STATE OF MISSOURI
Jeremiah W. (Jay) Nixon, Governor  Sara Parker Pauley, Director
DEPARTMENT OF NATURAL RESOURCES
dnr.mo.gov

Mr. Mike Rehme
14700 White Lane Ct.
St. Louis, MO  63017

Dear Permittee:

Pursuant to the Federal Water Pollution Control Act, under the authority granted to the State of Missouri and in compliance with the Missouri Clean Water Law, we have issued and are enclosing your State Operating Permit to discharge from Rehme at the Lake, Camden County, Missouri.

Please read your permit and enclosed Standard Conditions.  They contain important information on monitoring requirements, effluent limitations, sampling frequencies and reporting requirements.

Monitoring reports required by the special conditions must be submitted on a periodic basis.  The required forms are enclosed.  Please make copies for your use.  Completed forms should be mailed to this office.

This permit is both your Federal NPDES Permit and your new Missouri State Operating Permit and replaces all previous State Operating Permits issued for this facility under this permit number.  In all future correspondence regarding this facility, please refer to your State Operating Permit number and facility name as shown on page one of the permit.

**Please be aware that nothing in this permit relieves the permittee of any other legal obligations or restrictions, such as other federal or state laws, court orders, or county or other local ordinances or restrictions.**

If you were adversely affected by this decision, you may be entitled to an appeal before the administrative hearing commission pursuant to 10 CSR 20-1.020 and Section 621.250, RSMo. To appeal, you must file a petition with the administrative hearing commission within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier.  If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the administrative hearing commission.  Any appeal shall be directed to:  Administrative Hearing Commission, Truman Building, Room 640, 301 W. High Street, P.O. Box 1557, Jefferson City, MO 65102, Phone: 573-751-2422, Fax: 573-751-5018, website: www.oa.mo.gov/ahc.

Recycled Paper

If you have questions concerning this permit please contact Mr. Joshua L. Grosvenor, EI, of my staff by calling 417-891-4300 or via mail at Southwest Regional Office, 2040 W. Woodland, Springfield, MO 65807-5912.

Sincerely,

SOUTHWEST REGIONAL OFFICE

Cynthia S. Davies
Regional Director

CSD/jgk

Enclosures

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STATE OF MISSOURI

# DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

# MISSOURI STATE OPERATING PERMIT

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

| | |
|---|---|
| Permit No. | MO-0136417 |
| Owner: | Mr. Mike Rehme |
| Address: | 14700 White Lane Ct., St. Louis, MO 63017 |
| Continuing Authority: | Same as Above |
| Address: | Same as Above |
| Facility Name: | Rehme at the Lake |
| Facility Address: | Sioux Trails Road, Osage Beach MO 65065 |
| Legal Description: | Lot 2, S½, Sec. 05, T39N, R16W, Camden County |
| UTM (X/Y): | 525540 / 4222397 |
| Receiving Stream: | Lake of the Ozarks (L2) |
| First Classified Stream and ID: | Lake of the Ozarks (L2) (07205) |
| USGS Basin & Sub-watershed No.: | (10290109-0401) |

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

## FACILITY DESCRIPTION

Outfall #001 - Subdivision - SIC #8641

The use or operation of this facility does not require a CERTIFIED OPERATOR.

Septic tanks as part of a Septic Tank Effluent Pump (STEP) system / recirculating Advantex textile filter system / ultraviolet disinfection / sludge disposal by contract hauler.

Design organic population equivalent is 4.96.
Design average daily flow is 496 gallons per day.
Design sludge production is 0.03 dry tons/year.

This permit authorizes only wastewater discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 644.051.6 of the Law.

July 8, 2011
Effective Date

Sara Parker Pauley
Sara Parker Pauley, Director, Department of Natural Resources

July 7, 2016
Expiration Date

Cynthia S. Davies
Cynthia S. Davies, Regional Director, Southwest Regional Office

**A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective upon issuance and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

| OUTFALL NUMBER AND EFFLUENT PARAMETER(S) | UNITS | FINAL EFFLUENT LIMITATIONS | | | MONITORING REQUIREMENTS | |
|---|---|---|---|---|---|---|
| | | DAILY MAXIMUM | WEEKLY AVERAGE | MONTHLY AVERAGE | MEASUREMENT FREQUENCY | SAMPLE TYPE |
| Outfall #001 | | | | | | |
| Flow | MGD | * | | * | once/month** | 24 hr. estimate |
| Biochemical Oxygen Demand$_5$ | mg/L | | 15 | 10 | once/month** | grab |
| Total Suspended Solids | mg/L | | 20 | 15 | once/month** | grab |
| pH – Units | SU | *** | | *** | once/month** | grab |
| *E. coli* **(Note 1)** | #/100 ml | 630 | | 126 | once/month** | grab |
| Ammonia as N | mg/L | 6.0 | | 3.0 | once/month** | grab |

MONITORING REPORTS SHALL BE SUBMITTED **MONTHLY**; THE FIRST REPORT IS DUE **August 28, 2011**. THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

**B. STANDARD CONDITIONS**

IN ADDITION TO SPECIFIED CONDITIONS STATED HEREIN, THIS PERMIT IS SUBJECT TO THE ATTACHED Parts I & III STANDARD CONDITIONS DATED October 1, 1980 and August 15, 1994, AND HEREBY INCORPORATED AS THOUGH FULLY SET FORTH HEREIN.

MO 780-0010 (8/91)

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (continued)

* Monitoring requirement only.

** Reports shall be submitted by the 28th day of the month following the reporting period, e.g. Reporting period is the month of March (samples collected monthly), report due by April 28th.

*** pH is measured in pH units and is not to be averaged. The pH for all facilities except lagoons is limited to the range of 6.5-9.0 pH units.

Note 1 - Final limitations and monitoring requirements for *E. coli* are applicable only during the recreational season from April 1 through October 31. The Monthly Average Limit for *E. coli* is expressed as a geometric mean. Geometric mean for n samples = $[a_1 \times a_2 \times a_3 \ldots . \times a_n]^{1/n}$

C. SPECIAL CONDITIONS

1. This permit may be reopened and modified, or alternatively revoked and reissued, to:

(a) Comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a) (2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:

(1) contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

(2) controls any pollutant not limited in the permit.

