methods employed to collect and analyze field data, followed by a detailed summary of results. The objective is to document current system conditions, quantify the extent of ammonia-related impacts, and provide recommendations for corrective measures. Findings from this study will guide the City of Tontitown in planning targeted infrastructure improvements, prioritizing remediation needs, and ensuring compliance with state regulatory requirements.

Overall, results from the sewer evaluation indicate that the collection system is in surprisingly fair condition. Of the 72 sanitary manholes surveyed, only 3 manholes are in need of significant repairs that will involve lining the interior walls. Of the pipe segments surveyed, no intrusions, breaks, or root penetrations were observed, and the pipe walls appear to be in adequate condition. Many of the pipe segments were beginning to “build up” and accumulate a white film, most likely FOG, on the sides of the pipes. During the evaluation, one section of pipe with large amounts of buildup was videoed both before and after a jetting operation. Jetting the pipe provided a significant improvement to the removal of the while film and overall flow capacity. Water quality was also measured at five locations across the system. High levels of ammonia were observed at the Pianalto Lift Station; however, the concentration dropped further away from the lift station samples were taken as waste effluent became more diluted with conventional residential and commercial waste streams. At this time, the observed high ammonia concentrations do not appear to be significantly impairing the Tontitown Sewer Collection system function.

While odor complaints are mentioned in this report, this evaluation and subsequent water quality analysis does not offer any additional insights as to specific chemical constituents that are causing the odor or provide recommendations for pretreatment to mitigate for the odors. We recommend a follow-up Air Quality Evaluation, to determine the specific chemicals causing the nuisance odors and to implement a pretreatment facility at the source designed to remove constituents discovered during the Air Quality Evaluation.

We appreciate the opportunity to evaluate the Tontitown Sewer Collection System and look forward to working with the city to improve system function for the local community.



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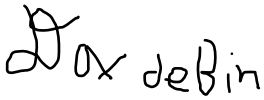

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Introduction

The Tontitown Sewer Collection System was originally constructed in 2010 and is relatively new with regards to sewer systems in Northwest Arkansas. Today, the system includes 7 lift stations, approximately 750 manholes, 37 miles of sewer mains and 6 miles of force mains. Waste streams are collected from a variety of sources, including residential and commercial customers, as well as one industrial customer, Waste Management located on the south side of Tontitown, just south of Arbor Acres Road. Most of the sanitary collection system is routed to the northeast corner of Tontitown, where it is pumped to the Northwest Arkansas Conservation Authority (NACA) for treatment by the Barrington Lift Station before ultimately discharging into the Osage Creek watershed.

Over the past year, numerous odor complaints have been fielded by both the City of Tontitown and the Arkansas Department Environmental Quality (ADEQ) in relation to the sewer collection system. Most of the complaints are located at the Pianalto Lift Station. This lift station receives wastewater exclusively from the Waste Management Landfill, where it is pumped north toward AR HWY 412, and then ultimately routed through the Tontitown sewer collection system to the Barrington Lift Station. Additionally, leachate samples collected in the area have shown ammonia (NH_4-N) well over 1,000 ppm.

The report intends to evaluate the impact high ammonia concentrations are having on the Tontitown Sewer Collection System and provide recommendations for remediation where deficiencies are found.

Methods

A comprehensive field inspection program was carried out along with the sewer collection system between the Pianalto Lift Station and the Barrington Lift Station. The program included three parts; wastewater sampling at five locations, visual and video inspection of approximately 70 sanitary manholes and both lift stations, and video inspection of five sections of sewer pipe between Arbor Acres and AR HWY 412. See Appendix A – Overview map for more information regarding the Tontitown sewer system layout and subsequent infrastructure labeling used in this report.

The following describes the methods used for each part.

WASTE WATER SAMPLING

Wastewater sampling was conducted at 5 locations; the Pianalto Lift Station, Sanitary Manhole MV3, Sanitary Manhole MF1, Sanitary Manhole MS7, and the Barrington Lift Station to quantify concentrations of ammonia (NH_4-N) in the collection system. Other constituents sampled included pH and sulfate (SO_4). Three water quality samples were taken per day over a one-week observation period. Water quality samples were collected and analyzed using the subcontractor GTS, Inc.

Data provided by the Water Department was compiled and plotted to illustrate concentration variations along the system. Laboratory results were compared against the threshold values identified by ADEQ, with particular attention given to concentrations exceeding 1,000 ppm. See Appendix C – Wastewater Testing and Data for more information regarding the wastewater testing results.

SANITARY MANHOLE AND LIFT STATION EVALUATION

Between Arbor Acres Road and the Barrington Lift Station, 70 sanitary manholes were investigated for potential degradation. Each manhole was opened, photographed, and assessed using a standardized grading rubric ranging from “Excellent” (Grade A) to “Failing” (Grade F). Observations included:

- **Structural Integrity**: Cracking, liner deterioration, rim condition, and evidence of infiltration.
- **Surface Buildup**: Presence of white or black buildup on manhole interiors and lids.
- **Corrosion Indicators**: Signs of rim rusting, concrete degradation, or loss of seal integrity.
- **Safety and Odor Concerns**: Presence of strong sewer or chemical odors reported during inspection, corroborated by resident observations.

The manholes were surveyed over the course of one week. Inspectors started at the sewer manholes closest to the landfill and worked northward to the Barrington lift station. Each manhole was opened and using a self-leveling sewer inspection camera, photographs and video were taken of the rim, lid, sides, bottom, service entry lines, force main entry lines, and any other characteristics of interest.

The field inspector also filled out a manhole evaluation report based on the condition inside each manhole. If the manhole was in poor enough condition, the field inspector took videos of any notable conditions in the manhole. After all the manholes were evaluated, videos were taken of the manholes in the worst and best condition to use as examples.

