MEMORANDUM

TO: Mayor and Council Members

FROM: Greg Meszaros, Austin Water Director

DATE: March 29, 2022

SUBJECT: **February 2022 Boil Water Notice Investigation Reports**

Austin Water has completed our internal investigation work of the February 2022 boil water event and I am enclosing four documents that summarize the findings. The first, entitled "Process Narrative - Ullrich Water Treatment Plant February 2022 Water Boil Water Notice," contains a process analysis and timeline of Ullrich Water Treatment Plant operations from the period of Monday, January 31, 2022, through the activation of the boil water notice on Saturday, February 5, 2022. Please note there are portions of this report that are redacted to protect critical infrastructure systems. The next three documents contain investigation summaries for the operations staff, known as the Orange Team, that were on duty during the February 4, 2022, 7:00 pm to February 5, 2022, 7:00 am shift.

These reports substantiate Austin Water's initial assessment. The cause of the February 2022 boil water notice stemmed from the start up seeding of basin 6 and the subsequent filter overloading and breakthrough that occurred because of high turbidity water flowing out of the basin on to the filters. Investigations of staff actions during the event found that Orange Team members did not appropriately respond to deteriorating plant conditions despite logs and multiple alarms that communicated the basin was seeding throughout the shift. Additionally, Orange Team members failed to reach out to their chain of command to communicate worsening water quality conditions and seek assistance.

In response to these findings, as summarized in previous correspondence and presentations, Austin Water has taken steps to mitigate risks and improve operational resiliency at our water treatment plants. Work completed or underway includes increased remote monitoring of plant processes, timer-based basin seeding only, enhanced shift pass-down communication procedures, filter control logic review and improvements, external alarm testing, and updated standard operating procedures, guides, and training.

Staff will be prepared to discuss these matters at the March 31, 2022, 2:00 pm Austin Water Oversight Committee special called meeting.

Please contact me at greg.meszaros@austintexas.gov if you have any questions or need more information on this matter.

Attachments:

Process Narrative - Ullrich Water Treatment Plant February 2022 Austin Water Boil Water Notice
Investigation Summary, Respondent 1
Investigation Summary, Respondent 2
Investigation Summary, Respondent 3

cc: Spencer Cronk, City Manager

Process Narrative – Ullrich Water Treatment Plant

February 2022

Austin Water Boil Water Notice

Summary of Events at Ullrich Water Treatment Plant Leading to the February 2022 Austin Water Boil Water Notice

Background

The Importance of Solids in Conventional Water Treatment

The two primary functions of a water treatment plant are disinfection and particle removal. Raw water from the Lower Colorado River contains suspended matter such as clay, silt, natural organic matter, and microorganisms. The metric that Austin Water and regulatory agencies use to measure particle removal at the plant is turbidity, a water's cloudiness, or its ability to scatter light, measured in Nephelometric Turbidity Units (NTU). In addition to aesthetic impacts such as taste and odor, turbid water is more likely to harbor harmful bacteria and viruses. Particles in water carry a negative charge, causing them to repel each other and stay in suspension. In water treatment, a chemical coagulant is added to neutralize the charge. Once destabilized, the particles no longer repel each other, allowing for aggregation during the flocculation process. The resulting larger particles are denser, allowing them to settle by gravity. At the Ullrich Water Treatment Plant (WTP), the three stages of a conventional treatment system - coagulation, flocculation, and settling - are combined into one treatment unit or clarifier. The incoming process water enters the clarifier through the center of the unit or mixing well. This area is segregated from the rest of the unit by a bell-shaped partition or "skirt". Within the mixing well, treatment chemicals (lime and ferric sulfate) are dispersed, initiating particle destabilization and the formation of larger, heavier "floc" particles. The formation of heavier particles is enhanced by the mixing of incoming destabilized particles with previously formed floc circulating within the mixing well. Adequate particle concentration, or solids density, in the mixing well is essential for interaction with the suspended, turbidity causing material in the raw water in order to form larger, heavier floc which can then settle by gravity to the bottom of the basin. Once settled, the solids must be removed from the basin to prevent excess buildup.

Maintaining the balance of solids in the mixing well is crucial to the performance of the clarifiers. Operators collect samples from the mixing well and measure the solids concentration every 4 hours and even more frequently when the solids are outside the optimum range. 6% solids by volume is the target, while 4-8% is a typical range. When the solids in the mixing well are too low, less than 3%, the upflow clarification process does not perform optimally, resulting in higher turbidity in the settled water leaving the basin and proceeding to the filters. To correct low mixing well solids conditions, operators will "seed" a basin with solids that had previously been removed during the clarification process. These solids are pumped from the solids thickener basin to the clarifier that is deficient of mixing well solids. If solids are allowed to accumulate in the basin without removal, eventually the floc material will build up and reach to top of the basin, causing high settled water turbidity and an extra burden on the filtration process.

Operational Data

Operators monitor plant performance using three primary apparatuses: 1) SCADA (System Control and Data Acquisition) screens that continuously display instrument-read data in real time, 2) manually collected "grab" samples that are processed in the onsite laboratory, and 3) visually assessing performance while collecting samples and performing scheduled station checks.

SCADA Data

The plant operations' SCADA computers display real-time data that is collected from instrumentation throughout the plant. Examples of these screens are shown in Figure 1 and Figure 2. Every important process parameter monitored by SCADA has a "LOW" and "HIGH" (displayed in [redacted]) alarm to indicate when a parameter has deviated from its typical acceptable range, requiring the operator's attention, and a "LOW LOW" and "HIGH HIGH" (displayed in [redacted]) alarm to indicate when the parameter is at a critically high or low level, requiring immediate action.

This report contains graphs such as Figure 3, displaying instrument-read SCADA trends. It is important to note that, operationally, these graphs are used for looking at previous or historical data as they do not update in real time. Operators are constantly monitoring screens like those shown in Figure 1 and Figure 2 but only access the graphs shown in this report, known as SCADA trends, when they have a specific reason to look at historical performance.

Manual Grab Samples

Operators collect samples manually every 4 hours at critical locations throughout the plant and process the samples in the onsite water quality lab. Some of the sampling is redundant; used to verify the accuracy of on-line instrumentation reporting to the SCADA system. Other process control parameters rely entirely on manual sampling because on-line instrumentation does not exist for every control test.

Visual Inspections

Manual collection of samples also has the added benefit of first-hand observation of conditions at critical points in the process by plant operators. This allows the operations team to reap additional information about the health of the process that is not measured by instruments.

Summary of Events & Timeline

Leading up to and including Ullrich WTP shutdown

The following is a timeline of events the week of January 31, 2022 leading up to and through the morning of Saturday, February 5, 2022.

Monday, January 31 – Fully staffed Ops/Maintenance

- Wet weather day, but routine operations.

Tuesday, February 1 – Fully staffed Ops/Maintenance

- Operations: Throughout the day and night, Basins 2, 5 and 6 are online to provide approximately 60 MGD of production.
- Morning - all WTPs, including Ullrich, start completing hard freeze winterization Standard Operating Procedures (SOPs) in response to the forecasted arctic blast. Hard freeze winterization protocol includes ceasing and draining non-critical chemical feed systems, accounting for/replenishing winter weather supplies, staging sand/de-icing fluid, checking chemical inventories, and ensuring staff shift coverage through the winter weather, forecasted for February 3 and 4.
- Afternoon - Centrifuge No. 4 exhibits mechanical issues and is not functional. Maintenance is inspecting the equipment and assistance is also requested from Electrical and Instrumentation and Control (I&C) staff. Centrifuge No. 2 and No. 4 are [redacted] already out of service for annual re-building. [redacted] With Centrifuge No. 4 out of commission, the plant utilizes Centrifuge No. 1 and No. 3, which lately deteriorated in performance to 50 to 70 gpm, each. This combined capacity is only adequate for keeping up with solids that are being stored in the solids holding tank (blended solids from solids thickener and washwater basins).
- [redacted] *Solids from the thickener tank and wash water (filter backwash) from the wash water basin are pumped in the right proportions into the solids holding tanks (SHT) upstream to provide feed at an adequate consistency for the centrifuges. The consistency of the solids in the SHTs is critical for efficient operation of the centrifuges. A minimum centrifuge feed rate must be maintained to avoid overwhelming the upstream thickener and washwater basin. Functional centrifuges are critical to maintaining both the SHT level (upstream) and the hoppers (downstream).*

Wednesday, February 2 – Fully staffed Ops/Maintenance.

- Operations: Basins (clarifiers) 2, 5 and 6 continue operation at approximately 60 MGD until Basin 8 is brought online to increase production to 75 MGD before 2 PM.
- Maintenance: In addition to winterization activities, Maintenance staff spends much of the day disassembling and re-building Centrifuge No. 4. At 1:06 PM, the City Manager suspends normal operations due to forecasted bad weather for Thursday. By approximately 3:30 PM, Centrifuge No. 4 is brought back online and put into operation. Quality checks of winterization SOP are also completed by the end of the day.

- Operations staff were left with instructions to periodically check to confirm that Centrifuges No. 3 and No. 4 are keeping up with solids production; not allowing solids to accumulate in the process.
- 4:00 PM – AW Incident Management Team / Department Operations Center (IMT / DOC) is notified of activation at midnight due to forecasted winter weather. Veoci updates every 6 hours is requested for all major facilities.
- Evening – Basins 2, 5, 6 and 8 are online to provide approximately 60-75 MGD of production.
- Evening / Early Morning - Given the forecasted icy road conditions, the solids hoppers (where dewatered solids are held until they are hauled to the Shaw Lane disposal site) are emptied at 2 AM since solids hauling is planned to be grounded on February 3.

Thursday, February 3 – Three operations staff are on site in addition to electrical and instrumentation/controls support staff.

- Operations: Throughout the day, Basins 2, 5, 6, and 8 are online to maintain 60-75 MGD production. In the evening, Basins 2 and 5 are kept online (Basin 6 is taken offline before midnight and Basin 8 is taken offline before 4 AM) when production was reduced to 45-50 MGD.
- Operations staff is requested to maintain a steady level in the solids holding tanks by controlling the rate of pumping from the washwater basin. Trucks are parked under the hoppers to collect solids in the event that hoppers need to be emptied.
- 3:30 PM – City Manager suspends normal operations for Friday, February 4 due to forecasted bad weather on Friday.

Friday, February 4 – Three operations staff are on site through the day shift until 7 PM in addition to electrical and instrumentation / controls support staff. Two maintenance staff and one Supervisor called in for assistance during the day. Solids hauling resumes in the morning.

