STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

CONSTRUCTION PERMIT

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

Mr. Mark Radake, P.E.
Missouri American Water Company
727 Craig Road
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.

August 6, 2019
Effective Date

Edward B. Galbraith, Director, Division of Environmental Quality

August 5, 2021
Expiration Date

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 draft Approval Process for Innovative Technology Factsheet. The upgrade will be a demonstration project for the patent pending NitrOx™ Reactor System developed by Triplepoint Environmental.

Modification to an existing two cell aerated lagoon by the partitioning of the lagoon to create a third cell, replacement of aeration equipment, addition of a Moving Bed Bioreactor (MBBR) between the second and third cells; modification includes replacement of lagoon aeration with two 7.5 HP, shore mounted blowers with 6 diffuser assemblies, intermediate lift station (cell #2 to MBBR), two concrete reaction chambers to be operated in series, dual 40 HP blowers, coarse bubble aeration, reactor HDPE media, heaters, final settling in third cell (polishing pond), recycle pump, associated transfer piping and junction splitting chambers, 80 kW emergency generator, together with existing equipment and the necessary appurtenances to make the facilities complete and usable. The modified treatment facility will have the capacity to treat the waste from a population equivalent of 2076 with an average daily discharge of 207,600 GPD. This facility discharges to a Tributary to the Big River, Jefferson County, MO-0040461.

As part of the construction project sludge may be removed from all the lagoon cells and land applied at agronomic rates on nearby agricultural land or disposed by an alternative method. This activity is not authorized by this construction permit. Approval of a "Biosolids Management Plan" must be secured before removing sludge. Please submit the Biosolids management plan to the St. Louis Regional Office for review.

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 consistent with plans and specifications signed and sealed by Donohue and Associates and as described in this permit.

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 St. Louis Regional Office per 10 CSR 20-7.015(9)(G).

5. The wastewater treatment facility shall be located above the twenty-five (25)-year flood level.

6. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the one hundred- (100-) year flood elevation per 10 CSR 20-8.140(2)(B).The minimum distance between wastewater treatment facilities and all potable water sources shall be at least three hundred feet (300') per 10 CSR 20-8.140(2)(C)1.

7. 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.

8. A United States (U.S.) Army Corps of Engineers (COE) permit (404) and a Water Quality Certification (401) issued by the Department or permit waiver may be required for the activities described in this permit. This permit is not valid until these requirements are satisfied. If construction activity will disturb any land below the ordinary high water mark of jurisdictional waters of the U.S. then a 404/401 will be required. Since the COE makes determinations on what is jurisdictional, you must contact the COE to determine permitting requirements. You may call the Department's Water Protection Program at 573-751-1300 for more information. See dnr.mo.gov/env/wpp/401/ for more information.

9. All construction must adhere to applicable 10 CSR 20-8 (Chapter 8) requirements listed below.

   10 CSR 20-8.140 Wastewater Treatment Facilities

   - Flood protection shall apply to new construction and to existing facilities undergoing major modification. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the one hundred- (100-) year flood elevation. 10 CSR 20-8.140 (2) (B)
   - Unless another distance is determined by the Missouri Geological Survey or by the department's Public Drinking Water Branch, the minimum distance between wastewater treatment facilities and all potable water sources shall be at least three hundred feet (300'). 10 CSR 20-8.140 (2) (C) 1.
   - Facilities shall be readily accessible by authorized personnel from a public right–of-way at all times. 10 CSR 20-8.140 (2) (D)
   - The alarm shall be activated in cases of high water levels. An audiovisual alarm or a more advanced alert system, with a self-contained power supply, capable of monitoring the condition of equipment whose failure could result in a violation of the operating permit, shall be provided for all wastewater treatment facilities. 10 CSR 20-8.140 (4) (D) and 10 CSR 20-8.140 (7) (C)
   - All sampling points shall be designed so that a representative and discrete twenty-four (24) hour automatic composite sample or grab sample of the effluent discharge can be obtained at a point after the final treatment process and before discharge to or mixing with the receiving waters. 10 CSR 20-8.140 (6) (B)
   - All wastewater treatment facilities shall be provided with an alternate source of electric power or pumping capability to allow continuity of operation during power failures. 10 CSR 20-8.140 (7) (A) 1.
   - Electrical systems and components in raw wastewater or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors that are normally present, shall comply with the NFPA 70 *National Electric Code (NEC)* (2017 Edition), as approved and published August 24, 2016, requirements for Class I, Division 1, Group D locations. 10 CSR 20-8.140 (7) (B)
   - No piping or other connections shall exist in any part of the wastewater treatment facility that might cause the contamination of a potable water supply. 10 CSR 20-8.140 (7) (D) 1.
   - Adequate provisions shall be made to effectively protect facility personnel and visitors from hazards. The following shall be provided to fulfill the particular needs of each wastewater treatment facility:
     - Gratings over appropriate areas of treatment units where access for maintenance is necessary; 10 CSR 20-8.140 (8) (B)