Inspection results were compiled and analyzed for trends in structural condition, buildup prevalence, and ammonia-related impacts. Manholes were assigned grades based on the rubric and grouped into condition categories. Results were documented to show the distribution of deficiencies along the Pianalto–Barrington corridor. See Appendix D – Sewer Evaluation and Data and Appendix E – Lift Station Reports for more detailed information.

SANITARY COLLECTION SYSTEM PIPE INPSECTION

Video inspection of selected sewer mains was coordinated with the Tontitown Water Department. Five locations were chosen based on their proximity to the Landfill. These included sections between MP-1/MP-2 (MH 9/MH 10 per WINCAN Report), MP-6/MP-7 (MH 1/MH 2 per WINCAN Report), MV-1/MV-2 (MH 3/ MH 4 per WINCAN Report), MM-3/MM-4 (MH 5/MH 6 per WINCAN Report), MM-4/MF1 (MH 6/MH 7 per WINCAN Report), and MF-1/MF-2 (MH 7/MH 8 per WINCAN Report). Reasons for selection of each segment of pipe included:

Table 1. Sanitary Sewer Pipe Location Descriptions

MP-1/MP-2 (MH 9/MH 10 per WINCAN Report)	First segment of public sewer collection pipe beyond the landfill and upstream of the Pianalto Lift Station
MP-6/MP-7 (MH 1/MH 2 per WINCAN Report)	Another segment of public sewer collection pipe located in close proximity to the Landfill and upstream of the Pianalto Lift Station
MV-1/MV-2 (MH 3/ MH 4 per WINCAN Report)	First segment of public sewer collection pipes beyond the Pianalto Lift Station. This run of sewer pipe collects wastewater discharging from the Pianalto Lift Station force main.
MM-3/MM-4 (MH 5/MH 6 per WINCAN Report)	Segment of public sewer collection pipe downstream of the Pianalto Lift Station. This run of sewer pipe collects wastewater discharging from the Pianalto Lift Station and as well as residential property in the area
MM-4/MF-1 (MH 6/MH 7 per WINCAN Report)	Small segment of public sewer collection pipe downstream of the Pianalto Lift Station.
MF-1/MF-2 (MH 7/MH 8 per WINCAN Report)	Segment of public sewer collection pipe downstream of the Pianalto Lift Station. This run of sewer pipe collects wastewater discharging from the Pianalto Lift Station and as well as South Pointe Lift Station Force main

Sewer pipe inspections were recorded by Carl Holley Plumbing, Inc.

Video footage was reviewed to identify internal pipe deficiencies, including joint separation, cracking, infiltration, and chemical buildup. Observations were recorded and cross-referenced with field manhole evaluations to provide a more complete system assessment. See Appendix F – Sewer Pipe Video Reports for pictures and WINCAN reports.

Results

Inspection of the sewer infrastructure between Pianalto Road and Barrington Road revealed a range of conditions from good to poor. Some of the most common issues where: White buildup on interior manhole walls, consistent with chemical scaling or saponified FOG deposits; concrete rim deterioration including cracking, spalling, and loss of material around the rim seal; service line entry degradation where its seals had failed or were visibly compromised; black organic films and occasional grease accumulation, which is indicative of biological activity and possible FOG contributions[2].

WATER QUALITY RESULTS

As part of the study, water sample testing was conducted. Samples were collected from five sites across the sewer line under evaluation. The sites were: Pianalto Lift Station, Sanitary Manhole MV1, Sanitary Manhole MM3, Sanitary Manhole MS7, and the Barrington Lift Station. There were 21 sets of data over 7 days with 3 data sets for each day. The data varies depending on the time of day, but the trends are consistent over the 1-week period. The data shows that almost all of the data points were below the 1000 ppm ammonia level that ADEQ stated in its formal request. Most of the data samples that were above 1000 ppm were from Site 1, also known as the Pianalto Lift Station. Only 5 data samples were above 1000 ppm and not from the Pianalto Lift Station; these were from Site 2 and Site 3. These sites are the closest to the landfill. Most of the data, especially from sites 3-5, was well below the 1000 ppm level. Ammonia concentrations drop further away from the Pianalto Lift Station.