- Operations: Basins 2 and 5 are still being utilized to maintain 45-50 MGD production.
- 6:40 AM – Supervision calls in to check with night team and it is reported that Centrifuge No. 4 has deteriorated performance. Washwater basin rake overtorqued due to excessive solids in the basin.
- 10:40 AM – Ops staff notify supervision that lime feed assemblies (located at each basin) have frozen on Basins 6 and 8. This is discovered when Basins 6 and 8 are brought online to increase production from 45 MGD to 72 MGD, as requested by the Pumping & Reservoirs Division. Supervision instructs Ops staff to adjust the low service pump discharge valving to send approximately 58 MGD to Basins 2 and 5 to maximize production in the two online basins. Pumping & Reservoirs Division was satisfied with this pumping rate.
- 11:00 AM - Two maintenance staff and Operations Supervisor are deployed to Ullrich to assist with restoring function to the frozen lime feed assemblies, washwater basin rake and Centrifuge No. 4.
- 2:00 PM – Supervision reports that Basin 8 lime feed assembly has thawed out and Basin 8 is being brought online. Supervision departs from Ullrich following status report.
- 4:00 PM – Basin 6 lime feed assemblies are thawed out. **Basin 6 is brought online.**
- 5:00 PM – Basin 6 begin seeding (feeding solids), leaving a note on the End of Shift report for next shift. Basin effluent turbidities initially spike (as is common while coming online) but drop to typical levels by 8:00 PM (Figure 3).

- 5:37 PM – Email from Superintendent Mike Mulgrew to Operations team with instructions to monitor centrifuge production and dump water from the hoppers if no solids are being produced by the centrifuge (the problem of water being dumped into the hoppers instead of processed solids is an indication that the centrifuges are not working properly). Additionally, instructions were provided to keep online basins running at all times to prevent lime feed assemblies from freezing.
- 6:00 PM – Maintenance reports that Centrifuge No. 4 was not successfully repaired. Maintenance staff depart from Ullrich. Plant is relying on [redacted] Centrifuges No. 1 and No. 3 to manage solids.
- 6:30 PM – Production is increased to 75 MGD with Basins 2, 5, 6 and 8 all online.

Friday, February 4 – Three operations staff are on site at start of 7pm night shift.

- 7:00 PM to 11:00 PM – Night shift is monitoring performance of the centrifuge and trying to troubleshoot excessive water being discharged to hopper. Supervision instructs night shift to drain solids from hopper into truck and discharge water to washwater basin through ground floor drains.
- 9:00 PM – Production is increased to approximately 86 MGD and remains at this rate until Basin 6 is shut down at 7:38 AM on Saturday morning.
- 9:30 PM - Basin 6 turbidities began to slowly climb according to SCADA trends.
- 10:22 PM – Division Manager called to Ullrich Control Room to check in on team and no issues reported.

Saturday, February 5 – Three operations staff are on site through continued night shift until 7 am - day shift change.

- 1:15 AM - Basin 6 solids removal valve was briefly opened then closed, as indicated by flow meter readings in SCADA records.
- 2:30 AM - Basin 6 effluent turbidities (under normal operation, goal is less than 2 NTU) climb more rapidly and well above typical levels, exceeding the instrument maximum of 100 NTU at approximately 3:00 AM (Figure 4). The effluent turbidity leaving the basin remained excessively high until it was taken offline by the day shift operations team at 7:38 AM.
- 4:00 AM - first filters begin to break through, quickly exceeding 0.1 NTU (AW target max), then 1.0 NTU (the regulatory limit), then 5 NTU within a few minutes. Two filters, 13 and 18, are taken offline but the others are left on. Nine (9) of the eleven (11) filters exceed the regulatory limit of 1.0 NTU (profile on Figure 11).
- 4:08 AM - solids thickener pump used to seed the basin) is shut off, stopping the flow of solids into Basin 6 (although solids were likely completely stripped from the thickener, where the solids come from).
- 4:16 AM - Basin 6 solids blowdown valve is opened, beginning the process of removing solids from Basin 6. The basin is left on, continuously sending high turbidity settled water to the filters.

Saturday, February 5 – Three operations staff are on site at start of 7 am - day shift change.

- 7:15 AM - plant supervision is notified. Supervision directs staff to turn off/isolate Basin 6.
- 7:38 AM - plant effluent turbidity (at the High Service Pump Station) exceeds 0.3 NTU (regulatory trigger for a treatment technique violation if 5% of monthly 4-hour readings exceed this turbidity) (Figure 12) and influent flow to Basin 6 is shut off.

- 8:00 AM - plant effluent turbidity (at the High Service Pump Station) exceeds 1.0 NTU (Boil Water Notice trigger if sustained) (Figure 12).
- 9:30 AM - Ullrich WTP is shut down.

Process Narrative

Basin 6 Online and Seeding

On Friday, February 4th, the dayshift operations staff began to bring Upflow Clarifier (UFC) No. 6 online at 4:08 PM. A graph of several relevant Basin 6 parameters is shown in Figure 3. Within an hour, the effluent, or settled water, turbidity from Basin 6 spiked above 20 NTU. The plant's settled water turbidity goal is below 2 NTU. Although it is not ideal, the turbidity in the basins can briefly spike above 20 NTU when they are first being brought online, as was the case for Basin 6. As the settled water turbidity spiked at 5:00 PM, the operators simultaneously began introducing solids to the basin, a process referred to as "seeding", and briefly opened the solids blow down to remove solids. It is unclear why both actions were taken, but aggressive solids removal only occurred for a few minutes. Low solids removal continued for approximately 2 hours, but this could have been from the effluent valve failing to properly seat. Figure 4 shows the flow of solids in and out of Basin 6 on February 4th.

Operators target a mixing well solids concentration of 4-8% by volume. When bringing an idle basin back online, operators are required to take a mixing well sample to determine whether the basin is properly seeded, but since this test is not a part of the typical sampling regime, it is often not recorded. The last mixing well sample taken on Thursday, February 3rd, the day prior when Basin 6 had been taken offline, was 10%. The day shift operators on Friday initiated seeding as they brought the basin back on-line, which is a standard practice.

The day shift operators put the solids seeding pump in manual mode and noted in their End of Shift Report (Figure 5) to the night shift that Basin 6 was currently seeding solids. The solids pumps used to seed basins can be set to run on a timer, but this is a matter of operator preference. A timer is often not used when it is not clear how much seeding a basin will require. In this case, the day shift operators started the seeding process without a timer, meaning that the solids pump will continue to run until it is manually shut off by an operator. In this mode of operation, mixing well samples should be collected frequently to determine when seeding operation can be terminated. Within 2 hours of Basin 6 being brought online, the settled water turbidity recovered from its initial spike and was trending down to more typical values on the evening of Friday, February 4th. However, as solids began to accumulate in Basin 6, the clarifier's performance deteriorated and settled water turbidity began to climb again at 9:30 PM. At 9:51 PM the settled water turbidity leaving Basin 6 exceeded 9 NTU, triggering a HIGH HIGH alarm on the SCADA computers.

Basin 6 Solids Buildup

The operators' 10 PM grab samples (manually collected and tested in the lab) indicate that the basin was not performing within the normal range. The 10 PM volumetric solids sample indicated the mixing well had a solids concentration of 19% (Figure 6). A value greater than or equal to 10% indicates that solids should be removed from the basin by opening the solids blowdown valve. Additionally, the Basin 6 settled water turbidity grab sample was 8.7 NTU (Figure 7), well above the goal of 2 NTU. However, this value was lower than the settled water turbidity had been during the initial turbidity spike during startup. Manually entered readings of settled water turbidity and mixing well solids during the shift are shown in Figure 6. On this bench sheet table, settled water turbidity readings are entered on the left side for Lines 1-4, representing the four pipelines transmitting settled water from the clarifiers to the filter building. Most of the water coming from Basin 6 is carried by Line 4. At 10 PM, only one of the settled water turbidity readings was meeting the 2 NTU goal, with Line 4 (Basin 6) being the highest.

The center of the bench sheet table also shows handwritten entries of 4-hour mixing well solids tests for each on-line basin or Upflow Clarifier (UFC). The entries show that the mixing well solids test results for both Basins 5 and 6 were well above the target operating range of 4 - 8%.

As the night went on, solids continued to accumulate in Basin 6, eventually overflowing into the settled water channel and on to the filters. Figure 8 shows the SCADA parameters measuring the performance of UFC Basin 6 on Saturday, February 5th. At 1:15 AM, solids are briefly removed from the basin, as indicated by the red line ("UFC 6 Sludge Blowdown Flow") on the figure. However, the valve is closed after several minutes (flow stopped), and seeding is never interrupted, as shown by the light blue line ("Sludge Thickener Pump Station Flow"). Manual grab samples were taken at 2 AM and were another indication of a process problem increasing in severity in Basin 6 (see Figure 9). The operator entries showed that the mixing well solids level remained extremely high at 18% and the settled water turbidity had climbed to 21 NTU (Figure 10). At 2:30 AM, the basin settled water turbidity begins to climb rapidly (blue line shown on Figure 8), exceeding the instrument's maximum reading of 100 NTU at 3:00 AM. As mentioned previously, the clarifiers work by settling and removing solids at the bottom of the basin while clarified water flows out through weirs at the top of the basin and on to the filtration process. By 2:30 AM, solids had accumulated in Basin 6 to the point of overflowing the weirs, as indicated by the rapid rise in settled water turbidity. For reference, at this time the water flowing over the weirs and onto the filters likely looked similar to the water in the Colorado River during the 2018 flood. While there were earlier opportunities to correct basin performance by halting seeding and opening the blowdown solid removal valves, at 2:30 AM the basin should have been shut off immediately to prevent high turbidity water from reaching the filters. However, Basin 6 remained on-line, sending water to the filters that was 10-100 times more turbid than typical for 5 hours until it was finally taken off-line at 7:38 AM by the day shift operations team.

Filter Overloading and Breakthrough

The online filters received and treated the high turbidity water for approximately 90 minutes before the high turbidity from Basin 6 overloaded the filters and breakthrough occurred. In this condition, a filter loses its ability to serve as a barrier to particles (turbidity) passing through. Austin Water has established an individual filter effluent turbidity goal of less than 0.10 NTU, as prescribed by the *Partnership for Safe Water* program. According to the plant's Standard Operating Procedures (SOP), plant operators may allow a filter to remain on-line above 0.10 NTU up to 15 minutes if it is in the "ripening" stage after backwash or if it is trending downward. If the effluent turbidity does not recover to below 0.10 NTU within a reasonable amount of time, it is taken off-line. This practice allows the plant to stay well below regulatory triggers of 0.3 and 1.0 NTU. In accordance with filter operation SOPs, if an operator can't maintain production while keeping individual filter turbidities below 0.10 NTU, they should contact their supervisor.

At 4:00 AM, the first filters began failing, with effluent turbidities sharply increasing. Between 4:00 and 5:00 AM, 9 of the 11 online filters broke through, with effluent turbidities increasing from below 0.05 NTU to the instrument maximum of 5 NTU in the span of several minutes. The filter profile for Filter 11 is shown in Figure 11. It depicts the filter effluent turbidity, flow, and differential pressure prior to breakthrough until the plant was shut down at 9:30 AM. The other filters that broke through have similar profiles. In the SCADA system, each filter has a HIGH alarm set at 0.08 NTU and HIGH HIGH alarm at 0.10 NTU. The SCADA record shows that an operator acknowledged these alarms as the filters were

spiking. When an alarm is acknowledged, the audible alarm stops, but the visual alarm (indicated by the color of the reading) remains in alarm until the value is back within the acceptable range.