- Provisions for local lockout/tagout on stop motor controls and other devices; 10 CSR 20-8.140 (8) (L)
- Provisions for an arc flash hazard analysis and determination of the flash protection boundary distance and type of PPE to reduce exposure to major electrical hazards shall be in accordance with NFPA 70E *Standard for Electrical Safety in the Workplace* (2018 Edition), as approved and published August 21, 2017. 10 CSR 20-8.140 (8) (M)

10 CSR 20-8.200 Wastewater Treatment Lagoons and Wastewater Irrigation Alternatives.

- The minimum berm width shall be eight feet (8') to permit access of maintenance vehicles. 10 CSR 20-8.200 (4) (A) 2.
- Minimum freeboard shall be two feet (2'). 10 CSR 20-8.200 (4) (A) 3.

10 CSR 20-8.210 Supplemental Treatment

- Polishing Reactors. The process shall—
  - Provide a minimum hydraulic retention time of three (3) hours; 10 CSR 20-8.210 (2) (A) 1.
  - Be based on actual reactor influent characteristics; 10 CSR 20-8.210 (2) (A) 2.
  - Include cold weather provisions, such as heaters, insulated covers, installation of temperature controlled enclosures for above-ground components to prevent freezing and to ensure ammonia removal; 10 CSR 20-8.210 (2) (A) 6. and
  - Provide a blower malfunction alarm able to notify the operator of alarm activations through audio-visual means. 10 CSR 20-8.210 (2) (A) 7.

10. Upon completion of construction:

A. Submit an electronic copy of the as builts if the project was not constructed in accordance with previously submitted plans and specifications; and

B. Submit the enclosed form Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N) and request the operating permit modification be issued.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

Current aerated lagoon discharge frequently exceeds future ammonia limits in operating permit MO-0040461; the facility processes more wastewater than the stated design flow. Proposed upgrade will provide additional treatment for reduction of ammonia and increase the design flow to 207,600 GPD.

2. FACILITY DESCRIPTION

The existing facility consists of an influent lift station, a two cell aerated lagoon, and UV disinfection. The first cell has a surface area of approximately 0.85 acres; the second cell has a surface area of approximately 3.8 acres. The primary cell is aerated with four floating aerators. The permitted design flow is 164,500 GPD.

The improved facilities will have three lagoon cells, the first cell will be aerated by shore mounted blowers, a new lift station will pump water from the second cell to a two stage MBBR (moving Bed Bio-reactor), water will enter the third cell for final polishing, then pass through a UV disinfection unit (seasonal disinfection required). A new lift station will be installed to return effluent to either the first or second cell as an enhanced treatment option.

The treatment facility will have a new design flow of 207,600 GPD, capable of treating a population equivalent of 2076. The treatment plant discharge location remains in Land Grant 359, Jefferson County; receiving stream is a Tributary to Big River. UTM Coordinates: X=704973, Y=4247890.

3. COMPLIANCE PARAMETERS

The proposed project is required to meet final effluent limits as established in the Antidegradation review dated July 17, 2018.

The construction is to meet more protective effluent limits. As this is a demonstration project, for the first year of operation following construction, additional monitoring will be required at locations 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	30
Total Suspended Solids	mg/L	30
Ammonia as N-summer	mg/L	1.0
Ammonia as N-winter	mg/L	2.3
pH	SU	6.5-9.0
E. Coli	#/100mL	126

4. ANTIDEGRADATION

Due to expansion of the design flow from 0.1645 MGD to 0.2076 MGD, the Department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated July 17, 2018. The Water Quality and Antidegradation Review was placed in the Public Notice of Operating Permit Modification MO-0040461, issued June 21, 2019.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

Modification to an existing two cell aerated lagoon by the partitioning of the second lagoon cell to create a third cell, replacement of aeration equipment, addition of a Moving Bed Bioreactor (MBBR) between the second and third cells;