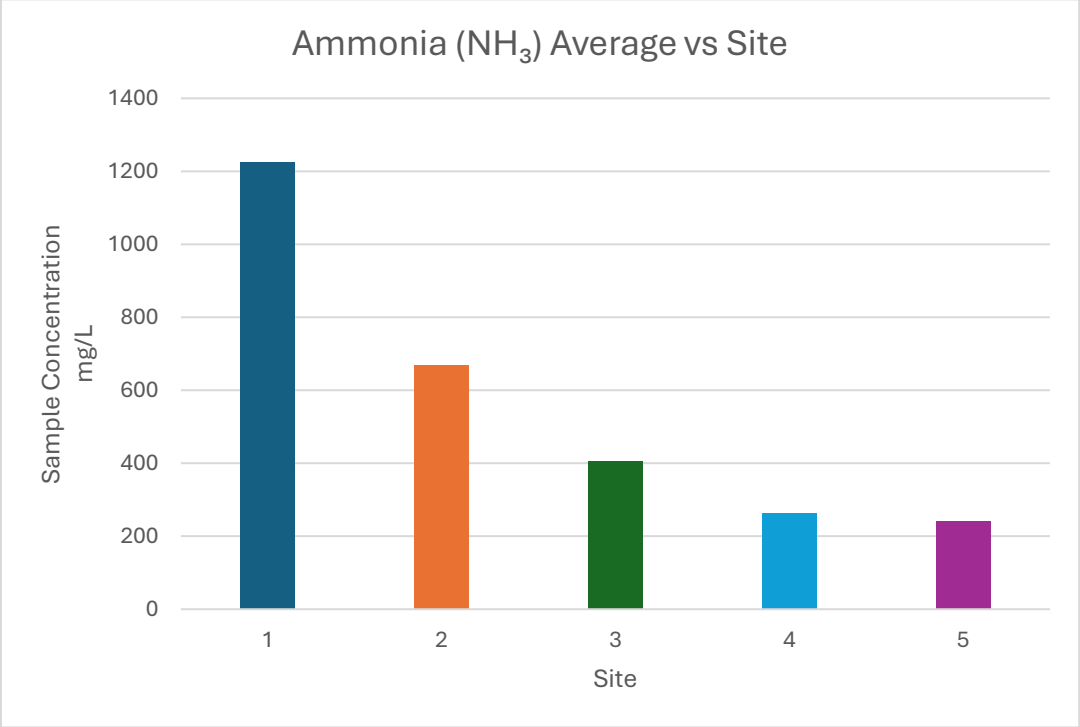

Figure 1 : Ammonia Average vs. Site

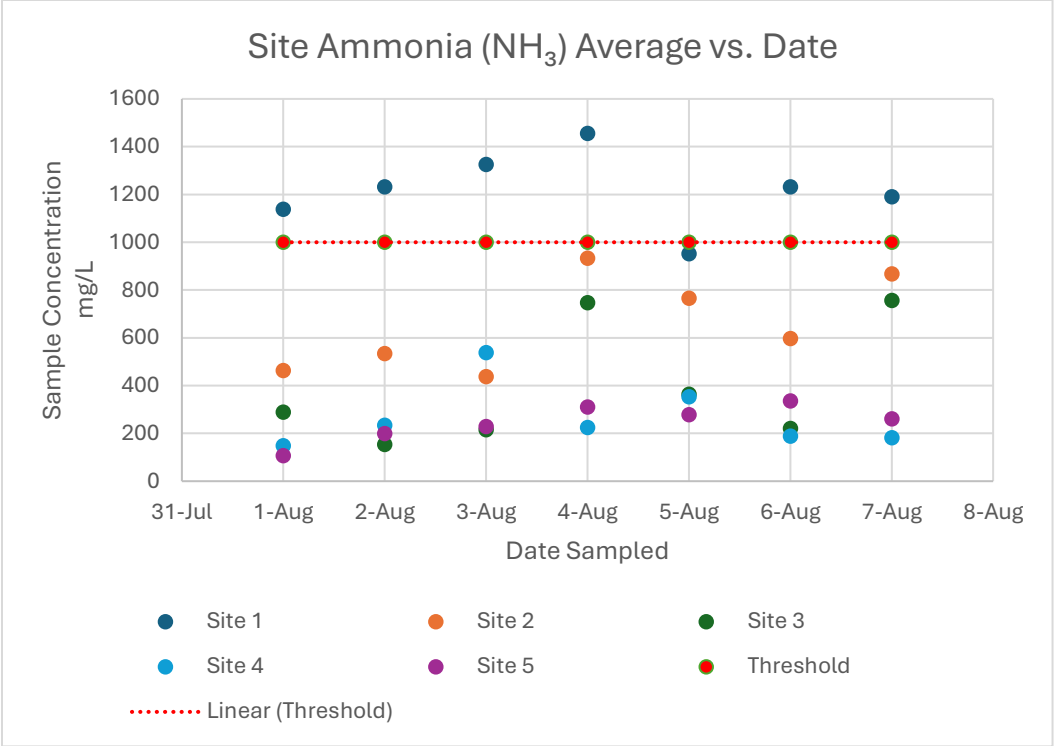

Figure 2 : Site Ammonia Average vs. Date

One notable uptick in ammonia concentration was observed on the fourth day of observation, Monday, August 4th, 2025. This increase in concentration registered at all sites across the system and represented the highest observed data during the evaluation. It is unknown as to the cause in higher ammonia concentration was observed this day.

