

ANNUAL DEPARTMENT REPORT WASTEWATER TREATMENT PLANT

December 2024

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MISSION STATEMENT

1. Provide reliable and courteous service to our customers.
2. Protect the public and environment utilizing quality operational and maintenance techniques in facilities designed for the conveyance and treatment of domestic and industrial waste.

PRETREATMENT PROGRAM

- The first step in the wastewater treatment process
- Requires certain industries that discharge to our sanitary sewer system to have pretreatment permits for their industrial waste.
- Permits are issued for five years.
- Three permitted significant industrial users (SIU):
 - ConAgra Foods
 - Cargill
 - Marshall Egg
- Industries must file an application to renew at least 90 days prior to the expiration of their current permit.
- We review the permit; amend, if necessary, to conform to local, state, and federal rules; and reissue.
- MMU staff conducts annual, formal pretreatment inspections at all permitted facilities.
- Staff also makes a number of other, informal visits.
- Unpermitted facilities (primarily restaurants) in town are checked as needed.
- DNR or EPA conducts an inspection of the pretreatment program on a frequent basis. The last one was done by DNR in November 2024. There were no violations noted on this inspection.

PLANT LAYOUT/PROCESS FLOW



1. Headworks
2. Aeration basins
3. Flow equalization basin
4. Final clarifiers
5. UV disinfection building
6. Golf course irrigation pumps
7. Cascade
8. Filter building
9. Sludge holding pads
10. Waste sludge basins
11. Office/laboratory
12. Genset
13. Maintenance Building

PROCESS CONTROL FACILITIES

HEADWORKS BUILDING

The headworks building is located slightly north of the filter building. The main coming into the plant from the west turns at the southeast corner and goes north along the east property line. It meets the main coming in from the north in front of the headworks building. The combined flow goes under the drive into the north end of the building.

The building is a precast structure from Coreslab.

This building was flooded by heavy rain in 2020 sustaining damage to the grit paddle motors as well as the Grit pumps, lights, MCC, VFD's and heaters that were in the basement. All of these items have been repaired with FEMA funding covering 90% of the costs.



Screens

The Duperon FlexRake system consists of two screens, a conveyor, and a washer compactor.

- The screens have ¼" openings, finer than the old screen.
- The motor is a 1/3 HP unit mounted on the top.
- The channel width is 2.5', height is 5.5', and the angle from vertical is 20°.
- The screens discharge into the conveyor, which moves the screened material to the washer compactor.
- The washer compactor, as its name implies, compacts the removed material and discharges it in blocks into a dumpster.
- Repairs
 - Compactor had to have repairs after coming apart in October 2015. Installed upgrade kit.
 - Replaced sensor and PLC for east screen.
 - New LED lights were installed in 2023
 - The west bar screen had to have repairs for bearing failure in 2023
 - The east bar screen motor was replaced in 2023



Screens—upper level with compactor



Screens--lower level

- Grit removal
Grit removal is started on the lower level of the headworks building after screening. Grit is removed from the incoming flow in the grit chamber and then is pumped to the main level where it discharges to a trash dumpster through the grit auger.
- New submersible grit pumps were installed in 2023
- Industrial sump pump was installed in grit level in 2023
- Pista grit paddles were repaired in 2023



Grit auger, main floor

Pumps

- Dry weather flow
- 3- 8” ABS XFP submersible sewage pump
- Motor
 - 84 HP
 - 3-phase motor
 - 95.7% efficient at full load, 94.7% efficient at 50% load
- Wet weather flow
- 3 - 8” ABS XFP submersible sewage pump
- Motor
 - 84 HP
 - 3-phase motor
 - 95.7% efficient at full load, 94.7% efficient at 50% load



Typical ABS XFP pump

Starting in July 2014, we have had problems with the dry flow pumps breaking impeller bolts and shafts. After a number of discussions involving FTC (distributor for ABS/Sulzer pumps), ABS/Sulzer, SKW, and staff, the opinion is that the dry flow pumps are oversized for the extremely low flows that we get. These flows are in the 1 MGD or less range. This causes the lead dry flow pump to cycle on and off excessively stressing the pump.

In 2018, we installed an 8” ABS XFP submersible pump into the dry flow wet well to handle the low flows and serve as a “daily duty pump”. The smaller pump handles the low average flows and to this point has worked very well for the situation.

In 2023 we installed two more 8” ABS XFP submersible pumps into the dry flow wet well. This corrected the sizing error made during the original design that had been causing issues. Downsizing the pumps put them at the correct size and the pumps now stay running without excessive shutdowns.

Miscellaneous

- Explosion-proof lights provided
- Gas monitors (oxygen, carbon monoxide, lower explosion level, and hydrogen sulfide) on lower level
- Wall-mounted heaters
- Ventilation system

A section of force main was laid from the new pumps to the top of the hill where it ties in with the existing line going to the aeration basins.

FEQ BASIN

- Stores flow that the treatment plant cannot handle due to high flows during rain events.
- Holds 9.6 million gallons of wastewater.
- Has a concrete bottom.
- About two-thirds of the basin sides are concrete-lined and need to have cracks grouted.
- The top third of the basin walls is soil with fescue vegetation.
- Also used as a catch basin if we need to work on equipment that requires us to shut the plant process pumps down for a short time.