The SCADA trend (Figure 8) shows that at 4:08 AM, the solids flow into the basin stopped (light blue line, “Sludge Thickener Pump Station Flow”), and the flow of solids out of the basin began (red line, “UFC 6 Sludge Blowdown Flow”). Despite this corrective action, the basin remained on-line (green line, “UFC 6 Raw Wtr Infl Flow”), continuing to send high turbidity settled water to the filters. Two of the first filters to experience breakthrough were taken offline soon after exhibiting high effluent turbidity near 4:00 AM, but the others remained online with the turbidimeter indicating the maximum reading. High turbidity water flowed from the filters to the clearwells for 5 hours until the plant was shut down. Supervision was never notified of the ongoing process problems and turbidity violations by the night shift operations team. Supervision and upper management were notified by the daytime operations team following shift change after 7:00 AM.

Finished Water Turbidity and Plant Shutdown

Effluent from individual filters combines and flows to the clearwells, two 10-million-gallon baffled tanks, prior to being sent to the distribution system from the High and Medium Service Pump Stations (HSPS and MSPS). The finished water regulatory turbidimeter is located at the HSPS. Austin Water has a finished water goal of less than 0.10 NTU at this meter. For reference, exceeding 0.10 NTU has only occurred a handful of times in the last 5 years. A TCEQ treatment technique violation occurs when 5% of the plant’s monthly 4-hour readings exceed 0.3 NTU. Any single reading more than 1.0 NTU is a potential Boil Water event, requiring consultation with TCEQ within 24 hours. Figure 12 shows the finished water turbidity and flows on Saturday morning (Feb. 5). The SCADA trend of finished water turbidity leaving the HSPS is shown in Figure 12. Following filter breakthrough, the high turbidity water made its way through the clearwells to the HSPS within about 2.5 hours. By 7:15 AM, the finished water turbidity had reached Austin Water’s maximum goal of 0.10 NTU. From that point, the turbidity rose rapidly, exceeding the first regulatory trigger of 0.3 NTU at 7:38 AM, and the Boil Water Notice trigger at 8:00 AM. Turbidity continued to rise, reaching 9 NTU by the time the plant was shut down at 9:30 AM.

Figure 1 Filter Overview SCADA Screen

Figure 2 Upflow Clarifier Overview SCADA Screen

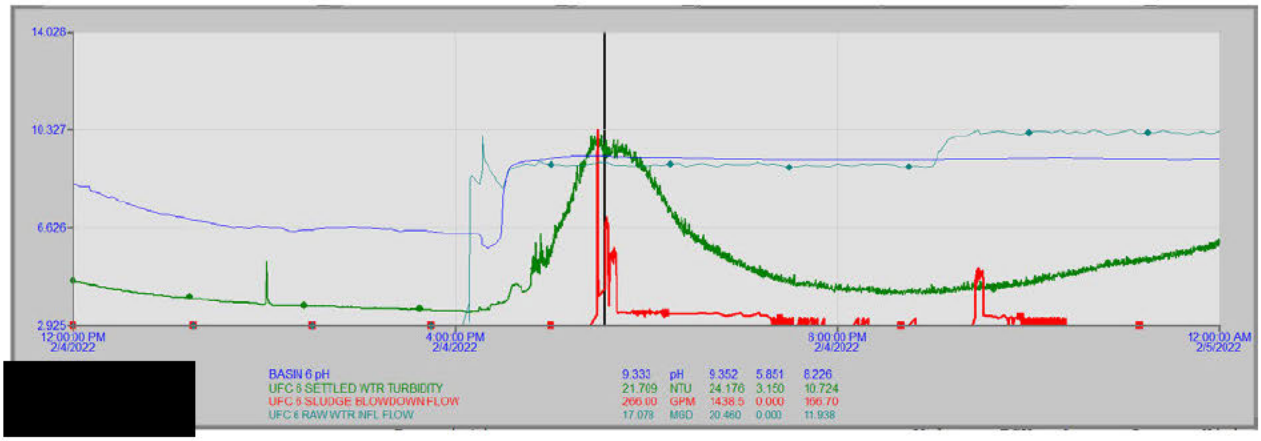


Figure 3 UFC Basin 6 Parameters on Friday, February 4th

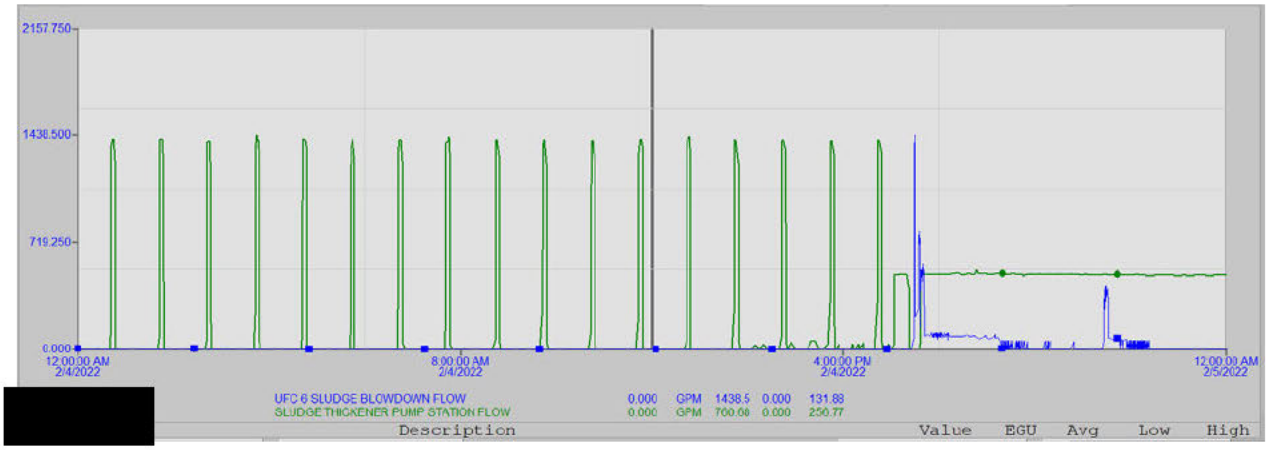


Figure 4 UFC 6 Solids Influent (Green, seeding process begins at approx. 5:00 PM) and Solids Effluent (Blue)

Control Room End of Shift Report

Day Shift 7a.m. - 7 p.m. Date: Friday, February 4, 2022

x	MOR Computer	x	Pumpage sheet	x	Flush Sludge Handling
x	MOR Paper	x	Lab Bench Sheet	x	Sludge Density Tests
x	Free Ammonia Sheet		**Meter Readings**		
x	Chemical Feed Sheet	x	Sludge Report		

Only two types of operations occure at Ullrich WTP: Routine & non-Routine.Routine operations occur when operators are are performing normal duties and all regulatory and plant goals are being met.Non-routine operations occur when an event or process difficulty prevents operators from meeting plant goals or performing normal duties.[Note: Non-routine refers to the plant as a whole and not to the methods used to perform the many tasks required to operate the plant.] **Remember: DO NOT throttle pump discharge valves.**

****Note - Press Alt+Enter to start a new line of text in the text box****

Multiple issues throughout the day found lime dosage points to basins 6 and 8 frozen (told to not turn off any basins) centrifuge 4 burned through all of it's belts (louis and brian called to work on them) multiple flow changes throughout the day due to our issues we were having on sight lab bench sheet will reflect higher numbers due to this, had slight issue with low service pump 6 but we managed to get it back on line we recently brought up basin 6, and 8 but have been fighting turbitity issues but seem to be improving, wash water rake torqued out but it now set in manual with a timer of 5 min every 30 min, we are set up seeding basin 6, refer to emails for more information

Day shift indicates Basin 6 is seeding solids.

W.O. written for centrifuge 4 # 179033

washwater on lime feed dosage assemblies on 2, 4, 6 have blown gaskets & or compl. RS water has been turned off

Operation during the entire shift was: _____ **Routine** _____ a non-routine event occurred

If a non-routine event occurred, the following section must be completed: The event was caused by:

x **Equipment Failure** _____ **Operator Error** _____ **Other**

Describe what happened, actions taken to identify and resolve the problem and by whom, the duration of the problem and any effect on meeting regulatory or plant goals. ***Continue on 2nd sheet if needed.***

refer to the top

Lab Assigned to: woody **Up & Out Assigned to:** Brett

The information included in this report is complete and true to the best of my knowledge:

Name: Gattis Operator in Charge of the Green team.

Figure 5 Friday, February 4th EOS Report

Date Feb. 04, 2022 Fri.

Ullrich WTP Pump Record

Low Serv Pumps

Pump #	Rate	ON	OFF	%
3	45	MN		100
5	20	1040	4500	
6		1049		
1		11:10	15:30	
6		15:30	9P	
2		4:50		
3		9P		

Med Serv Pumps

Pump #	Rate	ON	OFF	%
5	24	MN		35
2		9P		

High Serv Pumps

Pump #	Rate	ON	OFF
5	32	MN	10:35
4	17	1020	11:55
6	32	1145	
2	19	630	

Plant Pumpage

Raw	58.646
Med Serv	26.209
High Serv	32.453

Total Pumpage

Davis WTP	38.781
Ullrich WTP	58.662
Total	97.443

Ullrich WTP Sludge Handling Record

Time	Line 1	Line 2	Line 3	Line 4	UFCs 1	UFCs 2	UFCs 4	UFCs 5	UFCs 6	UFCs 7	UFCs 8	Treatment Rate (MGD) 1	Treatment Rate (MGD) 2	Treatment Rate (MGD) 4	Treatment Rate (MGD) 5	Treatment Rate (MGD) 6	Treatment Rate (MGD) 7	Treatment Rate (MGD) 8
12am	1.0	1.0	1.8	1.5									21.6		12.4			11.6
2am	1.3	1.4	2.5	1.6		9		16			13		21.4		12.4			11.6
4am	1.4	1.5	2.1	3.2									28.4		17.2			
6am	1.9	2.0	2.5	4.3		8		11					28.1		17.3			
8am	1.7	1.7	2.1	3.3									28.2		17.5			
10am	1.5	1.5	1.9	2.8		5		10					28.4		17.5			
12pm	1.8	1.9	2.0	2.7									35.6		22.8			
2pm	1.8	1.7	1.9	2.6		5		12					35.3		23.6			
4pm	1.4	1.4	2.4	2.2									23.3		16.5	15.6		17.2
6pm	2.1	3.7	10.4	9.2		5		16			9		22.4		17.6	17.0		17.3
8pm	2.0	4.0	4.4	5.7									22.4		17.8	16.4		16.9
10pm	1.9	4.7	5.3	8.0		6		15	19		9		26.5		21.3	20.4		19.3