(b) Incorporate new or modified effluent limitations or other conditions, if the result of a waste load allocation study, toxicity test or other information indicates changes are necessary to assure compliance with Missouri's Water Quality Standards.

C. SPECIAL CONDITIONS (continued)

(c) Incorporate new or modified effluent limitations or other conditions if, as the result of a watershed analysis, a Total Maximum Daily Load (TMDL) limitation is developed for the receiving waters which are currently included in Missouri's list of waters of the state not fully achieving the state's water quality standards, also called the 303(d) list.

The permit as modified or reissued under this paragraph shall also contain any other requirements of the Clean Water Act then applicable.

2. All outfalls must be clearly marked in the field.

3. Permittee will cease discharge by connection to a facility with an area-wide management plan per 10 CSR 20-6.010(3)(B) within 90 days of notice of its availability.

4. Changes in Discharges of Toxic Substances

The permittee shall notify the Director as soon as it knows or has reason to believe:

(a) That any activity has occurred or will occur which would result in the discharge of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:"

(1) One hundred micrograms per liter (100 µg/L);

(2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,5 dinitrophenol and for 2-methyl-4, 6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;

(3) Five (5) times the maximum concentration value reported for the pollutant in the permit application;

(4) The level established in Part A of the permit by the Director.

(b) That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant, which was not reported in the permit application.

5. Report as no-discharge when a discharge does not occur during the report period.

6. Water Quality Standards

(a) Discharges to waters of the state shall not cause a violation of water quality standards rule under 10 CSR 20-7.031, including both specific and general criteria.

(b) General Criteria. The following general water quality criteria shall be applicable to all waters of the state at all times including mixing zones. No water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:

(1) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses;

(2) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;

(3) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses;

(4) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life;

(5) There shall be no significant human health hazard from incidental contact with the water;

(6) There shall be no acute toxicity to livestock or wildlife watering;

C. SPECIAL CONDITIONS (continued)

(7) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community;

(8) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200-260.247.

**Missouri Department of Natural Resources**
**Statement of Basis**
**Rehme at the Lake**
**MSOP #: MO-0136417**
**Camden County**

A Statement of Basis (Statement) gives pertinent information regarding the applicable regulations and rational for the development of the NPDES Missouri State Operating Permit (operating permit). This Statement includes Wasteload Allocations, Water Quality Based Effluent Limitations, and Reasonable Potential Analysis calculations as well as any other calculations that effect the effluent limitations of this operating permit. This Statement does not pertain to operating permits that include sewage sludge land application plans and variance procedures, and does not include the public comment process for this operating permit.

A Statement is not an enforceable part of an operating permit.

Plans and specifications for this facility have been reviewed under construction permit number CP0000839 by the Department of Natural Resources. The design engineer, a registered Missouri professional engineer, has certified that the plans and specifications meet all requirements of 10 CSR 20-Chapter 8 Waste Treatment Design.

## Part I – Facility Information

Facility Type: NON-POTW
Facility SIC Code(s): 8641

Facility Description: Septic tanks as part of a Septic Tank Effluent Pump (STEP) system / recirculating Advantex textile filter system / ultraviolet disinfection / sludge disposal by contract hauler.

**OUTFALL(S) TABLE:**

| OUTFALL | DESIGN FLOW (CFS) | TREATMENT LEVEL | EFFLUENT TYPE | DISTANCE TO CLASSIFIED SEGMENT (MI) |
|---|---|---|---|---|
| 001 | 0.0008 | Secondary | Domestic New | 0.0 |

Receiving Water Body's Water Quality & Facility Performance History:

This is for new construction.

## Part II – Operator Certification Requirements

As per [10 CSR 20-6.010(8) Terms and Conditions of a Permit], permittees shall operate and maintain facilities to comply with the Missouri Clean Water Law and applicable permit conditions and regulations. Operators or supervisors of operations at regulated wastewater treatment facilities shall be certified in accordance with [10 CSR 20-9.020(2)] and any other applicable state law or regulation. As per [10 CSR 20-9.010(2)(A)], requirements for operation by certified personnel shall apply to all wastewater treatment systems, if applicable, as listed below:

Not Applicable ☒; This facility is not required to have a certified operator.

## Part III – Receiving Stream Information

**APPLICABLE DESIGNATIONS OF WATERS OF THE STATE:**
As per Missouri's Effluent Regulations [10 CSR 20-7.015], the waters of the state are divided into the below listed seven (7) categories. Each category list effluent limitations for specific parameters, which are presented in each outfall's Effluent Limitation Table and further discussed in the Derivation & Discussion of Limits section.

Missouri or Mississippi River [10 CSR 20-7.015(2)]: ☐
Lake or Reservoir [10 CSR 20-7.015(3)]: ☒
Losing [10 CSR 20-7.015(4)]: ☐
Metropolitan No-Discharge [10 CSR 20-7.015(5)]: ☐
Special Stream [10 CSR 20-7.015(6)]: ☐
Subsurface Water [10 CSR 20-7.015(7)]: ☐
All Other Waters [10 CSR 20-7.015(8)]: ☐

10 CSR 20-7.031 Missouri Water Quality Standards, the department defines the Clean Water Commission water quality objectives in terms of "water uses to be maintained and the criteria to protect those uses." The receiving stream and/or 1st classified receiving stream's beneficial water uses to be maintained are located in the Receiving Stream Table located below in accordance with [10 CSR 20-7.031(3)].

**RECEIVING STREAM(S) TABLE:**

| WATERBODY NAME | CLASS | WBID | DESIGNATED USES* | 8-DIGIT HUC | EDU** |
|---|---|---|---|---|---|
| Lake of the Ozarks | L2 | 07205 | LWW, AQL, WBC-A, SCR | 10290109 | Ozark/ Osage |

* - Irrigation (IRR), Livestock & Wildlife Watering (LWW), Protection of Warm Water Aquatic Life and Human Health-Fish Consumption (AQL), Cool Water Fishery(CLF), Cold Water Fishery (CDF), Whole Body Contact Recreation (WBC), Secondary Contact Recreation (SCR), Drinking Water Supply (DWS), Industrial (IND).
** - Ecological Drainage Unit

**RECEIVING STREAM(S) LOW-FLOW VALUES TABLE:**

| RECEIVING STREAM (U, C, P) | LOW-FLOW VALUES (CFS) | | |
|---|---|---|---|
| | 1Q10 | 7Q10 | 30Q10 |
| Lake of the Ozarks | 289 | 423 | 444 |

**MIXING CONSIDERATIONS TABLE:**

| MIXING ZONE (CFS) [10 CSR 20-7.031(4)(A)4.B.(II)(a)] | | |
|---|---|---|
| 1Q10 | 7Q10 | 30Q10 |
| 72.25 | 105.75 | 111 |

Zone of Initial Dilution: Not Allowed [10 CSR 20-7.031(4)(A)4.B.(I)(b)].

