

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION



CONSTRUCTION PERMIT

The Missouri Department of Natural Resources hereby issues a permit to:

Missouri American Water Company
Lake Carmel WWTF
727 Craig Rd.
St. Louis, MO 63141

for the construction of (described facilities):

See attached.

Permit Conditions:

See attached.

Construction of such proposed facilities shall be in accordance with the provisions of the Missouri Clean Water Law, Chapter 644, RSMo, and regulation promulgated thereunder, or this permit may be revoked by the Department of Natural Resources (Department).

As the Department does not examine structural features of design or the efficiency of mechanical equipment, the issuance of this permit does not include approval of these features.


A representative of the Department may inspect the work covered by this permit during construction. Issuance of a permit to operate by the Department will be contingent on the work substantially adhering to the approved plans and specifications.

This permit applies only to the construction of water pollution control components; it does not apply to other environmentally regulated areas.

March 15, 2019
Effective Date

March 14, 2021
Expiration Date


Edward B. Galbraith, Director, Division of Environmental Quality


Chris Wieberg, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

This is a **DEMONSTRATION** project and additional monitoring requirements are included in the operating permit in accordance with the Approval Process for Innovative Technology Factsheet and 10 CSR 20-6.010(5). The facility is proposing to install a Triplepoint Water Technologies, LLC NitrOxTM system followed by a clarifier to meet the schedule of compliance to achieve compliance with ammonia effluent limits. The facility will utilize the existing lagoon cells for flow equalization and preliminary reduction of BOD and TSS. The design average flow will increase to 22,100 gpd.

This project will also include general site work appropriate to the scope and purpose of the project and all necessary appurtenances to make a complete and usable wastewater treatment facility.

II. COST ANALYSIS FOR COMPLIANCE

Pursuant to Section 644.145, RSMo, when issuing permits under this chapter that incorporate a new requirement for discharges from publicly owned combined or separate sanitary or storm sewer systems or publicly owned treatment works, or when enforcing provisions of this chapter or the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., pertaining to any portion of a publicly owned combined or separate sanitary or storm sewer system or [publicly owned] treatment works, the Department of Natural Resources shall make a “finding of affordability” on the costs to be incurred and the impact of any rate changes on ratepayers upon which to base such permits and decisions, to the extent allowable under this chapter and the Federal Water Pollution Control Act. This process is completed through a cost analysis for compliance. Permits that do not include new requirements may be deemed affordable.

The Department is not required to complete a cost analysis for compliance because the facility is not a combined or separate sanitary sewer system for a publically-owned treatment works.

III. CONSTRUCTION PERMIT CONDITIONS

The permittee is authorized to construct subject to the following conditions:

1. This construction permit does not authorize discharge.
2. All construction shall be in accordance with the plans and specifications submitted by Bartlett & West, Inc., on November 21, 2018.
3. The Department must be contacted in writing prior to making any changes to the plans and specifications that would directly or indirectly have an impact on the capacity, flow, system layout, or reliability of the proposed wastewater treatment facilities or any design parameter that is addressed by 10 CSR 20-8, in accordance with 10 CSR 20-8.110(11).

4. State and federal law does not permit bypassing of raw wastewater, therefore steps must be taken to ensure that raw wastewater does not discharge during construction. If a sanitary sewer overflow or bypass occurs, report the appropriate information to the Department's North East Regional Office per 10 CSR 20-7.015(9)(G).
5. The wastewater treatment facility shall be located at least fifty feet (50') from any dwelling or establishment.
6. The wastewater treatment facility shall be located above the twenty-five (25)-year flood level.
7. Wastewater treatment facility shall not be located within one hundred feet (100') of any water well or water supply structure.
8. In addition to the requirements for a construction permit, 10 CSR 20-6.200 requires land disturbance activities of 1 acre or more to obtain a Missouri state operating permit to discharge stormwater. The permit requires best management practices sufficient to control runoff and sedimentation to protect waters of the state. Land disturbance permits will only be obtained by means of the Department's ePermitting system available online at dnr.mo.gov/env/wpp/epermit/help.htm. See dnr.mo.gov/env/wpp/stormwater/sw-land-disturb-permits.htm for more information.
9. Upon completion of construction:
 - A. The Missouri American Water Company will be the continuing authority for operation, maintenance, and modernization of these facilities;
 - B. Submit an electronic copy of the as builts if the project was not constructed in accordance with previously submitted plans and specifications;
 - C. Submit the enclosed form Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(D) and request the operating permit modification be issued.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