Figure 6 February 4th Sludge Handling Record

ULLRICH WTP — BENCH SHEET — Date: 4-Feb-22

Sample	Test	2	4	6	8	10	N	2	4	6	8	10	MN	AVG
Raw Water	M.O. Alk.	163		163		164		163		164		167		####
	Hardness					190								####
	Turbidity	6.41		8.02		6.8		1.9		1.8		1.6		####
	pH	8.21		8.19		7.89		8.12		8.17		8.18		####
Basin 2 Effluent	Phenol Alk	28		23		24		26		21		24		####
	M.O. Alk.	56		64		61		70		69		67		####
	Turbidity	2.07		2.66		2.5		2.3		2.8		2.5		####
	pH	10.55		10.14		[illegible]	10.10	10.01		9.95		10.11		####
	Hardness													####
Basin 5 Effluent	Phenol Alk	26		20		20		25		26		25		####
	M.O. Alk.	55		65		66		61		67		60		####
	Turbidity	2.59		4.62		4.5		3.0		3.2		3.1		####
	pH	10.43		9.93		9.98		10.11		10.25		10.15		####
	Hardness													####
Basin 8 Effluent	Phenol Alk	31								25		19		####
	M.O. Alk.	54								51		74		####
	Turbidity	2.52								3.2		9.8		####
	pH	10.76								10.41		9.74		####
	Hardness													####
Basin #6 Effluent	Phenol Alk											21		####
	M.O. Alk.											64		####
	Turbidity											8.7		####
	pH											9.98		####
	Hardness													####
Filtered Water	Phenol Alk													####
	M.O. Alk.													####
	pH	9.70	9.31	9.16	9.20	9.20	9.27	9.30	9.27	9.06	9.34	9.49	9.63	####
	Hardness													####
	Cl2 Res.	2.75	2.90	2.90	2.90	2.90	2.90	3.00	3.00	3.05	3.05	3.00	3.00	####
Tap	Cl2 Res.	2.60	2.65	2.70	2.75	2.80	2.90	2.90	2.90	2.90	2.90	3.00	3.00	####
	pH	9.62	9.58	9.71	9.66	9.45	9.31	9.06	9.17	9.20	9.47	9.37	9.44	####
	Turbidity MS	.03		.03		.04		.04		.05		.06		####
	Turbidity HS	.01		.01		.03		.03		.03		.04		####
	Hardness													####
Physical Condition	Weather	CLDY	CLDY	CLDY	cldy	mc	mc	mc	clr	clr	clr	clr	clr	####
	Rainfall	0	0	0	0	0	0	0	0	0	0	0	0	####
	Temp Raw	12	12	12	12	12	12	12	10	10	10	10	10	####
	Temp Tap	13	13	13	13	13	13	13	12	12	12	12	12	####
	Temp Air	21	21	22	24	28	32	38	38	39	33	32	30	####
Cl2 Residual	D1-R# M	3.40		3.05		3.10		3.20		3.25		3.25		####
	D1-R# A	3.57		3.31		3.01		3.10		3.49		3.50		####
	Filter - M	2.85		3.00		2.95		3.00		3.15		3.15		####
	Filter - A	2.85		3.02		2.94		3.01		3.11		3.14		####
	D2-M													####
	D2-A													####

5, 10 5, 12 5, 16, 9

Manual Basin 6 effluent turbidity samples: 10 PM, on 2/4 shows high value but not uncommon, especially for a basin being brought online.

Figure 7 February 4th Laboratory Bench Sheet

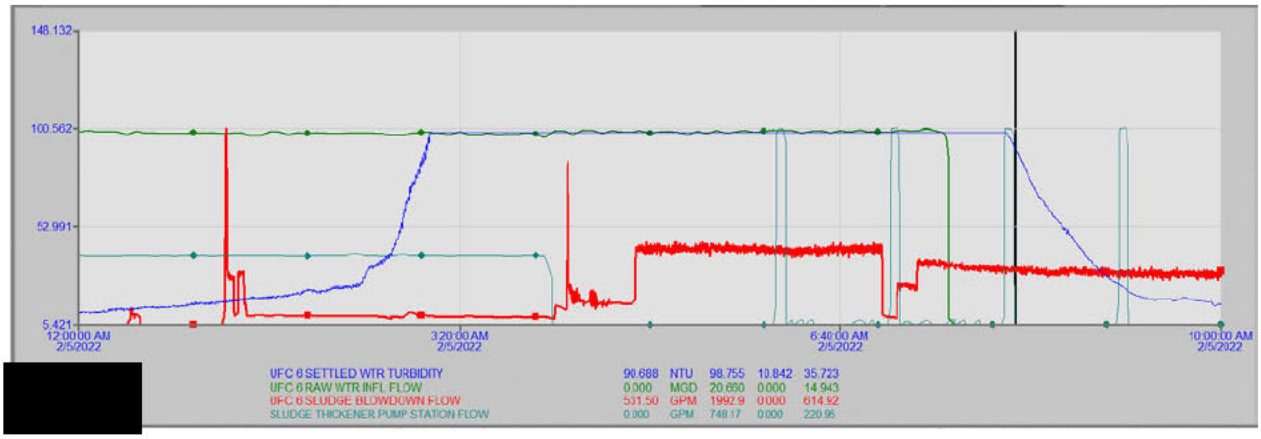


Figure 8 UFC Basin 6 Parameters on Saturday, February 5th

Date 02-05-2022

Ullrich WTP Pump Record

Low Serv Pumps				
Pump #	Rate	ON	OFF	%
2	43	mn		
3	43	mn		
6	30	10:04pm		

Med Serv Pumps				
Pump #	Rate	ON	OFF	%
2	10	mn	7:15	58
5	30	mn		64

High Serv Pumps			
Pump #	Rate	ON	OFF
2	14	mn	5:15A
6	29	mn	

Plant Pumpage	
Raw	34.707
Med Serv	14.533
High Serv	13.484

Total Pumpage	
Davis WTP	62.983
Ullrich WTP	28,017
Total	91.000

Ullrich WTP Sludge Handling Record

	Line				UFCs							Treatment Rate (MGD)						
Time	1	2	3	4	1	2	4	5	6	7	8	1	2	4	5	6	7	8
12am	2.2	7.0	8.1	10.2									26.7		21.3	20.2		20.0
2am	2.2	9.5	12.0	14.5		5		11	18		6		26.6		21.4	19.9		19.9
4am	2.1	100	100	99.9									26.6		21.1	20.0		19.6
6am	2.1	100	100	100		7		12	18		6		26.5		21.1	20.3		19.7
8am	2.1	100	100	100									26.8		21.1			19.8
10am	1.4	2.5	1.5	3.2									0		0			0
12pm																		
2pm																		
4pm																		
6pm																		
8pm	4.8	4.7	7.6	11.6									28.1					
10pm																		

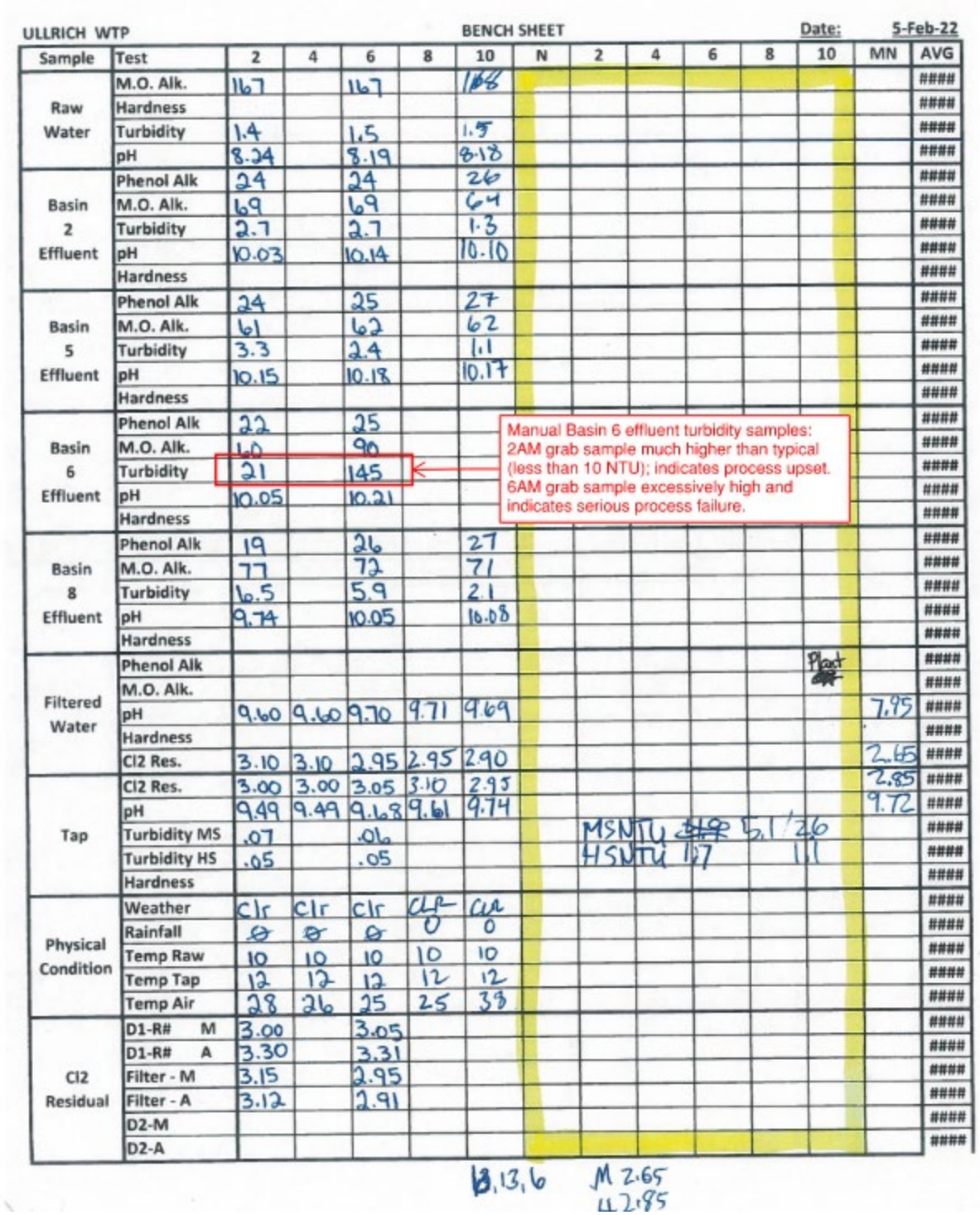
10:30

Plant Shutdown

Sludge readings show persistent need for solids removal throughout the early morning.

Operators record the turbidities from SCADA on the lines in between the clarifier basins and the filters. 100 NTU is the instrument maximum and is excesively high. This is the same data as that shown on the Page 3 figure.