Wastewater pumped to the FEQ basin is gravity fed back into the treatment process at the headworks. Not a permitted outfall (Any discharge will be a violation of our discharge permit.) Not a concern of any magnitude; we have had only one discharge from the basin. It occurred in 1993 and was roughly 30,000 gallons. 1993 was a very wet year and also the year of a major upgrade to the plant.

- Top third of the FEQ basin should be finished with concrete to complete the original construction. This will keep the dead vegetation that grows in that area from falling into the FEQ basin and adding to BOD and TSS levels.



FEQ looking southwest



Pumping to FEQ—looking south

AERATION BASINS



Upgraded Aeration Basin

- Where the biological process takes place
- Three 200 HP, 460 V, 120 amp, 3-phase, 4500 rpm Aerzen blowers.
- Ten mixers in the basin
- The motor control units that run the blowers and mixers are housed in the new control building to the west of the basin.
- Blower operations are controlled by oxygen and oxygen reduction potential (ORP) levels (determined by probes) and programmable timers.
- The basin is equipped with approximately 3000 fine-bubble air diffusers--
 - Suspended from the bridges.
- The south Aeration Basin was upgraded and put online in January 2023, the new system runs the two sides of the basin separately with dissolved oxygen and oxygen reduction potential (ORP) probes. The new system cycles between Aerobic and Anoxic cycles (cyclic Aeration). This method increases the system's ability to remove nutrients such as ammonia and phosphorus. Initial effluent readings from the new system are very encouraging.

RETURN ACTIVATED SLUDGE (RAS) PUMP BUILDING

- Houses three 12-inch Fairbanks T-40 pumps, VFDs, flow level sensing devices, and an overhead hoist system.
- Motors are 75 HP, 480 V, 90 amp, 3-phase, 1185 rpm Marathon units.
- Pumps:
 - Move activated sludge from the final clarifiers back to the aeration basins
 - #2 and #3 pumps refurbished in 2004.
 - Replaced the VFDs in 2010 after numerous, continuing problems.
 - Wear ring on #3 failed and ruined the vertical base elbow; replaced in 2011.
 - Painted pipes and the inside of the building and placed a rail around the pump access opening on the ground floor in 2011.
 - Pumps #2 and #3 were both refurbished in 2023.



RAS building with final clarifiers to the left and aeration basins to the right

- Maintenance
 - 2013
 - Repaired #3 pump
 - Replaced sump pump
 - Added a dehumidifier
 - 2016
 - Replaced the rotating assemblies
 - Replaced the elbow for #1 pump
 - 2018
 - Replaced Roof
 - 2024
 - Rebuilt RAS Pumps #2 and #3

FINAL CLARIFIERS

- Allow sludge to settle while the treated water is discharged to the cascade aerator and subsequently to Salt Fork or the golf course irrigation system.
- Three units operated in parallel fashion.
- Settled sludge is removed from the basins by gravity and flows to the RAS pump wet well.
- Excess or waste activated sludge (WAS) is removed from these basins and transferred to the sludge holding basins by gravity flow.
- An inline MAG flow meter tracks how much sludge we waste from the system. Replaced in 2011.
- Launder covers block sunshine, which is essential for algae growth. The weirs and troughs were sandblasted and painted prior to the launder cover installation.



Upgraded Middle Final Clarifier

- Maintenance/repairs
 - Final Clarifiers were upgraded in 2023 in the Aeration Basin/Final Clarifier project

UV DISINFECTION BUILDING

- Provides the required disinfection of the plant's effluent to Salt Fork during the recreation season.
- Design
 - Dual channel
 - Three banks (modules) of 40 vertical UV lamps per channel
 - Lamps have a 13,000 hour useful life.
 - UV tubes automatically cleaned while still in the channel. On occasion, they have to be removed for an acid bath.
 - Jib crane used to lift modules out of the channel for cleaning and for winter storage.
 - Each channel designed to treat up to 6 MGD.

- Allen Bradley controls
- Tied into the plant SCADA system
- The modules were raised following completion of construction to prevent flooding during extremely high flows.
From 2021 to 2023 we started having issues with this equipment, the wipers were cut off when they stopped working. The unit does not control the modules to adjust for different flows and vendor support has not been very good. We are required by our operating permit to run this unit continuously during the recreation season and issues with the current system could lead to permit violations. We have started the process of replacing this system, it is set to be finished before April 2025 for the recreational season mandated by DNR.



UV building



UV module with lamps



Jib crane (pits for acid wash)

WASTE ACTIVATED SLUDGE AERATOR PUMPS BUILDING

- An underground structure just west of the waste sludge holding basins
- Two 60 HP, 480 V, 60 amp, 3-phase motors drive the two Fairbanks Morse T-60 pumps that draw sludge from the two waste sludge basins.
- The sludge is pumped back in to the basins through an aspirator system that mixes air with the sludge. Air is from blowers in the former aeration basin pump station.
- The design of the system aerates and mixes the sludge.
- Excess water can be removed at this site as well.
- The aeration pumps can be shut off allowing the sludge to settle.
- Water above the sludge blanket then can be removed via piping.
- Maintenance issues:
 - Pumps overhauled in 2004.
 - Severely worn, showing significant damage from cavitation
 - First significant work since in installed in the early 1990s
 - 2011
 - Replaced seals.
 - Found same damage as in 2004.
 - 2012
 - Replaced sump pump.
 - 2023
 - Broken valve—Replaced in summer 2023.
 - New Waste Aeration blowers have been ordered and should be installed in 2024.
 - 2024
 - Replaced roof on this building in Spring 2024
 - New waste aeration blowers were installed in Summer 2024