## Part IV – Rationale and Derivation of Effluent Limitations & Permit Conditions

**ALTERNATIVE EVALUATIONS FOR NEW FACILITIES:**
As per [10 CSR 20-7.015(4)(A)], discharges to losing streams shall be permitted only after other alternatives including land application, discharges to a gaining stream and connection to a regional wastewater treatment facility have been evaluated and determined to be unacceptable for environmental and/or economic reasons.

Not Applicable ☒;
The facility does not discharge to a Losing Stream as defined by [10 CSR 20-2.010(36)] & [10 CSR 20-7.031(1)(N)], or is an existing facility.

**ANTI-BACKSLIDING:**
A provision in the Federal Regulations [CWA §303(d)(4); CWA §402(c); 40 CFR Part 122.44(I)] that requires a reissued permit to be as stringent as the previous permit with some exceptions.

☒ - New facility.

**AREA-WIDE WASTE TREATMENT MANAGEMENT & CONTINUING AUTHORITY:**
As per [10 CSR 20-6.010(8)(A)10.], when a Continuing Authority under paragraph 10 CSR 20-6.010(3)(B)1. or 2. is expected to be available for connection within the next five (5) years, any operating permit issued to a permittee under this paragraph, located within the service area of the paragraph (3)(B)1. or 2. facility, shall contain the following special condition… This language is contained in Special Condition #3 of this operating permit.

**ANTIDEGRADATION:**
Policies which ensure protection of water quality for a particular water body where the water quality exceeds levels necessary to protect fish and wildlife propagation and recreation on and in the water. This also includes special protection of waters designated as outstanding natural resource waters. Antidegradation requirements are consistent with 40 CFR 131.12 that outlines methods used to assess activities that may impact the integrity of a water and protect existing uses. This policy may compel the state to maintain a level of water quality above those mandated by criteria.

Applicable ☒;

Please see **APPENDIX A – ANTIDEGRADATION ANALYSIS.**

**APPLICABLE PERMIT PARAMETERS:**
Effluent parameters for conventional, non-conventional, and toxic pollutants have been obtained from the technology based effluent limits, water quality based limits, and from appropriate sections of the application.

**Bio-solids, Sludge, & Sewage Sludge:**
Bio-solids are solid materials resulting from wastewater treatment that meet federal and state criteria for beneficial uses (i.e. fertilizer). Sludge is any solid, semi-solid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility or any other such waste having similar characteristics and effect. Sewage sludge is solids, semi-solids, or liquid residue generated during the treatment of domestic sewage in a treatment works; including but not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works. Additional information regarding biosolids and sludge is located at the following web address: http://dnr.mo.gov/env/wpp/pub/index.html, items WQ422 through WQ449.

☒ Not applicable;
This condition is not applicable to the permittee for this facility.

**COMPLIANCE AND ENFORCEMENT:**
Action taken by the department to resolve violations of the Missouri Clean Water Law, its implementing regulations, and/or any terms and condition of an operating permit.

Not Applicable ☒;
The permittee/facility is not under enforcement action and is considered to be in compliance with the Missouri Clean Water Law, its implementing regulations, and/or any terms and condition of an operating permit.

**PRETREATMENT PROGRAM:**
The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a Publicly Owned Treatment Works [40 CFR Part 403.3(q)].

Not Applicable ☒;
At this time, the permittee is not required to implement and enforce a Pretreatment Program.

**REASONABLE POTENTIAL ANALYSIS (RPA):**
Limitations must control all pollutants or pollutant parameters that are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above the Missouri Water Quality Standards.

Not Applicable ☒;
A RPA was not conducted for this facility.

**REMOVAL EFFICIENCY:**
Removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to Biochemical Oxygen Demand 5-day ($BOD_5$) and Total Suspended Solids (TSS) for Publicly Owned Treatment Works (POTWs). Please see the United States Environmental Protection Agency's (EPA) website for interpretation of percent removal requirements for National Pollutant Discharge Elimination System Permit Application Requirements for Publicly Owned Treatment Works and Other Treatment Works Treating Domestic Sewage @ www.epa.gov/fedrgstr/EPA-WATER/1999/August/Day-04/w18866.htm

Not Applicable ☒;
This wastewater treatment facility is not a POTW. Influent monitoring is not being required to determine percent removal.

**SANITARY SEWER OVERFLOWS (SSOS), BYPASSES, INFLOW & INFILTRATION (I&I) – PREVENTION/REDUCTION:**
Sanitary Sewer Systems (SSSs) are municipal wastewater collection system that convey domestic, commercial, and industrial wastewater, and limited amounts of infiltrated groundwater and storm water (i.e. I&I), to a POTW. SSSs are not designed to collect large amounts of storm water runoff from precipitation events.

Untreated or partially treated discharges from SSSs are commonly referred to as SSOs. SSOs have a variety of causes including blockages, line breaks, sewer defects that allow excess storm water and ground water to overload the system, lapses in sewer system operation and maintenance, inadequate sewer design and construction, power failures, and vandalism. A SSOs is defined as an untreated or partially treated sewage release from a SSS. SSOs can occur at any point in an SSS, during dry weather or wet weather. SSOs include overflows that reach waters of the state. SSOs also include overflows out of manholes and onto city streets, sidewalks, and other terrestrial locations. SSSs can back up into buildings, including private residences. When sewage backups are caused by problems in the publicly-owned portion of an SSS, they are considered SSOs.

Not Applicable ☒;
This facility is not required to develop or implement a program for maintenance and repair of the collection system; however, it is a violation of Missouri State Environmental Laws and Regulations to allow untreated wastewater to discharge to waters of the state.