Two 7.5 HP positive displacement blowers each with a minimum capacity of 120 SCFM at 6.63 psig. Six air diffuser assemblies each with a combination of fine bubble and course bubble diffusers placed strategically throughout the first lagoon cell. Blowers operated with VFD's (variable frequency drives). Aeration design based on an influent BOD load of 370 lb./day. Primary (aerated) lagoon cell is approximately 0.85 acres with an approximate volume of 2.5 MG, detention time is approximately 12 days. Second cell area after placement of new berm will be approximately 2.75 acres with a volume of approximately 4.7 MG, detention time is approximately 22 days. Second cell to remain unaerated.

Lift station to pump water from second cell to the MBBR system. Three 3 HP pumps each with a capacity of 330 gpm at a TDH of 15 feet; Sulzer Model XFP 80-CB1, or equal. Pumps to operate with VFD's.

Two concrete chambers with overall inside dimensions of 20'x'20'x 17.1' deep; capacity of approximately 42,192 gallons at a liquid depth of 14.1 feet. The two tanks together provide a detention volume of more than 9.7 hours at design flows.

Two 40 HP positive displacement blowers each to supply 705 SCFM at 7.1 psi. Coarse bubble diffusers to be located near bottom of each tank. Blowers to operate with VFD's. Design is based on providing approximately 4.7 lb. of oxygen per pound of ammonia to be nitrified. Air requirements are estimated at 351 cfm (first tank), and 352 cfm (second tank).

MBBR reactor media constructed of HDPE to provide a minimum protected surface area of 113 sq. ft./cubic ft.; and have a specific gravity between 0.93 and 1.05.

Electric submersion heaters provided to maintain a minimum temperature of 5 degrees Celsius. Floating insulated covers to be provided in each tank.

Following MBBR treatment, water will flow to third lagoon cell. Final settling will take place in the third cell; approximate surface area of 0.69 acre, with a capacity of 1.1 MG providing a detention time of approximately 5 days.

After the third cell a recycle lift station to be installed with ability to pump desired amount of flow to the first or second cells. Two 5 HP pumps each with a capacity of 330 gpm at a TDH of 15.6 feet; Sulzer Model XFP 80-CB1, or equal. Pumps to operate with VFD's.

Associated transfer piping and junction/splitting chambers, 8-inch pvc transfer pipe, 4-inch PVC and DIP force main, together with existing equipment and the necessary appurtenances to make the facilities complete and usable.

Emergency generator rated for a minimum of 80 kW (100 kVA). Diesel engine driven standby generator will operate all treatment devices except the MBBR tank submersible heaters. Generator will power the two internal pump stations and UV disinfection system.

The modified treatment facility will have the capacity to treat the waste from a population equivalent of 2076 with an average daily discharge of 207,600 GPD. This facility discharges to a Tributary to the Big River, Jefferson County, MO-0040461

6. OPERATING PERMIT

Operating permit MO-0040461 will require a modification to reflect the construction activities. The modified MAWC, Cedar Hill Lagoon WWTF, MO-0040461, was successfully public noticed from June 21, 2019 to July 21, 2019 with no comments received. Submit the Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N) and request the operating permit modification be issued.

Andrew Appelbaum, P.E.
Engineering Section
andy.appelbaum@dnr.mo.gov

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CP0002065

RECEIVED
APR 04 2019
Water Protection Program

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM

APPLICATION FOR CONSTRUCTION PERMIT – WASTEWATER TREATMENT FACILITY

FOR DEPARTMENT USE ONLY	
APP NO.	CP NO.
FEE RECEIVED $1000.00	CHECK NO. 70005252
DATE RECEIVED 4-4-19	

SB

APPLICATION OVERVIEW

The Application for Construction Permit – Wastewater Treatment Facility 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 Has the Missouri Department of Natural Resources approved the proposed project's antidegradation review?
☒ YES Date of Approval: 7/18 ☐ N/A

1.3 Has the department approved the proposed project's facility plan*?
☒ YES Date of Approval: 7/18 ☐ NO (If No, complete No. 1.4.)