CASCADE AERATOR

- Insures that the final effluent has a DO of at least 5 mg/l.
- Maintenance/upgrades
 - Replaced the pump in 2004;
 - Added stairs to the top of cascade in 2005 to provide safer access to the effluent recycle pump (since removed) and to place the composite sampler; and
 - Placed safety restraining chains across the original access ladder opening in 2010.

From the cascade aerator, the effluent goes to the outfall on Salt Fork or to the golf course irrigation system.



Cascade aerator

EFFLUENT IRRIGATION BUILDING

- Built in 1999 just north of the cascade aerator.
- Holds equipment to pump treated, disinfected wastewater effluent to the golf course. We will continue to use this pump equipment.
 - Pump package
 - Syncroflo unit
 - Two 60 HP Aurora centrifugal pumps
 - One 5 HP Grundfos CR8 vertical turbine pump
 - The little pump maintains pressure on the line when water is not being pumped to the golf course.
 - Maximum output for this system is approximately 1100 GPM.
 - The UV unit originally used to disinfect water for the golf course is no longer needed with the new UV system.
 - A force main to the golf course delivers the disinfected, treated effluent.



Effluent irrigation building

- Maintenance/upgrades:
 - Installed a filter on the discharge line to prevent small pieces of plastics from clogging sprinkler heads.
 - Automated the cleaning cycle on the filter to keep it operational through the night.
 - Had major problems with the control panel for the pumps; it has been replaced with a drive unit out of the old raw sewage building. The replacement unit needs to be programmed.
 - Not currently in use.

SLUDGE HOLDING BASINS

There are four tanks provided to hold waste activated sludge prior to dewatering. Each is provided with aeration to mix the sludge and prevent odors. Each has means to decant the water from the tank to concentrate sludge prior to chemical addition and dewatering. Waste activated sludge cannot be directed to tanks #1 and #2 without being pumped from tanks #3 or #4.

Their capacities are:

#1-29,200 gallons, #2-50,100 gallons, #3-162,750 gallons, #4-162,750 gallons



Waste sludge holding basin #1



Waste sludge holding basin #2



Waste sludge holding basins #3 and #4

Maintenance/upgrades:

- 2012 – Cleaned, patched, and coated walls of #3 basin.
- Clean and repair diffusers on a regular basis.
- Redid handrails on #2 basin in 2015.
- Added safety access platforms in Spring 2018.
- Replaced manifold in the south holding basin in Summer of 2024. In the process of replacing the north manifold.



FILTER BUILDING

- Used for dewatering sludge for our land application program.
- Equipment:
 - Two Rex belt filter presses.
 - Various pumps, mixers, and controls.
- Maintenance/upgrades:
 - 2001 -- built the catwalk between the two belt presses and added a second catwalk across the north end of the presses.
 - 2006
 - Replaced two heaters.
 - Replaced three doors.
 - 2007 - replaced one polymer pump and floor drains.
 - 2009 - repaired polymer day tank.
 - 2010
 - Replaced the Serpentex conveyor belt main chain (takes sludge from the presses and drops it into a truck for transport to the sludge pad or directly to the field).
 - Added three new lights under the catwalks to improve visibility.
 - Replaced bearings and repaired rollers on the east press.
 - Replaced second polymer tank.
 - 2012
 - Replaced bearings and repaired rollers on the west press.
 - Replaced ventilation fans.
 - 2013
 - Removed old, unused polymer equipment.
 - Installed splash panels on the upper catwalk to make cleaning easier.
 - Cleaned and painted interior.
 - 2014
 - Exterior was tuck pointed and painted.
 - 2016
 - Replaced bearings on sludge pump for west belt press.
 - 2019
 - Lower roof of the filter building was replaced.
 - 2023
 - Upper roof of the filter building was replaced in December 2023.
- Future project—replace the belt presses with newer, smaller, more efficient rotary units.
- Contains the employee break room.
 - Replaced the air conditioner in 2010.
 - Due to the proximity to the belt presses, we have a serious roach problem in the break room. When setting off bug bombs did not help, we turned to a professional exterminator. This basically keeps the problem in check but does not eliminate it.
 - In 2022 the break room was remodeled after the flood in 2020, FEMA funds reimbursed 90% of the cost.
- Lime silo
 - Used for pH adjustment in the dewatered sludge process.
 - Repainted in 2014.



Filter building with lime silo



West belt press

SLUDGE DISPOSAL

Dewatered sludge holding area

- Originally designed to hold 90 days production.
- Prior to construction, size was cut to 45 days.
- During construction, cut in half again (22.5 days) due to budget considerations.
- Added the second storage pad adjacent to the original pad in 1999, giving 45 days of storage.
- Added a safety railing along the north side
- Spring of 2024 we widened the drains on the sludge holding pad to better collect sludge runoff after heavy rains so it would not run into the road. This was a concern on a past DNR inspection.