**SCHEDULE OF COMPLIANCE (SOC):**
A schedule of remedial measures included in a permit, including an enforceable sequence of interim requirements (actions, operations, or milestone events) leading to compliance with the Missouri Clean Water Law, its implementing regulations, and/or the terms and conditions of an operating permit.

Not Applicable ☒;
This permit does not contain a SOC.

**STORM WATER POLLUTION PREVENTION PLAN (SWPPP):**
In accordance with 40 CFR 122.44(k) *Best Management Practices (BMPs)* to control or abate the discharge of pollutants when: (1) Authorized under section 304(e) of the Clean Water Act (CWA) for the control of toxic pollutants and hazardous substances from ancillary industrial activities: (2) Authorized under section 402(p) of the CWA for the control of storm water discharges; (3) Numeric effluent limitations are infeasible; or (4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA.

In accordance with the EPA's *Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices* [EPA 832-R-92-006] (Storm Water Management), BMPs are measures or practices used to reduce the amount of pollution entering (regarding this operating permit) waters of the state. BMPs may take the form of a process, activity, or physical structure.

Additionally in accordance with the Storm Water Management, a SWPPP is a series of steps and activities to (1) identify sources of pollution or contamination, and (2) select and carry out actions which prevent or control the pollution of storm water discharges.

Not Applicable ☒;
At this time, the permittee is not required to develop and implement a SWPPP.

**WASTELOAD ALLOCATIONS (WLA) FOR LIMITS:**
As per [10 CSR 20-2.010(78)], the amount of pollutant each discharger is allowed by the department to release into a given stream after the department has determined to total amount of pollutant that may be discharged into that stream without endangering its water quality.

Applicable ☒;
Wasteload allocations were calculated where applicable using water quality criteria or water quality model results and the dilution equation below:

$$C = \frac{(C_s \times Q_s) + (C_e \times Q_e)}{(Q_e + Q_s)}$$ (EPA/505/2-90-001, Section 4.5.5)

Where C = downstream concentration
$C_s$ = upstream concentration
$Q_s$ = upstream flow
$C_e$ = effluent concentration
$Q_e$ = effluent flow

Chronic wasteload allocations were determined using applicable chronic water quality criteria (CCC: criteria continuous concentration) and stream volume of flow at the edge of the mixing zone (MZ). Acute wasteload allocations were determined using applicable water quality criteria (CMC: criteria maximum concentration) and stream volume of flow at the edge of the zone of initial dilution (ZID).

Water quality based maximum daily and average monthly effluent limitations were calculated using methods and procedures outlined in USEPA's "Technical Support Document For Water Quality-based Toxics Control" (EPA/505/2-90-001).

Number of Samples "n":
Additionally, in accordance with the TSD for water quality-based permitting, effluent quality is determined by the underlying distribution of daily values, which is determined by the Long Term Average (LTA) associated with a

particular Wasteload Allocation (WLA) and by the Coefficient of Variation (CV) of the effluent concentrations. Increasing or decreasing the monitoring frequency does not affect this underlying distribution or treatment performance, which should be, at a minimum, be targeted to comply with the values dictated by the WLA. Therefore, it is recommended that the actual planned frequency of monitoring normally be used to determine the value of "n" for calculating the AML. However, in situations where monitoring frequency is once per month or less, a higher value for "n" must be assumed for AML derivation purposes. Thus, the statistical procedure being employed using an assumed number of samples is "n = 4" at a minimum. For Total Ammonia as Nitrogen, "n = 30" is used.

**WLA MODELING:**
Not Applicable ☒;
A WLA study was either not submitted or determined not applicable by department staff.

**WATER QUALITY STANDARDS:**
Per [10 CSR 20-7.031(3)], General Criteria shall be applicable to all waters of the state at all times including mixing zones. Additionally, [40 CFR 122.44(d)(1)] directs the department to establish in each NPDES permit to include conditions to achieve water quality established under Section 303 of the Clean Water Act, including State narrative criteria for water quality.

**WHOLE EFFLUENT TOXICITY (WET) TEST:**
A WET test is a quantifiable method of determining if a discharge from a facility may be causing toxicity to aquatic life by itself, in combination with or through synergistic responses when mixed with receiving stream water.

Not Applicable ☒;
At this time, the permittee is not required to conduct WET test for this facility.

**303(d) LIST & TOTAL MAXIMUM DAILY LOAD (TMDL):**
Section 303(d) of the federal Clean Water Act requires that each state identify waters that are not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock and wildlife. The 303(d) list helps state and federal agencies keep track of waters that are impaired but not addressed by normal water pollution control programs.

A TMDL is a calculation of the maximum amount of a given pollutant that a body of water can absorb before its water quality is affected. If a water body is determined to be impaired as listed on the 303(d) list, then a watershed management plan will be developed that shall include the TMDL calculation

Not Applicable ☒;
This facility does not discharge to a 303(d) listed stream. However, Lake of the Ozarks is listed in the proposed 2010 303(d) list for nutrients: phosphorus and nitrogen.

**Adjusted Design Flow:**
10 CSR 20-6.011(1)(B)1. provides for an Adjusted Design Flow when calculating permit fees on human sewage treatment facilities. If the average flow is sixty percent (60%) or less than the system's design flow, the average flow may be substituted for the design flow when calculating the permit fee on human sewage treatment facilities. If the facility's actual average flow is consistently 60% or less than the permitted design flow, the facility may qualify for a reduction in your fee when:

- The facility has a valid permit, or has applied for re-issuance, is in compliance with the terms, conditions and effluent limitations of the permit, and the facility has a good compliance history; and

- Flow is not expected to exceed 60% of design flow for the remaining term of the existing operating permit.

Not Applicable ☒;
At this time, the permittee has not requested an Adjusted Design Flow modification.