MAWC, Lake Carmel needs to upgrade to meet ammonia effluent limits. The ammonia effluent limits become effective July, 2019, however; due to increasing design flow the facility submitted an Antidegradation Report. Through the antidegradation review process a new set of ammonia effluent limits were established differing to those established in the operating permit and subject to the schedule of compliance. The upgrade will be a demonstration project for the patent pending NitrOx™ Reactor System developed by Triplepoint Environmental. The upgrade will have lagoon cells 1 through 3 precede the NitrOx™ 2-stage covered Moving Bed Biological Reactor (MBBR), followed by a clarifier. Final design of the NitrOx™ system includes capability to return sludge to the first stage reactor for conversion to an IFAS system at a later date.

2. FACILITY DESCRIPTION

The addition of the NitrOx™ 2-stage covered Moving Bed Biological Reactor (MBBR)/IFAS system will lead to an expansion of design flow from 12,600 gpd to 22,100 gpd. The facility is not currently under enforcement action. The current treatment train includes an existing 3 cell lagoon with chlorine disinfection.

The MAWC, Lake Carmel WWTF is located at 10115 Old Forge Rd., Eugene, Cole County, Missouri. The facility has a design average flow of 22,100 gpd and serves a population equivalent of approximately 136 people. The facility is subject to a schedule of compliance to meet ammonia that expires July 1st, 2019. Below is a summary of the existing facility's performance from 2009 through 2018.

Parameter	Units	Permit Monthly Effluent Limit	Average discharge*
Flow	MGD	*	0.031
Biochemical Oxygen Demand ₅	mg/L	45	18.5
Total Suspended Solids	mg/L	80	23.0
Ammonia as N-summer	mg/L	1.4	4.8
Ammonia as N-winter	mg/L	2.8	9.4

3. COMPLIANCE PARAMETERS

The final effluent limits the project is required to meet have been established in the Water Quality and Antidegradation Review (WQAR) approved October 16, 2018. With the addition of the Nitrox system and clarifier, the facility no longer qualifies for equivalent to secondary effluent limits for biochemical oxygen demand (BOD) or total suspended solids (TSS).

The construction is to meet effluent limits established in the WQAR and satisfy the schedule of compliance for ammonia given in the existing operating permit. As this is a demonstration project, for the first year of operation following construction, additional monitoring will be required before and after the MBBR. The limits following the completion of construction will be applicable to the facility:

Parameter	Units	Monthly average limit
Biochemical Oxygen Demand ₅	mg/L	25
Total Suspended Solids	mg/L	30
Ammonia as N-summer	mg/L	0.8
Ammonia as N-winter	mg/L	1.6
pH	SU	6.5-9.0
Total Residual Chlorine	µg/L	8 (130 ML)
<i>E. Coli</i>	#/100mL	206
<i>Dissolved Oxygen, DO</i>	Mg/L	*

4. **ANTIDEGRADATION**

The Department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated October 16, 2018, due to the proposed increase in design flow.

5. **REVIEW of MAJOR TREATMENT DESIGN CRITERIA**

Existing Facilities

- Lagoon Cell No. 1 – Lagoon Cell No. 1 has a surface area of 0.67 acres and a wastewater volume of 0.614 million gallons (MG), providing approximately 27.8 days of retention at the design flow.
- Lagoon Cell No. 2 – Lagoon Cell No. 2 has a surface area of 0.27 acres and a wastewater volume of 0.286 million gallons (MG), providing approximately 12.9 days of retention at the design flow.
- Lagoon Cell No. 3 – Lagoon Cell No. 3 has a surface area of 0.07 acres and a wastewater volume of 0.091 million gallons (MG), providing approximately 4.1 days of retention at the design flow.

New Facilities

- Triplepoint Water Technologies, LLC NitrOx™ – The lagoon treated effluent will be transported by air lift process from the existing lagoon cells to the NitrOx™ system. The NitrOx™ system is capable of treating a design average flow of 22,100 gpd and a peak flow of 50,000 gpd.
 - The system is composed of two tanks, approximately 6 ft in diameter, and a side water depth of 10 ft. Total volume of the two tanks is 4,230 gallons.
 - The average flow hydraulic retention time is 4.5 hours and the peak flow hydraulic retention time is 2.0 hours.
 - A floating insulating cover shall be installed on the tank. Thickness of the cover will be 2-4 inches.
 - An immersion tank heater will be installed to maintain a minimum wastewater temperature of 36.5°F.
 - The tanks shall be filled with high surface area HDPE media to a density that allows for adequate aeration and mixing conditions. The media will have a total surface area of 152 ft² per cubic foot
 - Aeration by means of two bi or tri-lobe positive displacement blowers each with a 2-3 HP motor.