Sludge holding pads

Beneficial use of municipal biosolids program (land application)

- Began our land application program in 1972, on MMU-purchased farmland, before the state regulations enacted in the 1980s.
- Per 40 CFR 503, each farm where we spread sludge is required to have a soil test provided by the farmer.
 - Soil test includes:
 - pH,
 - Phosphorus,
 - Potassium,
 - Calcium,
 - Magnesium,
 - Organic matter,
 - Neutralizable acidity, and
 - Cation exchange capacity.
 - Can be used for a 5-year period.
- In FY23/24, we land applied 475 dry tons of sludge to 730 acres of farmland.

AUXILIARY BUILDINGS AND EQUIPMENT

One-megawatt diesel-fired generator

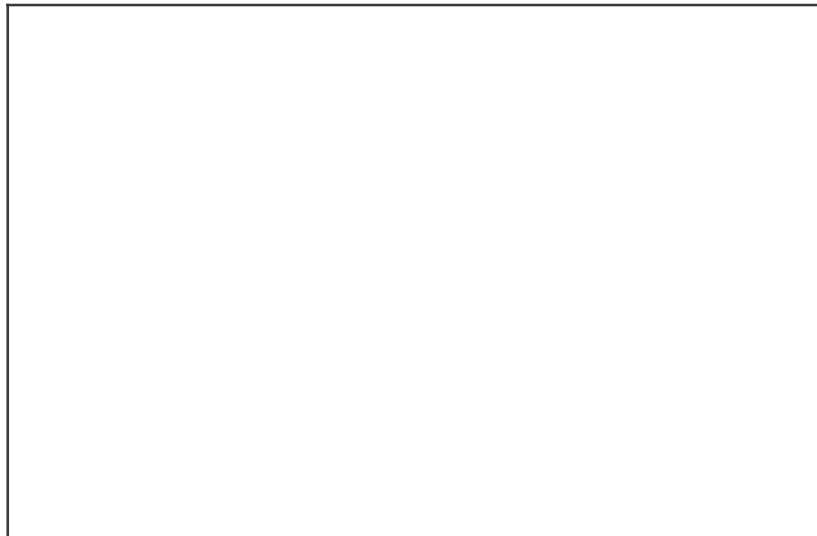
- Belongs to Electric Production.
- Can supply power for the operation of the plant equipment.
- Can push electricity back to town if needed. The electric lines are equipped with switches that can direct the flow of electricity.
- Located in the Genset building.
- In conjunction with the headworks/disinfection upgrade project, Electric Production automated the unit to come on in a power outage or loss of phase. This helps prevent the headworks from flooding and causing a discharge (a permit violation) along with damaging equipment (as happened after system went online) and will keep the UV system running (discharge of non-disinfected water in the recreational season or on the golf course is a permit violation),



Genset

Maintenance facility

- New maintenance building was completed September 2017.



Laboratory/office

- Building general:
 - Wood frame structure with vinyl siding
 - Ground-source heat pump with an auxiliary heating unit
 - Maintenance
 - 2010
 - » Replaced carpet in chief operator's office
 - » Painted interior
 - » Replaced roof
 - 2011
 - » Replaced siding
- Office:
 - Superintendent's office
 - File storage
 - Spare room
- Laboratory:
 - Wastewater
 - Testing
 - » Quality of both influent and effluent flows, including, but not limited to, tests required by the discharge permit, done weekly (BOD, TSS, ammonia, dissolved oxygen, and *Eschericia coliform*)
 - » Water quality upstream and downstream of the plant discharge -- weekly
 - » Different plant processes, daily -- track plant efficiency
 - » Quality of discharge from three pretreatment facilities – weekly
 - Equipment
 - » Oven
 - » Vacuum filter
 - » Desiccater
 - » Vacuum pump
 - » Balance
 - » One hand-held and one bench-top DO meters
 - » Assorted glassware
 - » IDEXX equipment for *E. coli* and fecal coliform analysis
 - » Incubator
 - » Refrigerator
 - » Equipment to produce lab grade water
 - » Fume hood -- not utilized. Typically used when mixing various dangerous reagents. For safety and convenience, as these premixed reagents can be purchased inexpensively, we do not mix our own in house.
 - » One bench top and two hand-held pH meters
 - » A bench-top meter for ammonia tests
 - » Four Isco automatic, 24-hour, composite samplers—used at plant influent and effluent, upstream and downstream of discharge point, and at three industries.
 - » Ice machine that provides ice to cool samples

As in past years, the 2024 WET test indicated that we continue to discharge a good quality effluent. The priority pollutants, TCLP, and dewatered sludge tests show no problems with the sludge we land apply.

- Drinking water
 - A DOH-certified bacteriological laboratory for distribution system sample analysis
 - Last inspection by DOH was September 2024 little was noted
 - Annual proficiency testing is required. Completed for 2024 with acceptable results.
 - Lab technician collects and analyzes distribution system bacteriological samples. He also analyzes samples for Underground Facilities following main repair and installation.
- Equipment
 - Field chlorine analyzer
 - Autoclave
 - Dry box incubator
 - Refrigerator
 - Colony counter
 - Electronic scale
 - Light microscope
 - Incubator
 - Necessary glassware, chemicals, reagents, and accessories.
 - Also includes a sampling station installed at the water tower, which is used for collection of bacteriological and THM/HAA samples.