***Outfall #001 –*** Main Facility Outfall
**EFFLUENT LIMITATIONS TABLE:**

| PARAMETER | UNIT | BASIS FOR LIMITS | DAILY MAXIMUM | WEEKLY AVERAGE | MONTHLY AVERAGE | MODIFIED | PREVIOUS PERMIT LIMITATIONS |
|---|---|---|---|---|---|---|---|
| FLOW | MGD | 1 | * | -- | * | N/A | N/A |
| $BOD_5$ | MG/L | 6 | -- | 15 | 10 | N/A | N/A |
| TSS | MG/L | 6 | -- | 20 | 15 | N/A | N/A |
| PH (S.U.) | SU | 1 | 6.5-9.0 | -- | 6.5-9.0 | N/A | N/A |
| AMMONIA AS N | MG/L | 6 | 6.0 | -- | 3.0 | N/A | N/A |
| *ESCHERICHIA COLI* | *** | 1 | 630 | -- | 126 | N/A | N/A |
| MONITORING FREQUENCY | Please see Minimum Sampling and Reporting Frequency Requirements in the Derivation and Discussion Section below. | | | | | | |

*** - Monitoring requirement only**
*** - # of colonies/100mL; the Monthly Average for Fecal Coliform and *e.coli* is a geometric mean.
**** - Parameter not previously established in previous state operating permit.
N/A – Not applicable
S – Same as previous operating permit

Basis for Limitations Codes:
1. State or Federal Regulation/Law
2. Water Quality Standard (includes RPA)
3. Water Quality Based Effluent Limits
4. Lagoon Policy
5. Ammonia Policy
6. Antidegradation Policy
7. Water Quality Model
8. Best Professional Judgment
9. TMDL or Permit in lieu of TMDL
10. WET test Policy
11. Dissolved Oxygen Policy

**OUTFALL #001 – DERIVATION AND DISCUSSION OF LIMITS:**

**Flow**. Please see **APPENDIX A – ANTIDEGRADATION ANALYSIS.**

**Biochemical Oxygen Demand ($BOD_5$)**. Please see **APPENDIX A – ANTIDEGRADATION ANALYSIS.**

**Total Suspended Solids (TSS)**. Please see **APPENDIX A – ANTIDEGRADATION ANALYSIS.**

**pH**. Please see **APPENDIX A – ANTIDEGRADATION ANALYSIS.**

**Temperature.** Temperature has been removed because it is no longer pertinent in determining ammonia limitations.

**Total Ammonia Nitrogen**. Please see **APPENDIX A – ANTIDEGRADATION ANALYSIS.**

***Escherichia coli (E. coli)***. Monthly average of 126 per 100 ml as a geometric mean and Daily Maximum of 630 during the recreational season (April 1 – October 31), to protect Whole Body Contact Recreation (A) designated use of the receiving stream, as per 10 CSR 20-7.031(4)(C). Daily Maximum effluent variability will be evaluated in development of a future effluent limit. An effluent limit for both monthly average and daily maximum is required by 40 CFR 122.45(d).

**Total Phosphorus**. Monitoring removed due to implementation procedure development.

**Total Nitrogen**. Monitoring removed due to implementation procedure development.

**Minimum Sampling and Reporting Frequency Requirements**.

| PARAMETER | SAMPLING FREQUENCY | REPORTING FREQUENCY |
|---|---|---|
| FLOW | MONTHLY | MONTHLY |
| $BOD_5$ | MONTHLY | MONTHLY |
| TSS | MONTHLY | MONTHLY |
| PH | MONTHLY | MONTHLY |
| AMMONIA AS N | MONTHLY | MONTHLY |
| ***Escherichia coli (E. coli)*** | MONTHLY | MONTHLY |

**Sampling Frequency Justification**:

This facility is a new facility monthly sampling is required to determine if the facility will be in compliance with the operating permit in accordance with Appendix U of Missouri's Water Pollution Control Permit Manual.

**Sampling Type Justification**:

Sand / textile filters are not defined in the regulations; they are not technically mechanical plants and based on the small flow grab samples are appropriate.

**Administrative Requirements**

On the basis of preliminary staff review and the application of applicable standards and regulations, the Department, as administrative agent for the Missouri Clean Water Commission, proposes to issue a permit(s) subject to certain effluent limitations, schedules, and special conditions contained herein and within the operating permit. The proposed determinations are tentative pending public comment.

**Date of Factsheet**: September 15, 2010 (Revised June 30, 2011)

Mr. Joshua L. Grosvenor, EI
WP Engineering Unit
(417) 891-4300
josh.grosvenor@dnr.mo.gov

**APPENDIX A – ANTIDEGRADATION ANALYSIS: THIS PAGE IS INTENTIONALLY BLANK. SEE NEXT PAGE**

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SWRO

STATE OF MISSOURI

Jeremiah W. (Jay) Nixon, Governor • Mark N. Templeton, Director

# DEPARTMENT OF NATURAL RESOURCES

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Mr. Mike Rehme
14700 White Lane Court
St. Louis, MO 63017

RE: Water Quality and Antidegradation Review Preliminary Determination for Rehme on the Lake WWTF, Camden Co.

Dear Mr. Rehme:

In accordance with the *Missouri Antidegradation Rule and Implementation Procedure (AIP)*, your proposed discharge is subject to an Antidegradation Review. The enclosed *Water Quality and Antidegradation Review (WQAR)* summarizes this preliminary determination based upon your Antidegradation Report submitted by Lake Professional Engineering.

The WQAR contains pertinent antidegradation review information based on the use of existing water quality, effluent limitations and monitoring requirements for the facility discharge. It was developed in accordance with 10 CSR 20-7.031, the Clean Water Commission approved *Missouri Antidegradation Rule and Implementation Procedure* (AIP) dated May 7, 2008, U.S. Environmental Protection Agency (US EPA) guidance, the applicant-supplied antidegradation review documentation, and the State of Missouri's effluent regulations (10 CSR 20-7.015). Please refer to the *General Assumptions of the Water Quality and Antidegradation Review* section of the enclosed WQAR. The WQAR is preliminary and subject to change as new information becomes available during future permit application processing.

Based on the Missouri Department of Natural Resources (Department) initial review, preliminary determination is that the applicant-supplied antidegradation review documentation satisfies the requirements of the AIP. This WQAR/preliminary determination may be appealed within 30 days of this letter in accordance with the AIP Section II.F.4.