Figure 9 February 5th Sludge Handling Record



ULLRICH WTP — BENCH SHEET — Date: 5-Feb-22

Sample	Test	2	4	6	8	10	N	2	4	6	8	10	MN	AVG
Raw Water	M.O. Alk.	167		167		188								####
	Hardness													####
	Turbidity	1.4		1.5		1.5								####
	pH	8.24		8.19		8.18								####
Basin 2 Effluent	Phenol Alk	24		24		26								####
	M.O. Alk.	69		69		64								####
	Turbidity	2.7		2.7		1.3								####
	pH	10.03		10.14		10.10								####
	Hardness													####
Basin 5 Effluent	Phenol Alk	24		25		27								####
	M.O. Alk.	61		62		62								####
	Turbidity	3.3		2.4		1.1								####
	pH	10.15		10.18		10.17								####
	Hardness													####
Basin 6 Effluent	Phenol Alk	22		25										####
	M.O. Alk.	60		90										####
	Turbidity	21		145										####
	pH	10.05		10.21										####
	Hardness													####
Basin 8 Effluent	Phenol Alk	19		26		27								####
	M.O. Alk.	77		72		71								####
	Turbidity	6.5		5.9		2.1								####
	pH	9.74		10.05		10.08								####
	Hardness													####
Filtered Water	Phenol Alk											Plant		####
	M.O. Alk.													####
	pH	9.60	9.60	9.70	9.71	9.69							7.95	####
	Hardness													####
	Cl2 Res.	3.10	3.10	2.95	2.95	2.90							2.65	####
Tap	Cl2 Res.	3.00	3.00	3.05	3.10	2.95							2.85	####
	pH	9.49	9.49	9.68	9.61	9.74							9.72	####
	Turbidity MS	.07		.06				MSNTU ~~3.9~~ 5.1 2.6						####
	Turbidity HS	.05		.05				HSNTU 1.7				1.1		####
	Hardness													####
Physical Condition	Weather	Clr	Clr	Clr	Clr	Clr								####
	Rainfall	0	0	0	0	0								####
	Temp Raw	10	10	10	10	10								####
	Temp Tap	12	12	12	12	12								####
	Temp Air	28	26	25	25	38								####
Cl2 Residual	D1-R# M	3.00		3.05										####
	D1-R# A	3.30		3.31										####
	Filter - M	3.15		2.95										####
	Filter - A	3.12		2.91										####
	D2-M													####
	D2-A													####

Manual Basin 6 effluent turbidity samples: 2AM grab sample much higher than typical (less than 10 NTU); indicates process upset. 6AM grab sample excessively high and indicates serious process failure.

B 13,6 M 2.65 A 2.85

Figure 10 February 5th Laboratory Bench Sheet

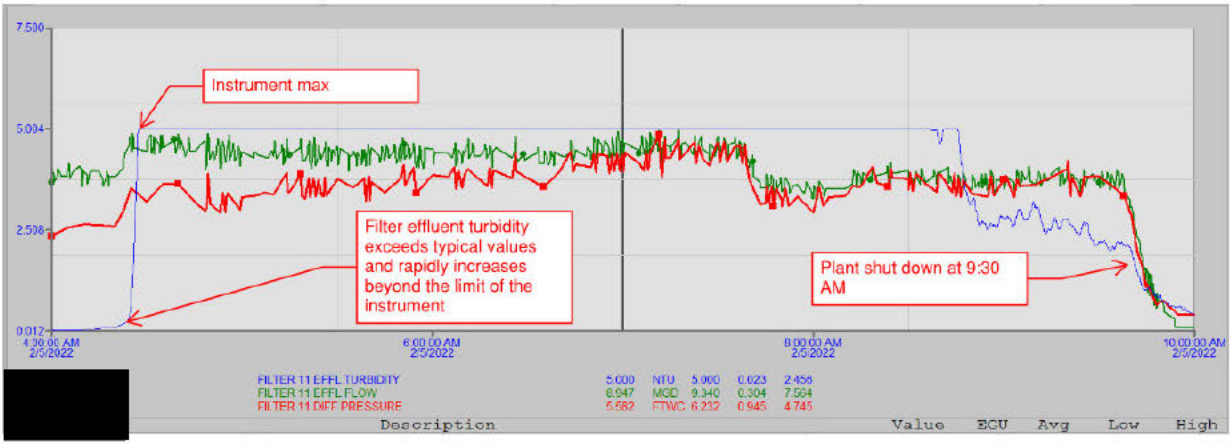


Figure 11 Filter 11 Breakthrough Profile Typical of the other Online Filters (Filter Effluent Turbidity Shown in Blue)

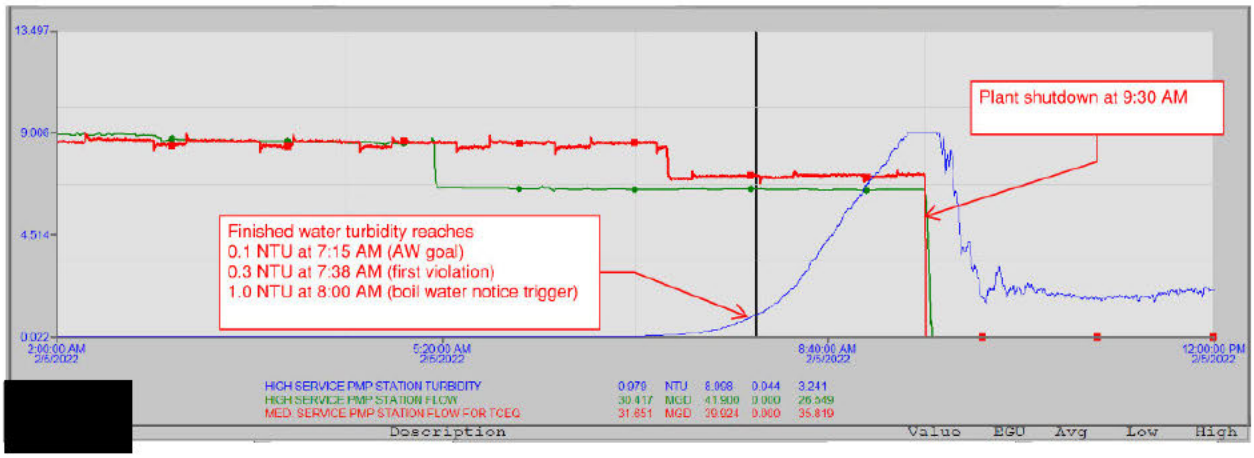


Figure 12 Finished Water Turbidity and Flows

Investigation Report Summary

Date of Report	March 22, 2022
AIM-on-Target #	2022-DA-0033
Department Investigated	Austin Water
Complainant(s) name, title, department	Incident Response
Respondent(s) name, title, department	Jason Perez, AW Treatment O&M Technician Senior (Lead)
Investigator(s) name, title, department	Sherri Hampton, Employee & Leadership Development Assistant Director, Austin Water Tamala Tatum, Human Resources Advisor Sr, Austin Water

BACKGROUND AND BASIS OF COMPLAINT

In the evening of February 4, 2022, a treatment process upset began at Ullrich Water Treatment Plant. This upset continued through the night into the early morning hours of February 5, 2022. Activities related to bringing Basin #6 online to provide more water treatment capacity were in process when conditions related to water quality began to deteriorate. The three-person crew on duty Friday evening was unable to appropriately address the situation. The situation continued to deteriorate overnight as high turbidity water in Basin #6 flowed into the filters and made its way to the clearwells where the turbidity levels exceeded Austin Water's goals and quickly rose above TCEQ regulatory limits. This resulted in the shutdown of the plant and the issuance of a Boil Water Notice for the entire city of Austin.

Joseph Dooley, AW Treatment O&M Associate, Jason Perez, AW O&M Technician Sr. (Lead), and Benjamin Petrush, AW O&M Technician Assistant, known as the Orange Team, were on duty from 7:00 pm to 7:00 am shift beginning Friday, February 4, 2022. Petrush was performing the role of Driver or owner of the Plant, Perez performed the role of Labs and Dooley had the role of Outs collecting grab samples.

It is alleged that these three crew members did not appropriately respond to the growing emergency despite multiple alarms. It is further alleged that their lack of appropriate actions and their failure to reach out to their chain of command directly resulted in water turbidity levels exceeding regulatory levels and a Boil Water Notice for the entire city of Austin to be issued.

ALLEGATION(S), FINDING(S) AND CONCLUSION(S)

Allegation 1: Despite repeated alarms from multiple sources and deteriorating lab results, Perez did not follow Ullrich operational practices to appropriately respond to and correct the high turbidity levels in Basin #6.

Findings of Fact: Perez has been employed with the City of Austin, Austin Water since August 27, 2012. He has been a licensed operator with Texas Commission on Environmental Quality (TCEQ) since 2013. He currently holds a Surface Water Treatment Operator Class B. His application for a Surface Water Treatment Operator Class A (the highest license offered) has been approved. He has completed over 600 hours of training related to Water Utility Operations.

Perez is the most senior technician on the team and has been designated as the Lead for the Orange Team. Being identified as a Lead means being the point of contact for any issues that may arise and making decisions to keep the plant running efficiently during the shift. The Lead is the first, but not sole point of contact, when management needs updates on the plant. As the Lead with 10 years of experience at Ullrich in water treatment process controls, Perez is responsible for ensuring the shift runs smoothly by reviewing pass down information, reviewing SCADA throughout the shift, and ensuring crew members are completing all assigned tasks to run the plant effectively and efficiently. He has the knowledge to review the alarms and incoming sample readings and determine a significant process upset was taking place. Even though Perez was in the 'lab' role for the shift, his Lead duties supersedes all other responsibilities and allows him to develop various corrective action plans to address issues that arise during a shift. Between midnight and 4:00 am, Perez did not review any incoming alarms or view SCADA to stop the process upset.

Pass downs between shifts occur at the start of each shift and are intended to communicate the state of the plant and ensure the incoming staff are aware of operational tasks and any ongoing concerns. Pass downs are given verbally as one shift comes on and the other is relieved. The information is also documented in writing on an Excel spreadsheet and saved on a shared drive that all employees can access. Additionally, the written pass down is printed and kept on a clipboard in the control room for reference. On the evening of February 4, 2022, Perez, Dooley, and Petrush were present for the pass down from the February 4, 2022 day crew, the Green Team. Two AW employees from the Green Team confirm the verbal pass down included the information that Basin #6 was seeding as did the written pass down.

Confirmation was received by multiple witnesses who testified that the practice for bringing basins online is to start by "seeding" the basin. This process occurs by pumping solids into the basin until the appropriate level of solids is reached. There is no set duration for this process. Completion of the seeding process is determined by taking percent solids samples and monitoring pH and turbidity. Because the Green Team began the process of bringing the Basin #6 online during the day on Friday, Perez should have known Basin #6 was seeding since his Orange Team was responsible for taking the basin offline Thursday night. Perez stated he did not know the basin was seeding and only discovered the thickener pump was still operating in the basin when he reviewed SCADA and the clipboard pass down around 4:00 am on February 5, 2022. In addition to the verbal and written notification by the Green Team at the pass down, Perez had other indicators that Basin #6 was seeding including the lab reports he himself was documenting as well as the data gathered from SCADA, both of which reflected the quick rise in turbidity and the excessive amount of solids in the basin.