- The effluent from the NitrOx™ will flow by gravity to the clarifier for polishing prior to disinfection and discharge.
- Hopper Style Clarifier- The hopper type clarifier will have a surface area of 50.0 square feet. The volume of the clarifier is 4,511 gallons with an average surface overflow rate of 1,000 gpd/square foot at peak flow.
 - The clarifier has the dimensions of 8 ft diameter by 14.0 ft total depth with a sidewater depth of 12 feet.

6. OPERATING PERMIT

Operating permit MO-0088986 will require a modification to reflect the construction activities. The modified MAWC, Lake Carmel WWTF, MO-008986, was successfully public noticed from 2/8/2019 to 3/11/2019. An internal comment was made on the draft operating permit and as a result internal monitoring requirements were added to the operating permit. Submit the Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(D) and request the operating permit modification be issued.

Aaron Sawyer
Engineering Section
Aaron.sawyer@dnr.mo.gov



MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
**APPLICATION FOR CONSTRUCTION PERMIT –
WASTEWATER FACILITY**

FOR DEPARTMENT USE ONLY

APP NO.	CP NO.
FEE RECEIVED	CHECK NO.
DATE RECEIVED	

APPLICATION OVERVIEW

The Application for Construction Permit – Wastewater Facility form is for construction pertaining to domestic wastewater treatment facilities, agrichemical facilities, and components thereof. This form has been developed in a modular format and consists of Part A and B. **All applicants must complete Part A.** Part B should be completed for applicants who currently land-apply wastewater or propose land application for wastewater treatment. **Please read the accompanying instructions before completing this form. Submittal of an incomplete application may result in the application being returned.**

PART A – BASIC INFORMATION

1.0 APPLICATION INFORMATION (Note – If any of the questions in this section are answered NO, this application may be considered incomplete and returned.)

- 1.1 Is this a Federal/State funded project? ☐ YES ☒ N/A Funding Agency: _____ Project #: _____
- 1.2 Is this an application for an agrichemical? ☐ YES (See instructions.) ☒ N/A
- 1.3 Has the Missouri Department of Natural Resources approved the proposed project's antidegradation review?
☒ YES Date of Approval: 10/16/2018
- 1.4 Has the department approved the proposed project's facility plan*?
☐ YES Date of Approval: _____ ☐ NO ☒ N/A (If Not Applicable, complete No. 1.5.)
- 1.5 [Complete only if answered Not Applicable on No. 1.4] Is a copy of the engineering report* for wastewater treatment facilities with a design flow less than 22,500 gpd included with this application?
☒ YES ☐ NO
- 1.6 Is a copy of the appropriate plans* and specifications* included with this application?
☒ YES Denote which form is submitted: ☒ Hard copy ☐ Electronic copy (See instructions.) ☐ NO
- 1.7 Is a summary of design* included with this application? ☒ YES ☐ NO
- 1.8 Is a general operating permit applicable?
☐ YES Submit the appropriate operating permit application to the Regional Office at least 60 days prior to operation.
☒ NO Enclose the appropriate operating permit application and fee submittal. Denote which form: ☒ B ☐ B2
- 1.9 Is the facility currently under enforcement with the department or the Environmental Protection Agency? ☐ YES ☒ NO
- 1.10 Is the appropriate fee included with this application? ☒ YES ☐ NO (See instructions for appropriate fee.)

* Must be affixed with a Missouri registered professional engineer's seal, signature and date.

2.0 PROJECT INFORMATION

2.1 NAME OF PROJECT

Lake Carmel WWTF Improvements

2.2 PROJECT DESCRIPTION

The current facility consists of a three-cell lagoon with chlorination/dechlorination with sludge retained in the lagoon. The current permitted design flow is 12,600 gpd with actual avg flows between 15,000 and 21,700 gpd. The proposed improvements are an effort to comply with ammonia limits as established in a schedule of compliance in the existing NPDES permit which ends June 30, 2019. The applicant's preferred alternative is to install an MBBR process after the third cell of the lagoon. A clarifier is proposed following the MBBR process. The new design flow is proposed for 22,100 gpd.