You may proceed with submittal of an application for an operating permit and antidegradation review public notice, an engineering report, or a complete application for a construction permit to Southwest Regional Office (SWRO). These submittals must reflect the design flow, facility description, and general treatment components of this WQAR or this preliminary determination may have to be revisited. The Advantex system is not covered in 10 CSR20-8, Design Guides and as such your engineer will need to work with the review engineer to ensure the treatment plant is sized correctly.

Camden/WPC
Rehme on the Lake
New Facility

Recycled Paper

Following the Department's public notice of draft Missouri State Operating Permit, including the antidegradation review findings and preliminary determination, the Department will review any public notice comments received. If significant comments are made, the project may require another public notice and potentially another antidegradation review. If no comments are received or comments are resolved without another public notice, these findings and determinations will be considered final. Following issuance of the construction permit and completion of the actual facility construction, the Department will proceed with the issuance of the operating permit.

If you should have questions, please feel free to contact Leasue Meyers by telephone at (573) 751-7906, by e-mail at leasue.meyers@dnr.mo.gov, or by mail at the Missouri Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102-0176.

Sincerely,

WATER PROTECTION PROGRAM

Refaat Mefrakis, P.E., Chief
NPDES Permits & Engineering Section

Enclosures

RK:lmn

c: Mr. Jim Jackson Jr. , Lake Professional Engineering Services, PO Box 27, Camdenton, MO, 65020
Ms. Kristen Pattinson, SWRO
File Copy

**Missouri Department of Natural Resources**
**Water Protection Program**
**Water Pollution Control Branch**
**NPDES Permits and Engineering Section**

# Water Quality and Antidegradation Review

*For the Protection of Water Quality and Determination of Effluent Limits for Discharge to Wood Hollow Cove of the Lake of the Ozarks*

***by***

## *Rehme on the Lake Wastewater Treatment Facility*

May 24, 2010

# Table of Contents

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## 1. FACILITY INFORMATION

FACILITY NAME: Rehme on the Lake WWTF NPDES #: NE W FACILITY

FACILITY TYPE/DESCRIPTION: The applicant is proposing to build a new treatment plant to replace a failing onsite sytem. The treatment plant will serve the current house and a second planned house. The design flow of the treatment plant is 555 gallons per day (0.000555 MGD). The applicant proposes to use an Orenco Advantex fabric filter system with ultraviolet (UV) disinfection. The plant would be direct discharge to the Lake of the Ozarks.

EDU*: Ozark / Osage ECOREGION: Ozark/Highlands 8- DIGIT HUC: 10290109 COUNTY: Camden
* - Ecological Drainage Unit

LEGAL DESCRIPTION: E ½, SW ¼, Section 05, T39N, R16W LATITUDE/LONGITUDE: +3808549/-9242307

UTM COORDINATES: x=525256; y= 4220922

## 2. WATER QUALITY INFORMATION

In accordance with Missouri's Water Quality Standard [10 CSR 20-7.031(2)] and federal antidegradation policy at Title 40 Code of Federal Regulation (CFR) Section 131.12 (a), the Missouri Department of Natural Resources (MDNR) developed a statewide antidegradation policy and corresponding procedures to implement the policy. A proposed discharge to a water body will be required to undergo a level of Antidegradation Review which documents that the use of a water body's available assimilative capacity is justified. Effective August 30, 2008, a facility is required to use *Missouri's Antidegradation Rule and Implementation Procedure (AIP)* for new and expanded wastewater discharges.

### 2.1. WATER QUALITY HISTORY:

No history for this facility. The Lake of the Ozarks (Lake) is not on the current EPA approved 2008 303(d) list; however Lake of the Ozarks is on the proposed 2010 303(d) list for nutrients: phosphorus and nitrogen. The impairment is believed to come from rural nonpoint sources and urban/development point sources.

| OUTFALL | DESIGN FLOW (CFS) | TREATMENT LEVEL | RECEIVING WATERBODY | DISTANCE TO CLASSIFIED SEGMENT (MI) |
|---|---|---|---|---|
| 001 | .00086 | Secondary | Lake of the Ozarks | 0.0 |

## 3. RECEIVING WATERBODY INFORMATION

| WATERBODY NAME | CLASS | WBID | LOW-FLOW VALUES (CFS) | | | DESIGNATED USES** |
|---|---|---|---|---|---|---|
| | | | 1Q10 | 7Q10 | 30Q10 | |
| Lake of the Ozarks | L2 | 7205 | - | - | - | AQL, LWW, SCR, WBC(A) |

** Irrigation (IRR). Livestock & Wildlife Watering (LWW). Protection of Warm Water Aquatic Life and Human Health-Fish Consumption (AQL). Cool Water Fishery (CLF). Cold Water Fishery (CDF). Whole Body Contact Recreation (WBC). Secondary Contact Recreation (SCR). Drinking Water Supply (DWS). Industrial (IND)

RECEIVING WATER BODY SEGMENT #1: Woods Hollow Cove to Lake of the Ozarks
Upper end segment* UTM or Lat/Long coordinates: +3808549/-9242307 (Outfall)
Lower end segment* UTM or Lat/Long coordinates: +3809026/-09242346 (Cove and Lake confluence)
*Segment is the portion of the stream where discharge occurs. Segment is used to track changes in assimilative capacity and is bound at a minimum by existing sources and confluences with other significant water bodies.

## 4. General Comments

Lake Professional Engineering prepared, on behalf of Mike Rehme, the Antidegradation Report for Rehme on the Lake Wastewater Treatment Facility dated January 22, 2010 and revised April 22, 2010. A Geohydrological Evaluation was submitted with the request and the results of that evaluation concluded that the Lake acts as a gaining segment (Appendix C). Please see 10 CSR 20-7.015(3) and 10 CSR 20-7.031 Table A and B for applicable water quality standards and effluent regulations for lakes. Applicant elected to assume that all pollutants of concern (POC) are significantly degrading the receiving stream in the absence of existing water quality. An alternative analysis was conducted to fulfill the requirements of the AIP. Information that was provided by the applicant in the submitted report and summary forms in Appendix E was used to develop this review document. A Missouri Department of Conservation Natural Heritage Review was obtained by the applicant; and no endangered species were found to be impacted by the discharge (Appendix D). Orenco Advantex fabric filter system performance data is included in Appendix F. The selected technology is not covered in 10 CSR 20-8, Design Guides; the department's review engineer will review to ensure the treatment system is sized appropriately. As this treatment technology is not listed in the Design Guides, the permit writer may increase monitoring frequency to ensure effluent limits are met.