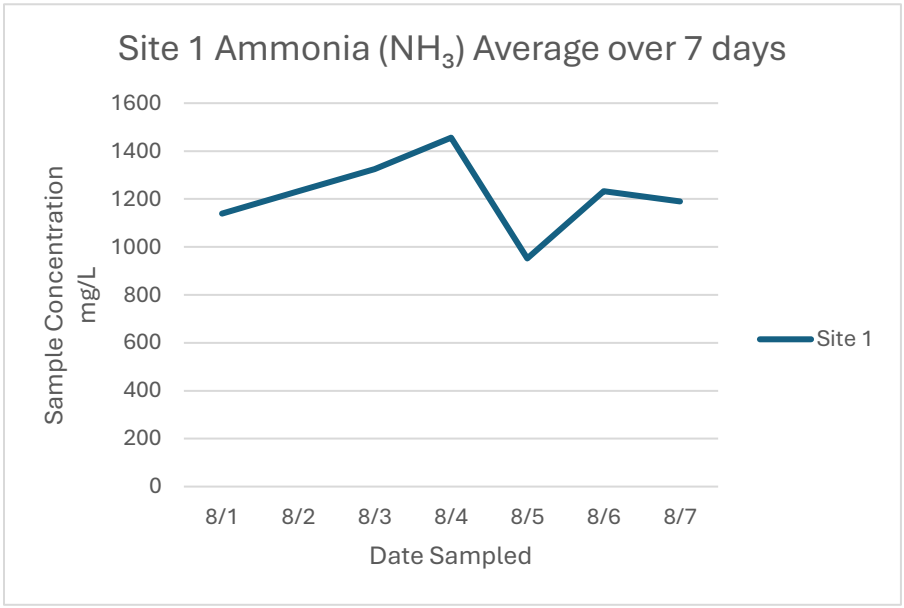

Figure 3: Site 1 Ammonia Average over 7 days

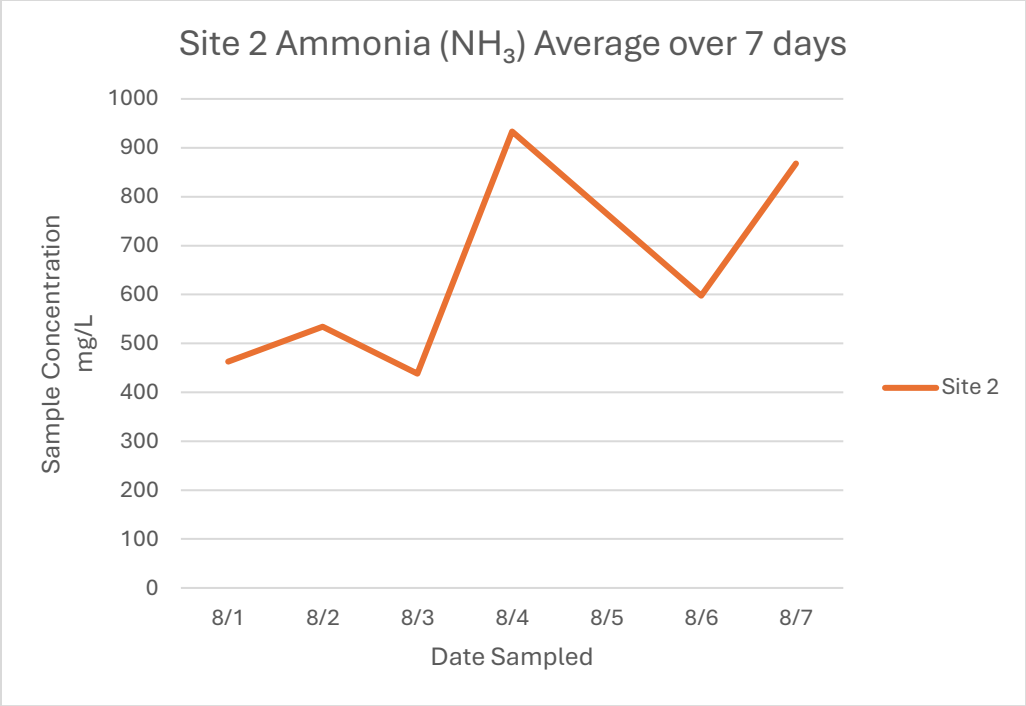

Figure 4: Site 2 Ammonia Average over 7 days

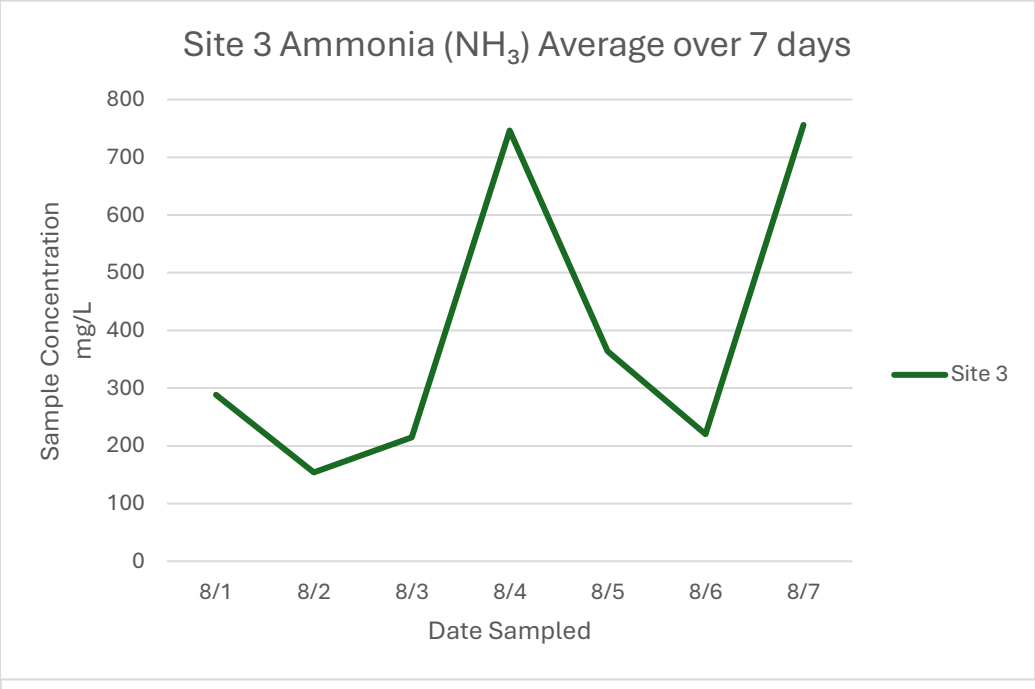

Figure 5: Site 3 Ammonia Average over 7 days

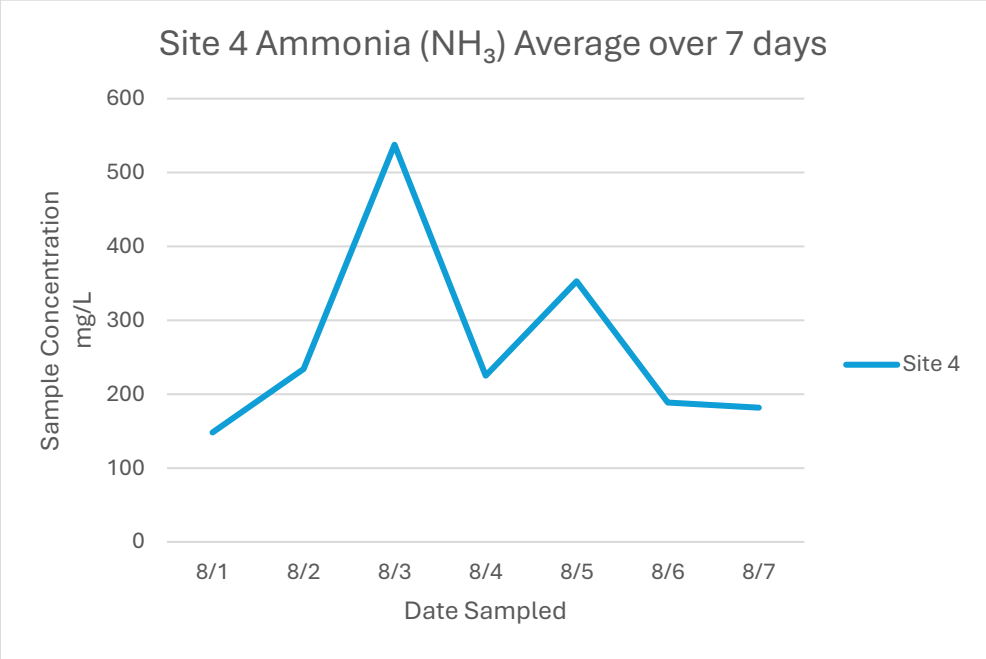

Figure 6: Site 4 Ammonia Average over 7 days

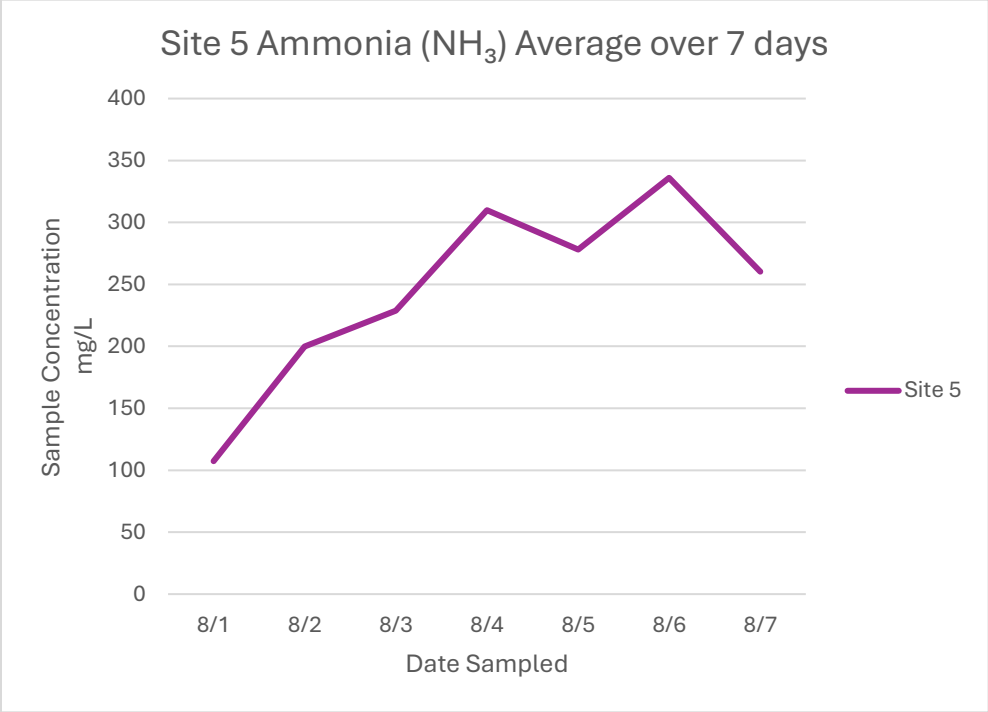

Figure 7: Site 5 Ammonia Average over 7 days

The wastewater sampling also tested for Sulfates and pH. In almost approximately 75% of the samples, sulfates were not detected at reporting levels. Because of the lack of data, this dataset was not included in the report. The pH of the wastewater samples was between 7 and 9.11 with approximately 75% of the samples having a pH between 8 and 9. This makes the wastewater consistently basic. Normal wastewater pH is 6.7-8.0[7].

In the making of this report, the head of the NWA Conservation Authority wastewater treatment plant, Mike Neil, was contacted to discuss if the sewer leachate coming from the Tontitown sewer system had any impact on the NACA plan, and its ability to treat wastewater. On the water treatment side, he is not having any direct impact on the plant from Tontitown's sewer system. Some of his outfalls recently have had a dark brown rusty color. He has conducted water testing on the outfall and there has been no definitive answer as to what is causing this coloring. Mr. Neil commented he has had no problems with levels of ammonia. As of right now, this is an aesthetic issue. The plant has also not had any unexplainable permit violations recently. The dark rusty color in the outfall could be from any of the cities that discharge their sewer systems to the NACA plant, as well as other upstream treatment processes that use Ferric Chloride.

SANITARY MANHOLE AND LIFT STATION EVALUATION RESULTS

The manhole inspection included all manholes on the line from the Pianalto road lift station to the Barrington Road lift station. There are 72 manholes on this section of the line. Inspections were completed on 71 of 72 manholes, as one manhole could not be located in the field. Because of this, it was easy to see trends and groupings in the conditions of the manholes.