2.3 SLUDGE HANDLING, USE AND DISPOSAL DESCRIPTION

Sludge will be transported from the clarifier and stored in lagoon cell 1 via a new air lift.

2.4 DESIGN INFORMATION

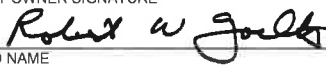
- A. Current population: 136; Design population: 136
- B. Actual Flow: 21,700 gpd; Design Average Flow: 22,100 gpd;
Actual Peak Daily Flow: 50,000 gpd; Design Maximum Daily Flow: 50,000 gpd;
Design Wet Weather Event: 200,000 gpd

2.5 ADDITIONAL INFORMATION

- A. Is a topographic map attached? ☒ YES ☐ NO (see Form B)
- B. Is a process flow diagram attached? ☒ YES ☐ NO (see drawings)

2.6 ESTIMATED PROJECT CONSTRUCTION COST

\$ 314,344.00

3.0 WASTEWATER TREATMENT FACILITY				
NAME MAWC, Lake Carmel Wastewater Treatment Facility		TELEPHONE NUMBER WITH AREA CODE (866) 430-0820		EMAIL ADDRESS Robert.Goeltz@amwater.com
ADDRESS (PHYSICAL) 10115 Old Forge Road	CITY Eugene	STATE MO	ZIP CODE 65032	COUNTY Cole
Wastewater Treatment Facility: Mo- 0105759 (Outfall 001 Of 001)				
3.1 Legal Description: SE ¼, NW ¼, NE ¼, Sec. 33 , T 43N , R 13W (Use additional pages if construction of more than one outfall is proposed.)				
3.2 UTM Coordinates Easting (X): 555838 Northing (Y): 4254549 For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)				
3.3 Name of receiving streams: Tributary to Clark Fork				
4.0 PROJECT OWNER				
NAME Missouri American Water Company		TELEPHONE NUMBER WITH AREA CODE (314) 469-6050		EMAIL ADDRESS timothy.ganz@amwater.com
ADDRESS 727 Craig Rd	CITY St. Louis	STATE MO	ZIP CODE 63141	
5.0 CONTINUING AUTHORITY: Permanent organization that will serve as the continuing authority for the operation, maintenance and modernization of the wastewater collection system.				
NAME Missouri American Water Company		TELEPHONE NUMBER WITH AREA CODE (314) 469-6050		EMAIL ADDRESS timothy.ganz@amwater.com
ADDRESS 727 Craig Rd	CITY St. Louis	STATE MO	ZIP CODE 63141	
5.1 A letter from the continuing authority, if different than the owner, is included with this application. <input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A				
5.2 COMPLETE THE FOLLOWING IF THE CONTINUING AUTHORITY IS A MISSOURI PUBLIC SERVICE COMMISSION REGULATED ENTITY.				
A. Is a copy of the certificate of convenience and necessity included with this application? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO				
5.3 COMPLETE THE FOLLOWING IF THE CONTINUING AUTHORITY IS A PROPERTY OWNERS ASSOCIATION.				
A. Is a copy of the as-filed restrictions and covenants included with this application? <input type="checkbox"/> YES <input type="checkbox"/> NO				
B. Is a copy of the as-filed warranty deed, quitclaim deed or other legal instrument which transfers ownership of the land for the wastewater treatment facility to the association included with this application? <input type="checkbox"/> YES <input type="checkbox"/> NO				
C. Is a copy of the as-filed legal instrument (typically the plat) that provides the association with valid easements for all sewers included with this application? <input type="checkbox"/> YES <input type="checkbox"/> NO				
D. Is a copy of the Missouri Secretary of State's nonprofit corporation certificate included with this application? <input type="checkbox"/> YES <input type="checkbox"/> NO				
6.0 ENGINEER				
ENGINEER NAME / COMPANY NAME Tyler Pjesky, P.E. / Bartlett & West, Inc.		TELEPHONE NUMBER WITH AREA CODE (785) 228-3203		EMAIL ADDRESS tyler.pjesky@bartwest.com
ADDRESS 1719 Southridge Drive, Suite 100	CITY Jefferson City	STATE MO	ZIP CODE 65109	
7.0 PROJECT OWNER: I hereby certify that I am familiar with the information contained in this application and to the best of my knowledge and belief such information is true, complete, and accurate, and if granted this permit, I agree to abide by the Missouri Clean Water Law and all rules, regulations, orders, and decisions, subject to any legitimate appeal available to applicant under Missouri Clean Water Law. I also understand the issuance of the construction permit does not guarantee the proposed wastewater treatment will meet the required effluent limitations of the issued Missouri State Operating Permit for this facility.				
PROJECT OWNER SIGNATURE 				
PRINTED NAME Robert Goeltz			DATE 11/20/18	
TITLE OR CORPORATE POSITION Senior Project Engineer		TELEPHONE NUMBER WITH AREA CODE (314) 996-2308		EMAIL ADDRESS robert.goeltz@amwater.com
Mail completed copy to: MISSOURI DEPARTMENT OF NATURAL RESOURCES WATER PROTECTION PROGRAM P.O. BOX 176 JEFFERSON CITY, MO 65102-0176				
END OF PART A.				
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHETHER PART B NEEDS TO BE COMPLETE.				