## 5. Antidegradation Review Information

The following is a review of the *Antidegradation* dated January 2010 and revised April 2010.

### 5.1. Tier Determination

Below is a list of pollutants of concern reasonably expected to be in the discharge (see Appendix D: Tier Determination and Effluent Limit Summary). Pollutants of concern are defined as those pollutants "proposed for discharge that affects beneficial use(s) in waters of the state. POCs include pollutants that create conditions unfavorable to beneficial uses in the water body receiving the discharge or proposed to receive the discharge." (AIP, Page 7). Tier 2 was assumed for all POCs (see Appendix D).

Table 1. Pollutants of Concern and Tier Determination

| Pollutants of Concern | Tier* | Degradation | Comment |
|---|---|---|---|
| $BOD_5$/DO | 2 | Significant | |
| Total Suspended Solids (TSS) | ** | Significant | |
| Ammonia | 2 | Significant | |
| pH | *** | N/A | Permit limits applied |
| Escherichia coli (E. coli) | 2 | Significant | |
| Total Nitrogen | 1 | | proposed 303(d) list |
| Total Phosphorus | 1 | | proposed 303(d) list |

* Tier assumed.
** No in-stream standards for these parameters.
*** Standards for these parameters are ranges

The following Antidegradation Review Summary attachments in Appendix C were used by the applicant:

☒ Tier Determination and Effluent Summary
☒ Attachment A, Tier 2 with significant degradation.

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## 5.2. Existing Water Quality

No existing water quality data was submitted. Biochemical Oxygen Demand, Ammonia, Total Suspended Solids and E. Coli were considered to be Tier 2. Total Nitrogen and Total Phosphorus were considered to be Tier 1, as Lake of the Ozarks is on the proposed 2010 303(d) list for nutrients.

## 5.3. Demonstration of Necessity and Social and Economic Importance

Missouri's antidegradation implementation procedures specify that if the proposed activity does result in significant degradation then an alternatives analysis and evaluation of social and economic importance are required. A total of thirteen (13) alternatives were considered in the report submitted by Lake Professional Engineering. Of these thirteen (13) alternatives; six (6) are non-degrading alternatives, and seven (7) are less degrading to degrading. For the full list of treatments, their level of degradation, and their economic considerations please see Table 3 below.

The six (6) non-degrading alternatives considered in the Antidegradation Report were: land application, subsurface irrigation, recycling or reuse, discharge to a regional collection system, individual holding tanks, and on-site septic systems. Of the six (6) alternatives, all six were considered impracticable.

Land application was determined impracticable due to the type, slope and available land area. Subsurface irrigation had similar limitations that land application had, and those limitations were the reasoning for considering the treatment type impracticable. Recycling and reuse was considered impracticable due to the fact that the amount of effluent generated will be much greater than the amount of water needed to support the remaining vegetation. Also the treatment type has a high probability of contact with humans, which would not be ideal. Connection to an existing wastewater treatment system was also considered impracticable due to the 1.4 mile distance to the closest sewer line. That makes the option cost prohibitive, which does not consider the required easements and lift station construction that would be needed as well. Individual holding tanks was an interesting alternative, and could be considered practicable, if sized properly, if the homes were seasonal. However, with the homes being year round residences, a properly sized holding tank would either be too large, or would have to be pumped multiple times per week. Therefore the holding tanks treatment alternative is impracticable. Finally, the on-site septic system was deemed impracticable due to the fact that a properly sized leach field would require a plot size which is unavailable. Groundwater contamination and setback areas would also be issues of concern for the alternative. No cost evaluation was conducted for the non-degrading alternatives because all of the alternatives were determined to be impracticable.

Table 2. Non-Degrading Alternatives

| Alternatives | Alternative type | Practicable | Present Worth Cost | Cost / 1000 gal | Economic Efficiency | Affordable |
|---|---|---|---|---|---|---|
| land application | non-degrading | N | N/A | | | |
| subsurface irrigation | non-degrading | N | N/A | | | |
| recycling and reuse | non-degrading | N | N/A | | | |
| regionalization | non-degrading | N | N/A | | | |
| holding tanks | non-degrading | N | N/A | | | |
| on-site septic | non-degrading | N | N/A | | | |

The seven (7) less degrading to degrading alternatives considered by Lake Professional Engineering were: recirculating sand filter, Orenco Advantex recirculating fabric filter, Zabel SCAT recirculation fabric filter, extended aeration plant, Delta EcoPOD, Bio-Microbics FAST system, and a lagoon. All of the less degrading to degrading treatments are considered practicable except a lagoon.

A recirculating sand filter is practicable and is considered a less-degrading alternative. This alternative is within 120% of the base case cost and would be considered economically efficient. The main drawback of this facility is the space required to construct and the operational needs of this type of treatment. The Orenco Advantex recirculating fabric filter was determined to be a practicable less-degrading alternative. Lake Professional Engineer found the Orenco Advantex filter to be a new technology but with enough data to show it more than capable of meeting lake limits. This is the preferred treatment technology as determined by the applicant, although it is not considered economically efficient. Another advantage of the Orenco Advantex system is its ability to fit in the available area. The Zabel SCAT filter is also a practicable less-degrading alternative. It has similar treatment capabilities as the Orenco filter and recirculating sand filter, but is not considered economically efficient. The extended aeration plant is practicable but is a degrading alternative that can only meet base case limits for the Lake. This alternative is economically efficient. The Delta EcoPOD is practicable and is the base case treatment due to being the lowest cost alternative that meets Water Quality Standards and effluent regulations for lakes. A Bio-Microbics FAST system is a practicable treatment option that is considered degrading. The amount of land required and the setback required for a lagoon are larger than the land available and the lagoon treatment itself would rarely if even meet the 20 / 30 $BOD_5$ and TSS limits. Therefore a lagoon was determined to be a not practicable treatment option and cost was not considered.