The manholes close to the landfill were in surprisingly fair condition. The buildup on these manholes was mostly white and very thick close to the landfill but became dark at MP4. After MP4, the buildup stayed dark until MP13 at the lift station. From here, the line is pumped by force main to a sewer manhole near Valle LN, MV1. The buildup at this manhole was also very black. This particular manhole was in the worst condition out of all manholes surveyed. Significant buildup around the wall of the manhole was observed, in addition to major corrosion of the discharge tee where the force main enters the manhole. Also, the underside of the rim as well as the base were observed to be significantly corroded.

After this manhole, the buildup was mostly white and not very thick. The next manhole that was in poor condition was MM3 where another force main connects. Again, after this manhole, subsequent manholes were in fair condition without much buildup. Of the remaining manholes, most of the ones in the worst condition were manholes with multiple inlets from other sewer lines. MT10, MT14, and MS8 all have multiple inlets, and these had more buildup than the rest of the manholes on this section. These manholes all had the characteristic black buildup as seen throughout the system. The remaining issues on this section of the line were degradation of service entry line seals and some degradation of manhole rims. Some of the service entry lines appeared to be grouted in addition to the liner. The lines that were grouted were in good condition but many of the non-grouted lines had degradation and signs of infiltration. This is a cause of infiltration that could be easily remedied by grouting around the interior wall where the pipe enters the manhole. The remaining issues were degradation of the concrete rim around the top. A few manholes had

concrete issues around the rim and a couple had roots growing around the inside of the rim. These are also possible sources of infiltration.

Both lift stations are in good condition. In reference to the Pianalto Lift Station, all the components are in normal working condition. There is some buildup on the floats and fittings in the wet well, but they remained functional. No major signs of infiltration.

Odor at the Pianalto Lift Station was very strong. In additional, the smell out of nearby sewer manholes was also very strong. This lift station was constructed with an air scrubber. The air scrubber uses activated carbon to remove contaminants in the air and prevent nuisance odors. The scrubber is a 300 CFM unit with a blower and rain hood. It has been in use in the last 2 years. Unfortunately, the current air scrubber system does not seem to have an impact on the smell coming out of the lift station. Currently, the City of Tontitown is exploring alternative media for the system to improve air quality around the lift station.

The Barrington Road lift station was also in good condition. The wet well and components had some buildup, but nothing affecting functionality. There was little to no degradation of the components. No major signs of infiltration. The buildup on these components should be cleaned, but the alarm sensors should be cleaned semi regularly to prevent buildup and loss of functionality.

Similar to the Pianalto Lift Station, a strong odor was detected at the lift station and nearby manhole was also particularly strong.

SANITARY COLLECTION SYSTEM PIPE INPSECTION

In addition to field inspections of the manholes and lift stations, certain sections of the sewer pipe were examined with a self-leveling sewer camera. Only sections of the pipe near the Pianalto lift station were videoed.

The pipes were mostly in fair condition. The most common observation is buildup. All of the pipes had some level of accumulated white residue; most had a fair amount of buildup. Other than accumulation, the pipes had a few obstructions, and a few low points, and the issue associated with the pipe were considered minor. There were no joint issues or visible holes or cracks in the pipes.

One section of the pipe was videoed before and after it had been jetted and cleaned. The difference between the two videos was significant. There was still some buildup in the pipe after jetting, but the residue had been significantly reduced. Obstructions observed before the jetting operation had been removed by the process. This means that much of the buildup and obstructions in the pipes could be removed easily and quickly by jetting the pipes. In a few sections of pipe, obstructions large enough to warrant ending the survey of the pipe section were observed. It is our opinion these obstructions can be removed with a jetting program.

SOURCES OF DEGRADATION

There are a few different possible sources of the buildup on the inside of the sewer manholes. The most common causes of buildup in sewer systems are fat, oil and grease or

(FOG) or mineral scale. When high levels of fat, oil, and grease are put into the sewer system, they can mix with calcium and metals to form a soap-like compound that builds up on the inside of the sewer system[2]. FOG can happen from residential and commercial releases of: meat, sauces, gravy dressings, deep-fried food, cheeses and butter[3]. FOG can also come from industrial activities[3].

After conducting field inspections, the manhole and lift station data was cross referenced and analyzed with the pipe section data. When analyzing this data, a few trends emerged.

1) Most of the manholes in the worst condition were either on the section close to the landfill, connected with a force main, or connected with another sewer line. This is consistent with the manholes and the pipe sections.
2) The manholes and pipes directly around force main connection manholes are in worse condition than the average manhole. This is likely to volatilization of the waste stream in these respective manholes that are reacting or coating the walls and lids of said manhole.
3) Even though there are reports of smells towards the Barrington lift station, the worst section is closest to the landfill based on field observation.
4) As the leachate flows through the Tontitown Collection System, it is diluted with conventional residential and commercial wastewater. Subsequently manholes further away from the landfill are in better condition as the waste stream becomes “less potent”.
5) In the pipe segments between the landfill and the Pianalto Lift Station, white residue is accumulating pipe walls at a faster rate than compared to pipes downstream.

Conclusions

The evaluation of the Tontitown sewer system between Pianalto and Barrington lift station confirms that the system is functional and in fair condition, but there are areas that should be addressed to prevent short- and long-term issues. The wastewater sampling shows that the levels of ammonia near the Pianalto lift station are typically above 1000 ppm. As the sampling traveled further away from the Pianalto lift station, the levels of ammonia dropped. This suggests that the leachate in the sewer system is diluted with another sewer streams the further downstream it goes. The water quality testing showed that the pH of the wastewater was consistently basic. Although ammonia in the sewer system is an issue, the larger issue in the system was the prevalence of buildup.