The Ullrich Water Treatment Plant Control Room is set up with audio and visual alarms to ensure the plant is run effectively and efficiently. The audio alarms have 2 levels of sounds that are produced and are set at various thresholds to create awareness and allow time for the crew to correct an issue, if one arises. Online turbidimeters report turbidity in each clarifier basin effluent, filter influent, filter effluent, and the clearwells (large water storage tanks before the distribution system) on a continuous basis via SCADA. Additionally, grab

samples of basin solids and turbidity are collected every 4 hours by the 'outs' and delivered to the 'lab' for processing. These results are recorded by the crew on the lab data sheets. Throughout the night, various alarms sounded and changed colors on the computer monitors in the control room indicating a process upset. The lab results entered by Perez showed a steady rise in solids for Basin #6. Lab data sheets show between 10:00 pm and 6:00 am the turbidity levels for Basin #6 quickly rose from 8.7 NTUs (nephelometric turbidity units) to 145 NTUs.

Because ferric lines had frozen during Winter Storm Uri, Perez assumed a lack of ferric sulfate caused by a possible break in the line was the cause of the spike in turbidity. Shortly after 10:00 pm, Perez directed the crew to trace ferric sulfate lines in an attempt to locate the issue. This was done repeatedly until 4:00 am. Perez, Dooley and Petrush all left their stations multiple times throughout the night to trace lines around the plant to locate a ferric sulfate break. The total time spent away from their stations was greater than 3 hours; however, no break in the ferric line was ever found.

The Orange Team did not take any corrective action other than checking and rechecking lines for a possible break in the ferric sulfate line. Online turbidity meters on the Basin #6 effluent upstream of the filters were well above typical levels starting at 2:30 am, and exceeded the instrument maximum of 100 NTU at approximately 3:00am. The Orange Team did not review the SCADA screens and determine the basin was still being seeded until 4:00 am.

Effluent from the online clarifier basins is conveyed to the filters via four settled water pipelines. In addition to online turbidity readings reported on SCADA, the turbidity readings for each online filter are recorded by the 'driver' of each team, in this instance Petrush. Petrush entered the data from SCADA on the log sheets every 2 hours for the filters. The 2 hour checks are to verify the performance of each filter. Starting at approximately 4:00 am, effluent from 9 out of the 11 online filters exceeded Austin Water's goal of 0.1 NTU before quickly increasing to 1 NTU and then 5 NTU in a short amount of time. Instead of complying with TCEQ regulations and AW standards of re-testing filters after 15 minutes to verify high reading, Perez told Petrush "it will do no good to take the other filters off line" and instructed Petrush to "leave what was online and keep on". The high turbidity water from the filters exceeding AW's and TCEQ regulatory requirements and from the filters made its way to the clearwells. Austin Water's goal of 0.1 NTU was exceeded at the effluent leaving the plant at 7:15 am, and shortly thereafter surpassed TCEQ regulatory requirements for turbidity of 0.3 NTU (TCEQ 290.111(e)(2)(A)) and 1.0 NTU, which automatically triggers a boil water notice, if sustained.

Each of the Orange Team crew members indicated in their statements that Petrush was taken away from his 'driver' duties during the first 4 hours of the shift due to him managing the centrifuge/hopper area. Perez confirmed that Petrush made him aware at all times of his activities related to that issue. As 'driver' of the shift, Petrush was responsible to remain in the control room and monitor the overall condition of the plant, reviewing SCADA screen by screen, act as point of contact (POC) for incoming calls and execute on any issues that arise. During the time Petrush was away from the control room, Perez could and should have stepped into the role as 'driver' and directed Dooley take the 'lab' role. Perez did not do so. Although Dooley has the ability to be perform the role of driver; due to the level of his license, TCEQ regulations prohibit him from making changes to the system without oversight and direction from an individual with a higher level license, such as Petrush or Perez.

Conclusion: The facts substantiate Allegation 1. Witness testimony and evidence documents Perez received information related to the seeding of the Basin #6 in the shift pass down, verbally and electronically. Perez failed to follow established practices, AW Standards and TCEQ regulations by not appropriately responding to the

information he was receiving through lab reports and SCADA data. By failing to review the pass down, the SCADA screens, stepping into the role as "driver" while Petrush was managing the centrifuge/hopper, and by pursuing the ferric line theory to the exclusion of other causes of the turbidity, Perez did not correctly diagnose the issue and allowed the problem to spread beyond the basin where it could have been easily contained. Instead, the turbid water was allowed to enter into the clearwells, ultimately resulting in a Boil Water Notice for the City of Austin. Perez's actions violate the Working Conditions policy because as the Orange Team Lead, he failed to maintain the efficiency of operation during his shift. His actions also violate the Working Relationships policy because he failed to perform the duties of his position at a level of cooperation, efficiency and economy acceptable to Austin Water and the City.

Allegation 2: Perez did not reach out to his chain of command to communicate the escalating water quality issues within the plant, resulting in a Boil Water Notice for the entire city of Austin.

Findings of Fact: Multiple witnesses testified that the practice is to contact a supervisor when the crew is unable to resolve a situation, multiple out of compliance lab reports or water quality is at risk. All Ullrich operators are authorized to contact anyone within their chain of command to discuss any issue or concern. An emergency contact phone list is located in main control room to allow easy access for all operators.

On Friday, February 4, 2022 at 5:37 pm, Michael Mulgrew sent an email to all crew members and chain of command including Operations Manager, Stephanie Sue and Division Manager Julie Hollandsworth giving instruction on two separate issues. The first issue concerned problems with the centrifuges and hoppers. The email gave direction to check the centrifuges and hoppers every two hours at a minimum and continue an aggressive settled water pumping schedule. The second issue gave the direction to keep the basins online, because the lime lines to the offline basins were freezing. Even with low flow, he gave direction that basins need to stay running due to the expected increase in demand.

Perez acknowledged that when indicators pointed toward the need to take Basin #6 offline, he did not contact Mulgrew because he felt like the direction Mulgrew gave in his email prevented him from doing so. Perez stated he believed Mulgrew wanted to ensure capacity of water and took the email as a "fast and hard rule". Perez did not reconsider or contact Mulgrew even when the situation had escalated beyond Basin #6. Crew members from the Green Team as well as the Lead from the Red Team all stated the need to take the basin offline and escalate to a supervisor was obvious. When the Red Team came on at 7:00am on Saturday February 5th, they contacted AW O&M Supervisor, Haywood, who directed them to take Basin #6 offline immediately. All crew members from Friday night indicated they felt no need to contact any supervisor to discuss the email from Mulgrew, the possible ferric sulfate concerns, or the rising turbidity in Basin #6. By turning off the thickener pump to Basin #6 off at 4:00 am and starting the "blowdown" process, the crew believed they had adequately managed the situation. With these actions in place, Perez felt the process to turn around the plant would just take time, even though he was aware the turbid water had reached the clearwells. Perez was not able to identify any indicators supporting his assumption that the plant was no longer at risk for exceeding regulations.

Conclusion: The facts substantiate Allegation 2. Perez had many opportunities to reach out to his supervisory chain of command to escalate the extremely high turbidity levels in Basin #6 and avoid breakthrough of the filters to the clearwells. Further, when issues were identified, he relied on an email from the superintendent regarding cold weather processes and kept Basin #6 online instead of using his expertise and good judgement expected of a licensed tenured Lead to take the Basin offline and contact his chain of command for guidance. As part of obtaining his TCEQ license, Perez was required to demonstrate his knowledge of TCEQ regulations and water treatment processes. These same principles are captured in every Technician's SSPR and must be

demonstrated in order to promote through the O&M Technician Career Progression Program. Perez's actions demonstrate a serious performance deficiency that impacted the City's entire water system. His failure to escalate to his chain of command and communicate the escalating situation prevented the leadership team from taking prompt corrective active and led directly to the Boil Water Notice. Perez's actions violate the City of Austin's Working Relationships policy because he failed to perform the duties of his position at a level of cooperation, efficiency and economy acceptable to Austin Water and the City.

Investigation Report Summary

Date of Report	March 22, 2022
AIM-on-Target #	2022-DA-0033
Department Investigated	Austin Water
Complainant(s) name, title, department	Incident Response
Respondent(s) name, title, department	Benjamin Petrush, AW Treatment O&M Technician Assistant
Investigator(s) name, title, department	Sherri Hampton, Employee & Leadership Development Assistant Director, Austin Water Tamala Tatum, Human Resources Advisor Sr, Austin Water

BACKGROUND AND BASIS OF COMPLAINT

In the evening of February 4, 2022, a treatment process upset began at Ullrich Water Treatment Plant. This upset continued through the night into the early morning hours of February 5, 2022. Activities related to bringing Basin #6 online to provide more water treatment capacity were in process when conditions related to water quality began to deteriorate. The three-person crew on duty Friday evening was unable to appropriately address the situation. The situation continued to deteriorate overnight as high turbidity water in Basin #6 flowed into the filters and made its way to the clearwells where the turbidity levels exceeded Austin Water's goals and quickly rose above TCEQ regulatory limits. This resulted in the shutdown of the plant and the issuance of a Boil Water Notice for the entire city of Austin.

Joseph Dooley, AW Treatment O&M Associate, Jason Perez, AW O&M Technician Sr. (Lead), and Benjamin Petrush, AW O&M Technician Assistant, known as the Orange Team, were on duty from 7:00 pm to 7:00 am shift beginning Friday, February 4, 2022. Petrush was performing the role of Driver or owner of the Plant, Perez performed the role of Labs and Dooley had the role of Outs collecting grab samples.

It is alleged that these three crew members did not appropriately respond to the growing emergency despite multiple alarms. It is further alleged that their lack of appropriate actions and their failure to reach out to their chain of command directly resulted in water turbidity levels exceeding regulatory levels and a Boil Water Notice for the entire city of Austin to be issued.

ALLEGATION(S), FINDING(S) AND CONCLUSION(S)

Allegation 1: Despite repeated alarms from multiple sources and deteriorating lab results, Petrush did not follow Ullrich operational practices to appropriately respond to and correct the high turbidity levels in Basin #6.

Findings of Fact: Petrush has been employed with the City of Austin, Austin Water since September 23, 2013. He has been a licensed operator with Texas Commission on Environmental Quality (TCEQ) since March 2019 and currently holds both a Surface Water Treatment Operator Class C and a Wastewater Treatment Operator Class C. He has completed over 600 hours of training related to Water Utility Operations.

As the 'driver' of the shift with over 7 years of experience in water treatment process controls, Petrush was responsible to remain in the control room and monitor the overall condition of the plant, reviewing SCADA screen by screen, act as point of contact (POC) for incoming calls and execute on any issues that arise. He has the knowledge to review the alarms and incoming sample readings to determine a significant process upset was taking place. Between midnight and 4:00 am, Petrush did not appropriately review all incoming alarms or view SCADA to stop the process upset.

Pass downs between shifts occur at the start of each shift and are intended to communicate the state of the plant and ensure the incoming staff are aware of operational tasks and any ongoing concerns. Pass downs are given verbally as one shift comes on and the other is relieved. The information is also documented in writing on an Excel spreadsheet and saved on a shared drive that all employees can access. Additionally, the written pass down is printed and kept on a clipboard in the control room for reference. On the evening of February 4, 2022, Perez, Dooley, and Petrush were present for the pass down from the February 4, 2022 day crew, the Green Team. Two AW employees from the Green Team confirm the verbal pass down included the information that Basin #6 was seeding as did the written pass down.