Laboratory



Sampling station

- Outside laboratory support
 - For analyses that are beyond the capability of our lab
 - Annually
 - » Whole effluent toxicity (WET)
 - » Priority pollutants
 - » Toxic characteristic leaching potential (TCLP)
 - Monthly
 - » Dewatered sludge tests
 - » Fats, oil, and grease (FOG)



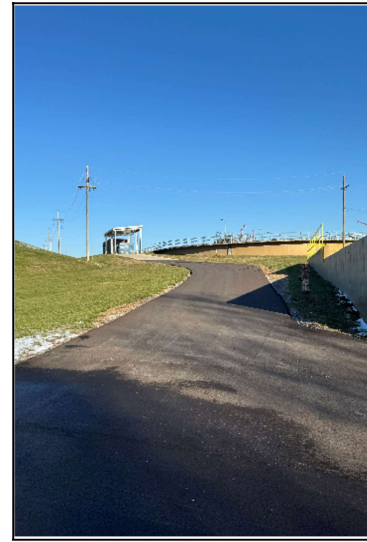
Office and laboratory building

- **Computers:**
 - The main computer, in the Superintendent's office, holds the software that runs our SCADA software. We use Intellution software for the plant SCADA.
 - The lab technician's computer is used to record lab data and prepare reports.
- **Intercom/Phone/fax:**
 - Tied into MMU's main phone system.
 - Separate outside line for a fax machine, which also copies and scans
 - Intercom system throughout the facility
- **Radios:**
 - Base radio in the office
 - Five truck radios, one each in 416, 401, 413, 405, and 408.
- **Safety:**
 - **Personal protective equipment**
 - Two Scott air packs with four air tanks
 - The air tanks are pressure-tested every five years; last done in January 2019. Marshall Fire Department (MFD) refills the tanks after use.
 - MFD staff also helps with our training by reviewing proper SCBA use and care. The most recent training session was held in February 2019.
 - Eyewash units
 - Hard plumbed
 - Locations:
 - ✓ Lab
 - ✓ Filter building
 - ✓ Genset
 - ✓ New maintenance building
 - Emergency shower in the lab
 - Other items of PPE for handling chemicals and performing work:
 - Respirators for cleaning, painting, and handling lime
 - Three automatic external defibrillators
 - Air quality monitor
 - Fall protection gear
 - Eye protection: safety glasses, goggles, face shields
 - Aprons, gloves
 - Hard hats
 - Ear protection

- Fire extinguishers
- Protective coveralls
- Waders
- **Training**
 - Weekly toolbox talks
 - Annual AED/CPR/first aid and confined space
 - Monthly safety meetings
 - MFD staff visited the plant to look at confined spaces and to become familiar with the basins should a need arise to have someone rescued.

Grounds

- Drive
 - Repaired and repaved the south leg of the drive and the portion going to the west lime silo in 2005.
 - Repaved the remainder in 2009.
 - Part of the existing drive was resurfaced in 2012 following construction.
 - In 2012, the drive was extended up to the UV building and from there up the hill to tie in with the drive that goes to the RAS building.
 - In Fall of 2024, the cracks in the asphalt were filled and the drive to the south of the office and around the sludge holding pads were replaced.



West fence

- Entrance
 - Repairs to area around culvert



- Fencing
 - Replaced fence posts on the north and east sides of the grounds in 2006.
 - West and north sides replaced in 2009.
 - Added signs on all four sides of the property identifying it as a wastewater treatment facility in 2009. Fences and signs are required in chapter 8 of the Water Pollution Control regulations.
 - Replaced a portion of the east side that was removed to allow access to the sewer main on the east side of the filter building. Also installed a new gate on the south side.
 - In 2009, moved the entry gate on the east side of the railroad tracks a little farther away from Watermill Road to make access to the area safer.
 - Bank stabilization and fence replacement along the south property line were done in 2012.



New south gate

South fence line

- Underground Facilities worked on a leaking manhole and got the leaking stopped.
- Low-water stream crossing in the middle of the property east of the railroad
- Discharge structure -- east of the railroad tracks on Salt Fork
- Underground Facilities fixed a leak where a slip joint pulled apart near the discharge point Spring 2018.



Discharge point

VEHICLES AND OTHER MOBILE EQUIPMENT

- 2016, ½ ton pickup (#416)
 - Purchase price: \$25,370
 - Uses
 - Superintendent uses it daily,
 - Used frequently by others for plant O&M, and
 - Used on weekends as necessary.
 - Average daily use is 15 to 25 miles daily.
 - Mileage: 29,872
- 2024, Chevy 1500 Double cab 1/2 ton pickup (#401)
 - Purchase price: \$41,434
 - Uses
 - Lab technician – set out and pick up samplers
 - Operators – Going for parts or supplies
 - Check the plant
 - Used on weekends as necessary.
 - Average use is 15 miles daily.
 - Mileage: 238
- 2024, Chevy 1500 Double Cab 1/2 ton pickup (#413)
 - Purchase price: \$41,434
 - Uses: Used by Plant staff to complete daily tasks
 - Mileage: 233
- 2024 International HV607 Dump Truck (#419)
 - Purchase price: \$100,935
 - Uses
 - Primarily for sludge production process
 - Used daily
 - Mileage: 1,272
- 2024 International HV607 Dump Truck (#422)
 - Purchase Price: 100,935
 - Uses
 - Primarily for sludge production process
 - Used daily
 - Mileage: 1,377
- 1993 Ford chassis w/spreader body (#408)
 - New spreader body in 2004
 - Purchase price: \$23,400
 - Uses
 - Spread sludge on area farms and move sludge from filter building to waste holding pad
 - Replaced all four tires in 2010.
 - Miles: 68,061
 - Hours: 6,800
- 2023 International Spreader Truck (#417)
 - Purchase Price: \$171,565.24
 - Uses