The majority of the buildup was clustered around the landfill and any manholes with a force main connection. Sewer manhole inspections reinforced these findings. Manholes nearest the landfill or connected by force mains showed the highest rates of deterioration, including buildup, corrosion, and rim degradation. Pipe inspections further illustrated the prevalence of buildup consistent with fats, oils, and grease (FOG) interactions and saponification processes. The presence of both black and white residues, coupled with chemical odors and corrosion at force main discharges, demonstrates multiple mechanisms of buildup and degradation that must be addressed proactively.

Community odor complaints documented by ADEQ from late 2024 through mid-2025 align with the physical findings of this study. Reports consistently reference strong leachate, rotten egg, or chemical odors near both the landfill and residential neighborhoods along the sewer corridor. In several cases, residents described physical symptoms such as headaches, nausea, and difficulty breathing during odor events. These records emphasize that, beyond structural concerns, the sewer system's chemical environment poses direct quality-of-life and potential public health impacts to Tontitown residents.

The pipe section inspection showed similar results. The pipe sections close to Pianalto all had high levels of buildup. This buildup could be mostly cleaned away with jetting, as is shown in pipe video evaluation report #1. The pipe sections near force mains also showed high levels of buildup. The buildup can be detrimental to sewer system, as it could cause sewer system overflows (SSOs).

The characteristics of the buildup are similar to FOG. FOG can form when fatty acids and calcium chloride mix and a saponification reaction happens[2]. When FOG builds up in sewer lines, it can cause SSOs. FOG or a similar buildup can be seen on the pipe section near sanitary manhole MV1. This buildup is concerning because it is primarily on one end of the pipe section. If the end with buildup is not cleaned, it can become blocked and cause SSOs.

The evaluation of the manholes also confirms this. Like the water sampling, the manholes that were in the worst condition were near the Pianalto lift station. In general, the buildup on the manholes near Pianalto is dark, thick, and waxy. The buildup on manhole further away generally is lighter, whiter and slightly chalky. The manholes that are in the worst condition are all force main connections.

Recommendations

Overall, this system is in fair condition. At this time, we do not recommend implementing a pretreatment program to remove ammonia from the system as the high ammonia concentration does not seem to have a significant impact on the collection system. Additionally, NACA also is not having trouble treating high ammonia concentrations. We do recommend implementing an annual cleaning/jetting program to keep the collection in normal function. Also, a few manholes do need repair to restore optimum functionality and ensure no failures in the near future.

However, more testing is needed in the area, specifically air quality testing. It is undeniable that a strong odor is present at the Pianalto Lift Station, as well as sanitary infrastructure between Waste Management and the Barrington Lift Station. Based on the numerous complaints filed with ADEQ, this odor is not only a major nuisance impacting the quality of life of property owners around compromised infrastructure but may be having health impacts as well. Air quality testing should be conducted to identify the specific chemicals and constituents causing the odor, and a pretreatment program directed at removing these constituents should be implemented at the source.

Specific to the lift stations, a few improvements should be made. The lift stations should be cleaned annually. The buildup on them is light, but crucial infrastructure such as alarm sensors, brackets, system floats, and guide rails should be kept clean to prevent sewer system overflows. The air scrubber at the Pianalto lift station should have its activated carbon media replaced according to manufacturer recommendations to help prevent the sewer smell.

The sewer pipes are in fair condition, but if the buildup that is currently in them continues to grow, there could be SSOs. The buildup is the only major issue observed with the sewer pipes. The pipes should be jetted every 6 months to prevent buildup. On one section of the pipe, most of the buildup is near the mouth of the inlet. This is dangerous because most of the pipe has low to medium buildup, but the end section has major buildup. If this major buildup is allowed to continue, it will cause a SSO even if the rest of the pipe is clean because the leachate will not be able to flow through the pipe. The buildup also allows obstructions to stick to the pipe. Normally, when the pipe is clear there is nothing for objects to cling to. But, when there is buildup, obstructions can get stuck in the pipe, ultimately blocking sewer flow. This can also cause SSOs. Also, when there are high levels of buildup, it can be hard to tell the condition of the pipe. There could be cracks or joint separations that are not being seen because they are covered by buildup. Finally, there is a large drop in the section of pipe from sanitary manhole MP1 to MP2. It is unclear if this is an obstruction or something else, but it should be reinspected after jetting.

The sewer manholes are in fair condition. There are a few problems with the manholes, but the major issue is buildup. A few manholes such as MP4, MV1, and MM3 have high levels of buildup on the inside. These manholes should be turned offline, cleaned, and epoxy lined to help prevent future buildup. Acceptable liners are either.

- Raven Ultra High-Build Epoxy Coating, designated as Raven 405, with an average thickness of 100 mils and a minimum thickness of 80 mils, or

- Warren Environmental Systems, designated as S-301, with an average thickness of 100 mils and a minimum thickness of 80 mils.

Another problem with the manholes is the rim and lid. Manholes such as MP2, MP3, MF2, and MT10 have high levels of deterioration in the rim and lid. These manholes should have the tops replaced with a combination non-reactive HDPE lid and rim to help prevent buildup and degradation. The final issue with the manholes is the grouting of certain the service entry lines. On manhole such as MB7, MB8, MB9, and MB13, the service entry line grouting is deteriorating. The service entry line on these manholes should be plugged, regrouted with a quick curing grout. Below is a table specifying what remediation needs to be done and the schedule.