PART B – LAND APPLICATION ONLY**(Submit only if the proposed construction project includes land application of wastewater.)****8.0 FACILITY INFORMATION**

8.1 Type of wastewater to be irrigated: ☐ Domestic ☐ State/National Park ☐ Seasonal business
☐ Municipal ☐ Municipal with a pretreatment program or significant industrial users
☐ Other (explain)

8.2 Months when the business or enterprise will operate or generate wastewater:
☐ 12 months per year ☐ Part of the year (list months):

8.3 This system is designed for:
☐ No-discharge ☐ Subsurface
☐ Partial irrigation when feasible and discharge rest of time
☐ Irrigation during recreational season, April – October, and discharge during November – March
☐ Other (explain)

9.0 STORAGE BASINS

9.1 Number of storage basins: _____ (Use additional pages if greater than two basins.)

9.2 Type of basins: ☐ Steel ☐ Concrete ☐ Fiberglass ☐ Earthen ☐ Earthen with membrane liner

9.3 Storage basin dimensions at inside top of berm (feet). Report freeboard as feet from top of berm to emergency spillway or overflow pipe.

Basin #1: Length _____ Width _____ Depth _____ Freeboard _____ Depth _____ Safety _____ % Slope _____
Basin #2: Length _____ Width _____ Depth _____ Freeboard _____ Depth _____ Safety _____ % Slope _____

9.4 Storage Basin operating levels (report as feet below emergency overflow level).

Basin #1: Maximum operating water level _____ ft Minimum operating water level _____ ft
Basin #2: Maximum operating water level _____ ft Minimum operating water level _____ ft

9.5 Design depth of sludge in storage basins.

Basin #1: _____ ft Basin #2: _____ ft

9.6 Existing sludge depth, if the basins are currently in operation.

Basin #1: _____ ft Basin #2: _____ ft

9.7 Total design sludge storage: _____ dry tons and _____ cubic feet

10.0 LAND APPLICATION SYSTEM

10.1 Type of land application: ☐ Fixed Head Sprinklers ☐ Center Pivot ☐ Traveling Gun ☐ Drip Dispersal
☐ Subsurface Low Pressure Pipe ☐ Other (describe) _____

10.2 Number of irrigation sites _____ Total Acres _____ Maximum % field slopes _____

Location: _____ ¼, _____ ¼, _____ ¼, _____ Sec. _____ T _____ R _____ County _____ Acres

Location: _____ ¼, _____ ¼, _____ ¼, _____ Sec. _____ T _____ R _____ County _____ Acres

Location: _____ ¼, _____ ¼, _____ ¼, _____ Sec. _____ T _____ R _____ County _____ Acres

(Use additional pages if greater than three irrigation sites.)

10.3 Type of vegetation: ☐ Grass hay ☐ Pasture ☐ Timber ☐ Row crops
☐ Other (describe)

10.4 Wastewater flow (dry weather) gallons per day: Average annual _____
Seasonal _____ Off-season _____

10.5 Land application rate (design flow including 1-in-10 year storm water flows):

Design: _____ inches/year _____ inches/hour _____ inches/day _____ inches/week

Actual: _____ inches/year _____ inches/hour _____ inches/day _____ inches/week

10.6 Total irrigation per year (gallons): Design: _____ gal Actual: _____ gal

10.7 Actual months used for irrigation (check all that apply):

☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec

10.8 Land application rate is based on:

☐ Hydraulic Loading ☐ Other (describe) _____

☐ Nutrient Management Plan (N and P) If N and P is selected, is the plan included? ☐ YES ☐ NO