- spread sludge on area farms and move sludge from filter building to sludge holding pad
 - Miles:3,846

- 2006 Case front-end loader (#412)
 - Purchase price: \$61,000
 - Uses
 - primarily on the sludge pads to load the spreader trucks.
 - When the steam plant shut down, the loader from the power plant was moved to the WWTP and the old 1992 loader was moved to underground facilities.
 - Hours: 2396
- 2014 John Deere Gator
 - Purchase price: \$16,900
 - Uses
 - daily during warm months and frequently in the winter.
 - Has lift bed, cab, brush guard, snow plow, and windshield.
 - Hours: 1705
 - Mileage: 9,212
- 2016 Ventrac 4500Y mower
 - Purchase price: \$28,945
 - Used daily from mid-March to mid-October or later
 - Hours: 1242
- 2018 John Deere Z950M Zero Turn Mower
 - Purchase Price: \$8,100
 - Used daily from mid-March to mid-October or later
 - Hours: 535

- Boat
 - Purchase price: \$565
 - Used when performing maintenance on the aeration basins that requires access from the water.
 - Also used at the water treatment plant on the lagoons.



Ventrac Mower



John Deere Gator



Spreader Truck



Dump Truck #419



Dump Truck #422

OPERATIONS/PERSONNEL

The current organizational structure for the Wastewater Plant is appropriate.

- Six full-time, permanent employees: Superintendent, Lab Technician/Operator, and four Operators (out of five available positions)
- One or two summer employees (high school or college students)

The current staffing level is appropriate.

- Operator tenure status:

<u>Individual</u>	<u>Years of Service (WWTP)</u>
○ Eric Perkins, Superintendent	10.2
○ Kyle O’Bryan, Lab Tech/Operator	11.3
○ Austin Stickels	1.2
○ Joe Boston	1.2
○ Bruce Carter	7
○ James Hieronymus	7

MISCELLANEOUS DATA RELATED TO OPERATIONS

Inflow and infiltration (I&I)

- The entry into the collection system of unwanted groundwater and surface water
- Treated at the plant the same as wastewater coming in and thus, adds to our expenses.
- EPA and DNR are addressing this issue with wastewater systems.
- Our discharge permit (see next section) contains an annual reporting requirement on the steps we are taking to reduce I&I in our collection system.

REGULATORY

Discharge permit

- Mandated by the federal Clean Water Act (CWA) through EPA and regulated by the Missouri Department of Natural Resources (DNR).
- Details our discharge quality, required testing, the pretreatment program, the sludge land application program, and I&I program.
- Issued August 1, 2017. A new permit application was submitted to DNR in 2019. We are waiting on their response.
- Discharge limits are for the main outfall:

<u>Constituent</u>	<u>Limit, mg/l</u>	
	<u>Summer</u>	<u>Winter</u>
Biochemical oxygen demand		
Weekly average	15	20
Monthly average	10	15
Total suspended solids		
Weekly average	45	45
Monthly average	30	30
Ammonia		
Daily maximum	monitor only	
Monthly average	monitor only	
Oil and grease		
Daily maximum	15	15
Monthly average	10	10

Recreational Season

<i>Eschericia</i> coliform	
Weekly average	1030
Monthly average	206

- Except for *E. coli*, summer is defined as June 1 to September 30, and winter is the rest of the year.
- For *E. coli*, the recreational season is defined as April 1 to October 31.
- Discharge limit for the irrigation outfall is 200 fecal coliform colonies per 100 milliliters.
- The FEQ basin is not permitted as an outfall. We can use the basin for flow equalization, but any discharge from it is a violation of our permit.
- Discharge permit allows the volume of water used at the golf course to vary “*depending on vegetation needs and precipitation.*”
- Requires disinfection of the entire effluent during the recreational season.

Reporting

- Monthly
 - Discharge monitoring report
 - Daily operational analyses
- Quarterly

- Discharge monitoring report
- Upstream/downstream nitrogen and phosphorous

- Annually
 - WET test
 - Form S (sludge handling) DNR & EPA
 - Irrigation
 - Pretreatment
 - I&I (done by Underground Facilities)
- Once we receive the new discharge permit, we will be filing these reports electronically. We use DNR's eDMR (electronic discharge monitoring reports) system.
- We anticipate Ammonia, Phosphorous, and possibly Nitrogen limits in the future. Phosphorous is the bigger concern, we have been analyzing influent, effluent, upstream, and downstream samples and calculating percent removal since May 2008

Construction permit

- Publicly-owned treatment systems must submit an engineering report and plans and specifications to DNR for review and issuance of a construction permit before undertaking any construction, alteration, or extension.
- Required by 10 CSR 20-6.010 and 10 CSR 20-8
- Design standards for wastewater systems are in 10 CSR 20-8.
- Effective January 1, 2015, the cost of a construction permit went from \$750 to \$3000.