Table 2. Recommendations

Sewer Manhole Recommendations			
Manhole ID	**Manhole Issue**	**Required Remediation**	**Completion Date**
MP2	The manhole lid and rim are degrading. The rim has high levels of rust and breakdown, and the lid has excessive buildup	The top replaced with a combination non-reactive HDPE lid and rim	March 2026
MP3	The manhole lid and rim are degrading. The rim has high levels of rust and breakdown, and the lid has excessive buildup	The top replaced with a combination non-reactive HDPE lid and rim	March 2026
MP4	Manhole has significant buildup around the interior walls; rim is highly corroded	Manhole to be taken offline and cleaned, and epoxy lined; discharge tee fully replaced; rim and lid to be replaced with non-reactive HDPE rim and lid combination	March 2026
MP5	The manhole lid and rim are degrading. The rim has high levels of rust and breakdown, and the lid has excessive buildup	The top replaced with a combination non-reactive HDPE lid and rim	March 2026

MV1	Manhole has significant buildup around the interior walls, discharge tee is highly corroded, rim is highly corroded	Manhole to be taken offline and cleaned, and epoxy lined; discharge tee fully replaced; rim and lid to be replaced with non-reactive HDPE rim and lid combination	March 2026
MM3	Manhole has significant buildup around the interior walls, discharge tee is highly corroded,	Manhole to be taken offline and cleaned, and epoxy lined; discharge tee fully replaced	March 2026
MF2	The manhole lid and rim are degrading. The rim has high levels of rust and breakdown, and the lid has excessive buildup	The top replaced with a combination non-reactive HDPE lid and rim	March 2026
MF3	The manhole rim is very loose. The concrete around the rim is crumbling and degrading.	The top replaced with a combination non-reactive HDPE lid and rim	March 2026
MT10	The manhole lid and rim are degrading. The rim has high levels of rust and breakdown, and the lid has excessive buildup	The top replaced with a combination non-reactive HDPE lid and rim	March 2026
MS13	The manhole had roots on the underside of the rim.	The manhole should be reevaluated to determine if the roots are infiltrating from the outside or growing on the inside. If a source of infiltration is found such as a crack, the top replaced with a combination non-reactive HDPE lid and rim. If a source is not found there is no remediation needed.	March 2026
MB7	The manhole rim is very loose. The concrete around the rim is crumbling and	The top replaced with a combination non-reactive HDPE lid and rim. The service entry line should be ballooned, and re-grouted with a quick curing grout	March 2026

	degrading. The service entry line grouting is breaking down.		
MB8	The manholes service entry line grouting is breaking down.	The service entry line should be ballooned, and re-grouted with a quick curing grout	March 2026
MB9	The manholes service entry line grouting is breaking down.	The service entry line should be ballooned, and re-grouted with a quick curing grout	March 2026
MB13	The manholes service entry line grouting is breaking down.	The service entry line should be ballooned, and re-grouted with a quick curing grout	March 2026
Pipe Segment Recommendations			
Pipe Segment	**Pipe Segment Issue**	**Required Remediation**	**Completion Date**
Pipe Segment MP1/MP2	Significant fat, oil, and grease (FOG) buildup	Pipelines should be cleaned by mechanically powered or hydraulically propelled cleaning tools	January 2026
Pipe Segment MP2/MP3	Significant fat, oil, and grease (FOG) buildup	Pipelines should be cleaned by mechanically powered or hydraulically propelled cleaning tools	January 2026
Pipe Segment MP3/MP4	Significant fat, oil, and grease (FOG) buildup	Pipelines should be cleaned by mechanically powered or hydraulically propelled cleaning tools	January 2026
Pipe Segment MP4/MP5	Significant fat, oil, and grease (FOG) buildup	Pipelines should be cleaned by mechanically powered or hydraulically propelled cleaning tools	January 2026
Pipe Segment MP5/MP6	Significant fat, oil, and grease (FOG) buildup	Pipelines should be cleaned by mechanically powered or hydraulically propelled cleaning tools	January 2026
Pipe Segment MP6/MP7	Significant fat, oil, and grease (FOG) buildup	Pipelines should be cleaned by mechanically powered or hydraulically propelled cleaning tools	January 2026
Pipe Segment MP11/MP12	Significant fat, oil, and grease (FOG) buildup	Pipelines should be cleaned by mechanically powered or hydraulically propelled cleaning tools	January 2026
Pipe Segment MP12/MP13	Significant fat, oil, and grease (FOG) buildup	Pipelines should be cleaned by mechanically powered or hydraulically propelled cleaning tools	January 2026
Pipe Segment MV1/MV2	Significant fat, oil, and grease (FOG) buildup	Pipelines should be cleaned by mechanically powered or hydraulically propelled cleaning tools	January 2026

Pipe Segment MV2/MV3	Significant fat, oil, and grease (FOG) buildup	Pipelines should be cleaned by mechanically powered or hydraulically propelled cleaning tools	January 2026
Pipe Segment MM2/MM3	Significant fat, oil, and grease (FOG) buildup	Pipelines should be cleaned by mechanically powered or hydraulically propelled cleaning tools	January 2026
Pipe Segment MM3/MM4	Significant fat, oil, and grease (FOG) buildup	Pipelines should be cleaned by mechanically powered or hydraulically propelled cleaning tools	January 2026
Pipe Segment MM4/MF1	Significant fat, oil, and grease (FOG) buildup	Pipelines should be cleaned by mechanically powered or hydraulically propelled cleaning tools	January 2026
Pipe Segment MF1/MF2	Significant fat, oil, and grease (FOG) buildup	Pipelines should be cleaned by mechanically powered or hydraulically propelled cleaning tools	January 2026
Lift Station Recommendations			
Lift Station	**Lift Station Issue**	**Required Remediation**	**Completion Date**
Pianalto Lift Station	Buildup on alarm sensors, brackets, and guide rails. Loss of effectiveness of air scrubber	Lift Stations should be cleaned by mechanically powered or hydraulically propelled cleaning tools. Air scrubber medium should be replaced.	January 2026
Barrington Lift Station	Buildup on alarm sensors, brackets, and guide rails.	Lift Stations should be cleaned by mechanically powered or hydraulically propelled cleaning tools.	January 2026