1.4 [Complete only if answered No on No. 1.3.] Is a copy of the facility plan* for wastewater treatment facilities included with this application? NA
☐ YES ☐ NO ☐ Exempt because _____

1.5 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

1.6 Is a summary of design* included with this application? ☒ YES ☐ NO

1.7 Has the appropriate operating permit application (A, B, or B2) been submitted to the department?
☐ YES Date of submittal: _____
☐ Enclosed is the appropriate operating permit application and fee submittal. Denote which form: ☐ A ☐ B ☐ B2
☒ N/A: However, In the event the department believes that my operating permit requires revision to permit limitation such as changing equivalent to secondary limits to secondary limits or adding total residual chlorine limits, please share a draft copy prior to public notice? ☒ YES ☐ NO

1.8 Is the facility currently under enforcement with the department or the Environmental Protection Agency? ☐ YES ☒ NO

1.9 Is the appropriate fee or JetPay confirmation included with this application? ☒ YES ☐ NO
See Section 7.0

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

2.0 PROJECT INFORMATION

2.1 NAME OF PROJECT: Cedar Hill Lagoon Upgrade

2.2 ESTIMATED PROJECT CONSTRUCTION COST: $2,071,000

2.3 PROJECT DESCRIPTION

Addition of NitrOx System to remove ammonia

2.4 SLUDGE HANDLING, USE AND DISPOSAL DESCRIPTION

sludge will be periodically removed from the lagoon

2.5 DESIGN INFORMATION

A. Current population: 2000; Design population: 2076

B. Actual Flow: 176000 gpd; Design Average Flow: 207,000 gpd;
Actual Peak Daily Flow: 616000 gpd; Design Maximum Daily Flow: 726600 gpd; Design Wet Weather Event: 842,000

2.6 ADDITIONAL INFORMATION

A. Is a topographic map attached? ☒ YES ☐ NO

B. Is a process flow diagram attached? ☒ YES ☐ NO

3.0 WASTEWATER TREATMENT FACILITY

NAME	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
MAWC - Cedar Hill Lagoon	314 996 2361	Mark.RadakeOIC amwater.com

ADDRESS (PHYSICAL)	CITY	STATE	ZIP CODE	COUNTY
8419 Industrial Drive	Cedar Hill	MO	63141	Jefferson

Wastewater Treatment Facility: Mo-0040461 (Outfall 1 Of 1)

3.1 Legal Description: _____ ¼, _____ ¼, _____ ¼, Sec. _____, T _____, R _____
(Use additional pages if construction of more than one outfall is proposed.)

3.2 UTM Coordinates Easting (X): 704987 Northing (Y): 4247877
For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)

3.3 Name of receiving streams: Tributary to Big River

4.0 PROJECT OWNER

NAME	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
Missouri American Water Co	314 996 2361	Mark.RadakeOIC@amwater.com

ADDRESS	CITY	STATE	ZIP CODE
727 Craig Road	St Louis	MO	63141

5.0 CONTINUING AUTHORITY: A continuing authority is a company, business, entity or person(s) that will be operating the facility and/or ensuring compliance with the permit requirements.

NAME	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
Missouri American Water Co	314 996 2361	Mark.RadakeOIC@amwater.com

ADDRESS	CITY	STATE	ZIP CODE
727 Craig Road	St. Louis	MO	63141

5.1 A letter from the continuing authority, if different than the owner, is included with this application. ☐ YES ☐ NO ☒ 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? ☒ YES ☐ NO

5.3 COMPLETE THE FOLLOWING IF THE CONTINUING AUTHORITY IS A PROPERTY OWNERS ASSOCIATION. NA

A. Is a copy of the as-filed restrictions and covenants included with this application? ☐ YES ☐ 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? ☐ YES ☐ 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? ☐ YES ☐ NO

D. Is a copy of the Missouri Secretary of State's nonprofit corporation certificate included with this application? ☐ YES ☐ NO

6.0 ENGINEER

ENGINEER NAME / COMPANY NAME	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
Donohue + Assoc	636 536 7042	acalliere donahue-associates

ADDRESS	CITY	STATE	ZIP CODE
1415 Elbridge Payne Rd	Chesterfield	MO	63017

7.0 APPLICATION FEE

☐ CHECK NUMBER ☐ JETPAY CONFIRMATION NUMBER

8.0 PROJECT OWNER: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

PROJECT OWNER SIGNATURE: Mark Radake

PRINTED NAME	DATE
Mark Radake	3/22/2019

TITLE OR CORPORATE POSITION	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
Project Manager	314-996-2361	Mark.Radake@amwater.com

Cell 314 705-7343

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.