Confirmation was received by multiple witnesses who testified that the practice for bringing basins online is to start by "seeding" the basin. This process occurs by pumping solids into the basin until the appropriate level of solids is reached. There is no set duration for this process. Completion of the seeding process is determined by taking percent solids samples and monitoring pH and turbidity. Because the Green Team began the process of bringing the Basin #6 online during the day on Friday, Petrush should have known Basin #6 was seeding since his Orange Team was responsible for taking the basin offline Thursday night. Petrush stated he did not know the basin was seeding until the crew discovered the thickener pump was still operating in the basin at the same time Perez reviewed SCADA and the clipboard pass down around 4:00 am on February 5, 2022. In addition to the verbal and written notification by the Green Team at the pass down, Petrush had other indicators that Basin #6 was seeding including the lab reports Perez was documenting as well as the data gathered from SCADA that Petrush himself was recording. Both sources reflected the quick rise in turbidity and the excessive amount of solids in the basin. Additionally, in an email Petrush sent to Mulgrew at 8:19 am after his departure from the plant on Saturday, February 5, 2022, Petrush states "the seed was mentioned in their [day shift's] passdown and "I missed this…".

The Ullrich Water Treatment Plant Control Room is set up with audio and visual alarms to ensure the plant is run effectively and efficiently. The audio alarms have 2 levels of sounds that are produced and are set at various thresholds to create awareness and allow time for the crew to correct an issue if one arises. Online turbidimeters report turbidity in each clarifier basin effluent, filter influent, filter effluent, and the clearwells (large water storage tanks before the distribution system) on a continuous basis via SCADA. Additionally, grab samples of basin solids and turbidity are collected every 4 hours by the 'outs' and delivered to the 'lab' for processing. These results are recorded by the crew on the lab data sheets. Throughout the night, various alarms sounded and changed colors on the computer monitors in the control room indicating a process upset. The lab results

entered by Perez showed a steady rise in solids for Basin #6. Lab data sheets show between at 10:00 pm and 6:00 am the turbidity levels for Basin #6 quickly rose from 8.7 NTUs (nephelometric turbidity units) to 145 NTUs.

Because ferric lines had frozen during Winter Storm Uri, Perez assumed a lack of ferric sulfate caused by a possible break in the line was the cause of the spike in turbidity. Shortly after 10:00 pm, Perez directed the crew to trace ferric sulfate lines in an attempt to locate the issue. This was done repeatedly until 4:00 am. Perez, Dooley and Petrush all left their stations multiple times throughout the night to trace lines around the plant to locate the ferric sulfate break. The total time spent away from their stations was greater than 3 hours; however, no break in the ferric line was ever found. Perez states that Petrush "was nervous and didn't know what to do". According to Perez, he advised Petrush that "there was nothing we could do."

The Orange Team did not take any corrective action other than checking and rechecking lines for a possible break in the ferric sulfate line. Online turbidity meters on the Basin #6 effluent upstream of the filters were well above typical levels starting at 2:30 am and exceeded the instrument maximum of 100 NTU at approximately 3:00am. The Orange Team did not review the SCADA screens and determine the basin was still being seeded until 4:00 am.

Effluent from the online clarifier basins is conveyed to the filters via four settled water pipelines. In addition to online turbidity readings reported on SCADA, the turbidity readings of each online filter are recorded by the 'driver' of each team, in this instance Petrush. Petrush entered the data from SCADA on the log sheets every 2 hours for the filters. The 2 hour checks are to verify the performance of each filter. Starting at approximately 4:00 am, effluent from 9 out of the 11 online filters exceeded Austin Water's goal of 0.1 NTU before quickly increasing to 1 NTU and then 5 NTU in a short amount of time. Instead of complying with TCEQ regulations and AW standards of re-testing filters after 15 minutes to verify high reading, Perez told Petrush 'it will do no good to take the other filters off line' and instructed Petrush to 'leave what was online and keep on'. The high turbidity water from the filters exceeding AW's and TCEQ regulatory requirements and from the filters then made its way to the clearwells. Austin Water's goal of 0.1 NTU was exceeded at the effluent leaving the plant at 7:15 am and shortly thereafter surpassed TCEQ regulatory requirements for turbidity of 0.3 NTU (TCEQ 290.111(e)(2)(A)) and 1.0 NTU, which automatically triggers a boil water notice, if sustained.

Each of the Orange Team crew members indicated in their statements that Petrush was taken away from his 'driver' duties during the first 4 hours of the shift due to him managing the centrifuge/hopper area. As 'driver' of the shift, Petrush was responsible to remain in the control room and monitor the overall condition of the plant, reviewing SCADA screen by screen, act as point of contact (POC) for incoming calls and execute on any issues that arise. Petrush stated Mulgrew specifically directed him to personally manage the issue. However, Mulgrew stated he gave the instruction, but both Perez and Petrush were capable of assisting with the centrifuge/hopper issues due to their level of experience. Neither Perez or Petrush informed Mulgrew that Petrush was fulfilling the role of 'driver' for the shift and his time and attention were taken away from the control room. During the time Petrush was away from the control room, Perez could and should have stepped into the role as 'driver' and directed Dooley to take the "lab' role. Perez did not do so. Although Dooley has the ability to perform the role of driver; due to the level of his license, TCEQ regulations prohibit him from making changes to the system without oversight and direction from an individual with a higher level license, such as Petrush or Perez.

Conclusion: The facts substantiate Allegation 1. Petrush did not read the written pass down until almost 4:00 am on February 5, 2022. As the "driver" for the shift, Petrush was the first crew member to hear and see all incoming alarms. Petrush was responsible for reviewing and recording data from the SCADA monitors. Although

designated as the "driver" for the shift, he was not in the control room for approximately 8 hours of his entire shift – first because he was independently managing the centrifuge/hopper issues and then because he was tracing ferric sulfate lines for possible breaks at Perez's direction. During the time Petrush was away from the control room, he should have requested Perez to assign Dooley to fill in for him or request Perez to step in. Petrush did not record the 4:00 am filter loss of head, rate of flow, or turbidity readings on the Daily Filter Record due to arriving back to the control room after the assigned reading time. Petrush did not review the alarms or sample readings to determine a corrective action plan but instead took direction from the Lead without first reviewing SCADA data or Lab samples to determine the root cause of the turbidity in Basin #6. By failing to review the pass down, the SCADA screens, and by pursuing the ferric line theory to the exclusion of other causes of the turbidity, Petrush did not correctly diagnose the issue and allowed the turbid water to spread beyond the Basin where it could have been contained. Instead, the turbid water was allowed to enter into the clearwells, ultimately resulting in a Boil Water Notice for the City of Austin. Additionally, his pass down to the Red Team (Saturday day shift) did not include critical information about the state of the filters. This information was vital in communicating to the next shift the state of the plant. His actions violate the Working Relationships policy because he failed to perform the duties of his position at a level of cooperation, efficiency and economy acceptable to Austin Water and the City.

Allegation 2: Petrush did not reach out to his chain of command to communicate the escalating water quality issues within the plant, resulting in a Boil Water Notice for the entire city of Austin.

Findings of Fact: Multiple witnesses testified that the practice is to contact a supervisor when the crew is not able to resolve a situation, multiple out of compliance lab reports or water quality is at risk. All Ullrich operators are authorized to contact anyone within their chain of command to discuss any issue or concern. An emergency contact phone list is located in main control room to allow easy access for all operators.

On Friday, February 4, 2022 at 5:37 pm, Michael Mulgrew sent an email to all crew members and chain of command, including Operations Manager, Stephanie Sue and Division Manager Julie Hollandsworth, providing direction on two separate issues. The first issue concerned problems with the centrifuges and hoppers. The email gave direction to check the centrifuges and hoppers every two hours at a minimum and continue an aggressive settled water pumping schedule. The second issue gave the direction to keep the basins online, because the lime lines to the off basins were freezing. Even at low flow, he gave direction that basins need to stay running due to the expected increase in demand.

Petrush acknowledged that when indicators pointed toward the need to take Basin #6 offline, he did not contact Mulgrew because he felt like the direction Mulgrew gave in his email prevented him from doing so. Petrush stated he believed Mulgrew wanted to ensure capacity of water and took the email as "marching orders". Petrush did not reconsider or contact Mulgrew even when the situation had escalated beyond Basin #6. In his email to Mulgrew sent on Saturday morning after leaving the plant, he does not mention he did not take Basin #6 offline because of the direction in Mulgrew's email. Crew members from the Green Team as well as the Lead from the Red Team all stated the need to take the basin offline and escalate to a supervisor was obvious. When the Red Team came on at 7:00am on Saturday February 5th, they immediately contacted their supervisor, Haywood, who directed them to take Basin #6 offline. All Orange Team crew members from Friday night indicated they felt no need to contact any supervisor to discuss the email from Mulgrew, the possible ferric sulfate concerns, or the rising turbidity in Basin #6. By turning off the thickener pump to Basin #6 at 4:00 am and starting the "blowdown" process, the crew believed they had adequately managed the situation. With these actions in place, Petrush felt the process to turn around the plant would just take time, even though he was

aware the turbid water had reached the clearwells. Petrush was not able to identify any indicators supporting his assumption that the plant was no longer at risk for exceeding regulations.

Petrush received multiple phone calls regarding the centrifuge/hopper issue from Greg Rippentrop, AW O&M Supervisor. He also received calls from Mulgrew at 7:00 pm, 8:16 pm, 10:27 pm and 11:02 pm. At no time during these calls did Petrush inform Mulgrew of the issues with rising turbidity levels in Basin #6 or the fact the crew was spending time tracing lines to identify a possible ferric sulfate issue. Petrush received a call from Haws at midnight and at 5:40 am on February 5, 2022. During the midnight call, Petrush provided the Department Operations Center (DOC) raw and finished water production rates. At the 5:40 am call, Petrush again provided the DOC information and stated the Orange Team had just found out Basin #6 was still seeding, but the finished water turbidity level was still under 0.1 NTU. Petrush did not ask for assistance or detail the actual state of the plant on the 5:40 am call only saying they had 'found a basin seeding all night' and that 'it was all on him'. By not providing this critical information during any of the calls, Petrush prevented the chain of command from taking corrective action and possibly avoid the Boil Water Notice.

Conclusion: The facts substantiate Allegation 2. Petrush had multiple opportunities to inform leadership of the extremely high turbidity levels in Basin #6 and avoid breakthrough of the filters to the clearwells. Further, in Petrush's email to Mulgrew after his shift was over indicates he felt obligated to give an "explanation" for the state of the plant. Had Petrush sent this email during his shift, Mulgrew would have had the opportunity to give guidance and instruction and possibly avoided the plant being shut down and the issuance of the Boil Water Notice. As part of obtaining his TCEQ license, Petrush was required to demonstrate his knowledge of TCEQ regulations and water treatment processes. These same principles are captured in every Technician's SSPR and must be demonstrated in order to promote through the O&M Technician Career Progression Program. Petrush's actions demonstrate a serious performance deficiency that impacted the City's entire water system. His failure to escalate to his chain of command and communicate the escalating situation, prevented the leadership team from taking prompt corrective action and led directly to the Boil Water Notice. Petrush violated the City of Austin's Personnel Policy Working Relationships because he failed to perform the duties of his position at a level of cooperation, efficiency and economy acceptable to Austin Water and the City.