Operations

- DNR inspections
- Last inspected in July 2020.
- Operator certification
 - Required by state regulation, 10 CSR 20-9.
 - Operators are required to hold at least a D level certificate of competency.
 - The chief operator must be certified at, or above, the level that the facility is rated.
 - MMU's plant is rated as a class A facility.
 - Superintendent Eric Perkins holds a class A certificate.
 - Kyle O'Bryan, the Lab Tech/Operator, holds a class A certificate.
 - Operators are required by DNR to have a minimum of 30 hours of renewal training in a three-year period to maintain their certificates. This training must pertain to the wastewater field.
 - Certified operators at the wastewater treatment plant include:

<u>NAME</u>	<u>CERTIFICATE LEVEL</u>
Austin Stickels	C
Kyle O'Bryan	A
Eric Perkins	A
Joe Boston	C
Bruce Carter	B
James Hieronymus	C

Primacy fee

- We are required to collect and remit to DNR a fee similar to the drinking water primacy fee.
- A customer fee based upon the number of service connections in the system and water meter sizes. The fees are:

Residential	\$0.72
Industrial/commercial	
Meter 3/4"	\$.20
Meter 2"	\$.75
Meter 3"- 4"	\$2.75
Meter 6"	\$7.25

(Maximum charge of \$700 for industrial/commercial customers)
- Must be remitted at least annually.
- MMU is allowed to keep 5% to cover expenses.

Rulemaking

EPA's rulemaking drives what the states do. Since Missouri has responsibility for implementing the federal rules, we generally, but not always, see a lag in the time a rule becomes effective at the federal level and the time it is adopted by DNR. Following is a list of some of the rulemakings that we know are coming in the next five to ten years that will affect MMU:

Regulatory Issues

Effluent *Escherichia coli*form (*E. coli*)/enterococci including a decrease in the *E. coli* limit from 206 monthly average to 126.

Wastewater system design standards

Antidegradation of receiving stream quality

Combined sewers/wet weather issues

Nutrient loading (phosphorous, nitrogen)

Water Quality Standards triennial review (DNR)

National ammonia criteria—reductions in ammonia limits

Non-water quality regulations

- *Oil Pollution Act*
 - Amended the CWA
 - Requires spill prevention, control, and countermeasures (SPCC) plans for facilities with above-ground oil storage tanks with capacity greater than 1320 gallons total.
 - The large tank contains approximately 2000 gallons.
 - The small diesel tank holds approximately 1000 gallons.
 - Additional information is in the environmental annual report.

ONGOING CONSTRUCTION AND IMPROVEMENTS

Current

Replace UV system

Upcoming

Short-term (1 – 2 years)

Replace Filter presses

Long-term (> 2 years)—in no particular order

Paint/coat final clarifiers

Concrete top third of FEQ basin

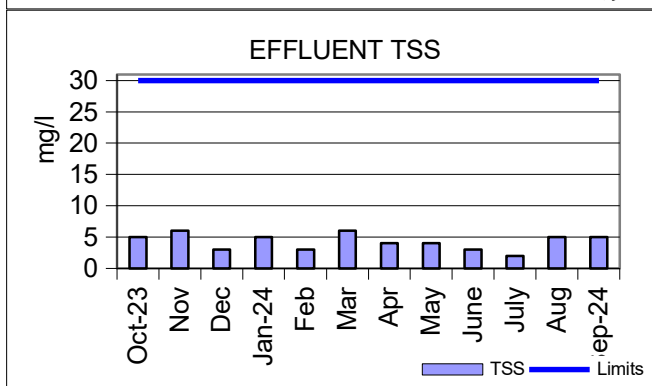
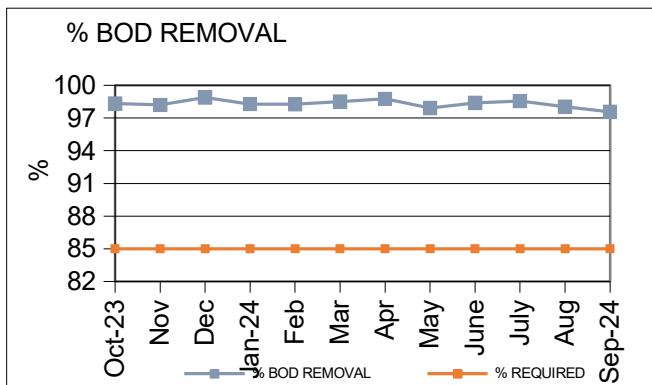
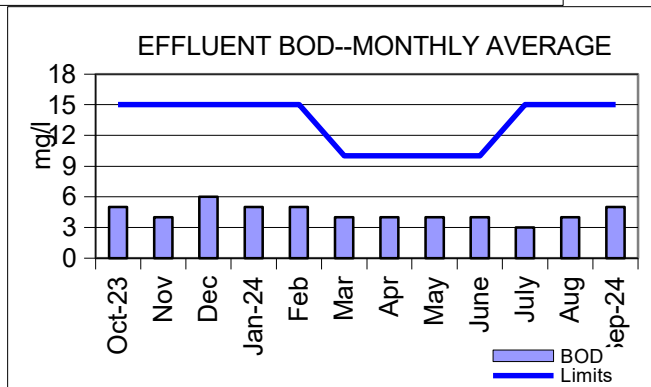
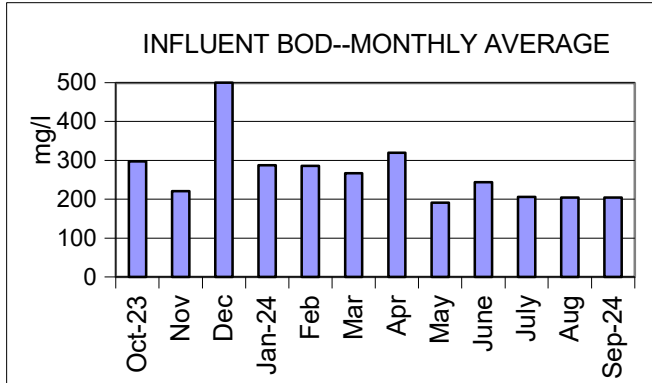
Of course, changes in regulatory requirements from EPA and DNR could change the above list, increasing some items in importance and adding others.