Investigation Report Summary

Date of Report	March 22, 2022
AIM-on-Target #	2022-DA-0033
Department Investigated	Austin Water
Complainant(s) name, title, department	Incident Response
Respondent(s) name, title, department	Joseph Dooley, AW Treatment O&M Technician Associate
Investigator(s) name, title, department	Sherri Hampton, Employee & Leadership Development Assistant Director, Austin Water Tamala Tatum, Human Resources Advisor Sr, Austin Water

BACKGROUND AND BASIS OF COMPLAINT

In the evening of February 4, 2022, a treatment process upset began at Ullrich Water Treatment Plant. This upset continued through the night into the early morning hours of February 5, 2022. Activities related to bringing Basin #6 online to provide more water treatment capacity were in process when conditions related to water quality began to deteriorate. The three-person crew on duty Friday evening was unable to appropriately address the situation. The situation continued to deteriorate overnight as high turbidity water in Basin #6 flowed into the filters and made its way to the clearwells where the turbidity levels exceeded Austin Water's goals and quickly rose above TCEQ regulatory limits. This resulted in the shutdown of the plant and the issuance of a Boil Water Notice for the entire city of Austin.

Joseph Dooley, AW Treatment O&M Associate, Jason Perez, AW O&M Technician Sr. (Lead), and Benjamin Petrush, AW O&M Technician Assistant, known as the Orange Team, were on duty from 7:00 pm to 7:00 am shift beginning Friday, February 4, 2022. Petrush was performing the role of Driver or owner of the Plant, Perez performed the role of Labs and Dooley had the role of Outs collecting grab samples.

It is alleged that these three crew members did not appropriately respond to the growing emergency despite multiple alarms. It is further alleged that their lack of appropriate actions and their failure to reach out to their chain of command directly resulted in water turbidity levels exceeding regulatory levels and a Boil Water Notice for the entire city of Austin to be issued.

ALLEGATION(S), FINDING(S) AND CONCLUSION(S)

Allegation 1: Despite repeated alarms from multiple sources and deteriorating lab results, Dooley did not follow Ullrich operational practices to appropriately respond to and correct the high turbidity levels in Basin #6.

Findings of Fact: Dooley has been employed with the City of Austin, Austin Water since September 14, 2020. He obtained his current Water Operator Class D January 12, 2022. According to the TCEQ Publication RG-195, 290.46(c)(6)(D), Public Water Systems shall not allow Class "D" operators to adjust or modify the treatment processes at a surface water treatment plant unless an operator who holds a Class "C" or higher surface license is present at the plant and has issued specific instructions regarding the proposed adjustment. Dooley, as a Licensed D Operator, was not authorized to make independent decisions or make changes to the Treatment process without direction from a higher licensed operator, such as Perez or Petrush.

Pass downs between shifts occur at the start of each shift and are intended to communicate the state of the plant and ensure the incoming staff are aware of operational tasks and any ongoing concerns. Pass downs are given verbally as one shift comes on and the other is relieved. The information is also documented in writing on an Excel spreadsheet and saved on a shared drive that all employees can access. Additionally, the written pass down is printed and kept on a clipboard in the control room for reference. On the evening of February 4, 2022, Perez, Dooley, and Petrush were present for the pass down from the February 4, 2022 day crew, the Green Team. Two AW employees from the Green Team confirm the verbal pass down included the information that Basin #6 was seeding as did the written pass down. Dooley stated he did not read the written pass down due to his role being the 'outs' person.

Confirmation was received by multiple witnesses who testified that the practice for bringing basins online is to start by "seeding" the basin. This process occurs by pumping solids into the basin until the appropriate level of solids is reached. There is no set duration for this process. Completion of the seeding process is determined by taking percent solids samples and monitoring pH and turbidity. Because the Green Team began the process of bringing the Basin #6 online during the day on Friday, Dooley should have known Basin #6 was seeding since his Orange Team was responsible for taking the basin offline Thursday night. Two AW employees from the Green Team confirm the verbal pass down included the information that Basin #6 was seeding as did the written pass down. Dooley stated he did not know the basin was seeding and only realized it when the crew discovered the thickener pump was still operating in the basin when they were looking for frozen ferric lines at approximately 4:00am.

The Ullrich Water Treatment Plant Control Room is set up with audio and visual alarms to ensure the plant is run effectively and efficiently. The audio alarms have 2 levels of sounds that are produced and are set at various thresholds to create awareness and allow time for the crew to correct an issue if one arises. Online turbidimeters report turbidity in the clarifier basin effluent, filter influent, filter effluent, and the clearwells (large water storage tanks before the distribution system) on a continuous basis via SCADA. Additionally, grab samples of basin solids and turbidity are collected every 4 hours by the 'outs' and delivered to the 'lab' for processing. These results are recorded by the crew on the lab data sheets. Throughout the night, various alarms sounded and changed colors on the computer monitors in the control room indicating a process upset. The lab results entered by Perez showed a steady rise in solids for Basin #6. Lab data sheets show between at 10:00 pm and 6:00 am the turbidity levels for Basin #6 quickly rose from 8.7 NTUs (nephelometric turbidity units) to 145 NTUs.

Dooley was responsible for manually collecting the grab samples to be analyzed and recorded on the logs by Perez. Dooley sat in the back of the control room in between completing his rounds. He stated he "does not remember any alarms going off". While sitting in the back of the room, Dooley had access to hear and see the

audio and visual alarms. Additionally, there are multiple access points throughout Ullrich to monitor SCADA to review the various alarms that Dooley could have utilized while performing his rounds.

Because ferric lines had frozen during Winter Storm Uri, Dooley assumed a lack of ferric sulfate caused by a possible break in the line was the cause of the spike in turbidity. Shortly after 10:00 pm, Perez directed the crew to trace ferric sulfate lines in an attempt to locate the issue. This was done repeatedly until 4:00 am. Perez, Dooley and Petrush all left their stations multiple times throughout the night to trace lines around the plant to locate the ferric sulfate break. The total time spent away from their stations was greater than 3 hours; however, no break in the ferric line was ever found.

The Orange Team did not take any corrective action other than checking and rechecking lines for a possible break in the ferric sulfate line. Online turbidity meters on the Basin #6 effluent upstream of the filters were well above typical level starting at 2:30 am, and exceeded the instrument maximum of 100 NTU at approximately 3:00am. The Orange Team did not review the SCADA screens and determine the basin was still being seeded until 4:00 am.

Effluent from the online clarifier basins is conveyed to the filters via four settled water pipelines. In addition to online turbidity readings reported on SCADA, the turbidity readings of each online filter are recorded by the 'driver' of each team, in this instance Petrush. Petrush entered the data from SCADA on the log sheets every 2 hours for the filters. The 2 hour checks are to verify the performance of each filter. Starting at approximately 4:00 am, effluent from 9 out of the 11 online filters exceeded Austin Water's goal of 0.1 NTU before quickly increasing to 1 NTU and then 5 NTU in a short amount of time. Instead of complying with TCEQ regulations and AW standards of re-testing filters after 15 minutes to verify high reading, Perez told Petrush "it will do no good to take the other filters off line" and instructed Petrush to "leave what was online and keep on". The high turbidity water from the filters exceeding AW's and TCEQ regulatory requirements and from the filters made its way to the clearwells. Austin Water's goal of 0.1 NTU was exceeded at the effluent leaving the plant at 7:15 am, and shortly thereafter surpassed TCEQ regulatory requirements for turbidity of 0.3 NTU (TCEQ 290.111(e)(2)(A)) and 1.0 NTU, which automatically triggers a boil water notice, if sustained.

Each of the Orange Team crew members indicated in their statements that Petrush was taken away from his 'driver' duties during the first 4 hours of the shift due to him managing the centrifuge/hopper area. Perez confirmed that Petrush made him aware at all times of his activities related to that issue. As 'driver' of the shift, Petrush was responsible to remain in the control room and monitor the overall condition of the plant, reviewing SCADA screen by screen, act as point of contact (POC) for incoming calls and execute on any issues that arise. During the time Petrush was away from the control room, Perez could and should have stepped into the role as 'driver' and directed Dooley take the "lab' role. Perez did not do so. Although Dooley has the ability to be perform the role of driver; due to the level of his license, TCEQ regulations prohibit him from making changes to the system without oversight and direction from an individual with a higher level license, such as Petrush or Perez.

Conclusion: The facts substantiate Allegation 1. Witness testimony and evidence documents Dooley received information related to the seeding of the Basin #6 in the shift pass down, verbally and electronically. Additionally, Dooley failed to follow established practices, AW Standards and TCEQ regulations by not appropriately responding to the information the crew was receiving through lab samples and SCADA data. As part of obtaining his TCEQ license, Dooley was required to demonstrate his knowledge of TCEQ regulations and water treatment processes. These same principles are captured in every Technician's SSPR. His actions violate

the Working Relationships policy because he failed to perform the duties of his position at a level of cooperation, efficiency and economy acceptable to Austin Water and the City.

Allegation 2: Dooley did not reach out to his chain of command to communicate the escalating water quality issues within the plant, resulting in a Boil Water Notice for the entire city of Austin.

Findings of Fact: Multiple witnesses testified that the practice is to contact a supervisor when the crew is unable to resolve a situation, multiple out of compliance lab reports or water quality is at risk. All Ullrich operators are authorized to contact anyone within their chain of command to discuss any issue or concern. An emergency contact phone list is located in main control room to allow easy access for all operators.

Dooey stated that he didn't think it was necessary to contact a supervisor once they set the plant in the right direction. H was not able to identify any indicators supporting his assumption that the plant was "headed in the right direction".

Dooley answered the control room phone and spoke to Hollandsworth at approximately 12 midnight. Dooley stated Hollandsworth gave kudos to the team for making it through the freezing temperatures. Dooley had the opportunity to update Hollandsworth regarding the rise in turbidity with Basin #6 and failed to do so. By not providing this critical information during any of the calls, Dooley missed an opportunity to inform the chain of command of the critical state of the plant and delayed corrective actions being implemented that could have prevented a Boil Water Notice.

Conclusion: The facts substantiate Allegation 2. Dooley had many opportunities to reach out to his supervisory chain of command to escalate the water quality issues within the plant. His failure to do so is unacceptable and demonstrates a serious performance deficiency that impacted the City's entire water system. His failure to escalate to his chain of command and communicate the escalating situation, prevented the leadership team from taking prompt corrective active and led directly to the Boil Water Notice. His actions violate the Working Relationships policy because he failed to perform the duties of his position at a level of cooperation, efficiency and economy acceptable to Austin Water and the City.