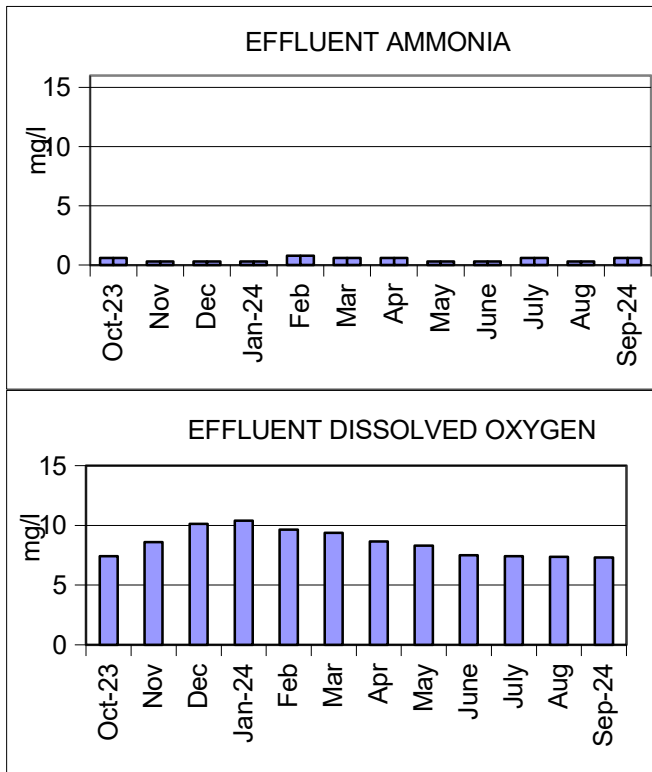
Wastewater Treatment Plant

- The plant treated 936,791,000 gallons of wastewater, an approximate We applied roughly 475 tons of sludge to local farmland.
- The Plant made upgrades to the Aeration Basin as well as the Final Clarifiers.
- Following are charts showing the wastewater treatment plant's effluent sampling results for FY23/24. The Plant continues to stay below the effluent limits set by DNR.

The following charts indicate the current parameter limits and monthly averages for BOD, ammonia, TSS, and DO in mg/l for 2024.

On BOD, we are required to meet a minimum of 85% removal.





We currently do not have an ammonia discharge limit but are required to monitor. We anticipate ammonia limits being reestablished in the new permit. Even though we currently do not have a minimum limit for effluent dissolved oxygen (DO), we continue to monitor DO as in the past when we had to meet a 5 mg/l minimum limit.

BOD – biochemical oxygen demand

TSS – total suspended solids

mg/l – milligrams per liter or parts per million

There currently is no discharge limit, only a monitoring requirement, for ammonia.

ACRONYMS

ABPS	Aeration basin pump station
BOD	Biochemical oxygen demand
CFR	Code of Federal Regulations
CIU	Categorical Industrial user
CWA	Clean Water Act
DNR	Missouri Department of Natural Resources
DO	Dissolved oxygen
DOH	Missouri Department of Health
<i>E. coli</i>	<i>Eschericia coliform</i>
EPA	Environmental Protection Agency
FEQ	Flow equalization
FOG	Fats, oil, and grease
I&I	Inflow and infiltration
MFD	Marshall Fire Department
MGD	Million gallons per day
MMU	Marshall Municipal Utilities
SIU	Significant industrial user
RAS	Return activated sludge
SCADA	System control and data acquisition
SCBA	Self-contained breathing apparatus
SKW	Shafer, Kline & Warren
SPCC	Spill prevention, control, and countermeasures
TCLP	Toxic characteristic leaching potential
TSS	Total suspended solids
UP	Union Pacific Railroad
UV	Ultraviolet
VFD	Variable frequency drive
WAS	Waste activated sludge
WET	Whole effluent toxicity
WWTP	Wastewater treatment plant