Table 3. All alternatives

| Alternatives | Alternative type | Practicable | Present Worth Cost | Cost / 1000 gal | Economically Efficient | Affordable |
|---|---|---|---|---|---|---|
| land application | non-degrading | N | N/A | | | |
| subsurface irrigation | non-degrading | N | N/A | | | |
| recycling and reuse | non-degrading | N | N/A | | | |
| regionalization | non-degrading | N | N/A | | | |
| holding tanks | non-degrading | N | N/A | | | |
| on-site septic | non-degrading | N | N/A | | | |
| recirculating sand filter | less degrading | Y | $43,608.00 | $10.76 | Y | |
| **Orenco Advantex filter** | **less degrading** | **Y** | **$56,010.00** | **$13.82** | **N** | |
| Zabel SCAT filet | less degrading | Y | $51,309.00 | $12.66 | N | |
| Extended Aeration plant | degrading | Y | $50,010.00 | $12.34 | Y | |
| Delta EcoPOD | base case alternative | Y | $41,809.00 | $10.31 | N/A | |
| Bio-Microbics FAST system | degrading | Y | $43,309.00 | $10.68 | Y | |
| Lagoon | degrading | N | N/A | | | |

### 5.3.1. REGIONALIZATION ALTERATIVE

Within Section II B 1. of the AIP, discussion of the potential for discharge to a regional waste water collection system is mentioned. The applicant provided discussion of this alternative under the non-degrading section of their Antidegradation Report. There is no regional authority in the area so a waiver required under 10 CSR 20-6.010(3) (B) 1 Continuing Authorities can not be obtained.

NEEDS A WAIVER TO PREVENT CONFLICT WITH AREA WIDE MANAGEMENT PLAN APPROVED UNDER SECTION 208 OF THE CLEAN WATER ACT AND/OR UNDER 10 CSR 20-6.010(3) (B) 1 OR 2 CONTINUING AUTHORITIES? (Y OR N) N

The applicant first identified the community that will be affected by the proposed degradation of water quality. The affected community is Camden County, Camdenton R3 schools, and other local public services that rely on tax funding. The loss in tax revenue if the current home is condemned and the vacant lot is not built on will be approximately $5,000 per year. This funding is needed in the area, especially now, due to the current cuts in tax receipts. This project will also provide construction jobs to the area to build the facility and the new home planned for the vacant lot as well. Finally the removal of a failed on-

site septic system will help improve the water quality of Woods Hollow Cove and the Lake of the Ozarks overall.

## 6. General Assumptions of the Water Quality and Antidegradation Review

1. A Water Quality and Antidegradation Review (WQAR) assumes that [10 CSR 20-6.010(3) Continuing Authorities and 10 CSR 20-6.010(4) (D), consideration for no discharge] has been or will be addressed in a Missouri State Operating Permit or Construction Permit Application.
2. A WQAR does not indicate approval or disapproval of alternative analysis as per [10 CSR 20-7.015(4) Losing Streams], and/or any section of the effluent regulations.
3. Changes to Federal and State Regulations made after the drafting of this WQAR may alter Water Quality Based Effluent Limits (WQBEL).
4. Effluent limitations derived from Federal or Missouri State Regulations (FSR) may be WQBEL or Effluent Limit Guidelines (ELG).
5. WQBEL supersede ELG only when they are more stringent. Mass limits derived from technology based limits are still appropriate.
6. A WQAR does not allow discharges to waters of the state, and shall not be construed as a National Pollution Discharge Elimination System or Missouri State Operating Permit to discharge or a permit to construct, modify, or upgrade.
7. Limitations and other requirements in a WQAR may change as Water Quality Standards, Methodology, and Implementation procedures change.
8. Nothing in this WQAR removes any obligations to comply with county or other local ordinances or restrictions.
9. As the selected technology is not designated in 10 CSR 20-8, Design Guides, the department's review engineer will review to ensure the treatment system is sized appropriately. As this treatment technology is non-standard, the permit writer may increase monitoring frequency to ensure effluent limits are met.

## 7. Mixing Considerations

**Triangular Prism Method**

**Mixing Zone (MZ) Parameters:** According to the USGS 1:24,00OK Quadrangle, the mainstem lake width near the facility outfall location is approximately 640 feet (ft). One quarter of this width equals 160 ft. Therefore, MZ Width =100 feet [l0 CSR 20-7.031 (4)(A) 4.B.(IV)(a)]. (Appendix B)

**Mixing Zone (MZ):** The flow volume approximates a triangular prism because of the slope of the lake bottom, where the formula is Volume = L*W*(D*0.5). Assuming that the width will be either side of the discharge (MZ) length (100 feet) to form the plume effect, the box dimensions are length (L) = 100 ft, width (W) = 100 ft, and depth (D) = 20 ft. Depth was obtained using mixing zone length projected 100 ft from shoreline to the intersecting contour on 7.5' USGS topographic map. Volume = L*W*(D*(0.5)) = **(100)*(100)*(20*0.5)**= 100,000 $ft^3$. The flow volume of 100,000$ft^3$ is assumed as the daily mixing zone. Therefore (100,000 $ft^3$/day)*(1 day/86,400 sec) = 1.16 $ft^3$/sec.

**Zone of Initial Dilution (ZID):** Not Allowed [10 CSR 20-7.031(4)(A)5.B.(IV)(b).]

## 8. Permit Limits and Monitoring Information

| Wasteload Allocation Study Conducted (Y or N): | N | Use Attainability Analysis Conducted (Y or N): | N | Whole Body Contact Use Retained (Y or N): | Y |
|---|---|---|---|---|---|

**OUTFALL #001**

| Wet Test (Y or N): | N | Frequency: | N/A | AEC: | N/A | Method: | N/A |
|---|---|---|---|---|---|---|---|

TABLE 4. EFFLUENT LIMITS

| PARAMETER | UNITS | DAILY MAXIMUM | WEEKLY AVERAGE | MONTHLY AVERAGE | BASIS FOR LIMIT (NOTE 2) | MONITORING FREQUENCY |
|---|---|---|---|---|---|---|
| FLOW | GPD | * | | * | FSR | ONCE/MONTH |
| $BOD_5$ | MG/L | | 15 | 10 | PEL | ONCE/MONTH |
| TSS | MG/L | | 20 | 15 | PEL | ONCE/MONTH |
| PH | SU | 6.5 – 9.0 | | 6.5 – 9.0 | FSR | ONCE/MONTH |
| TEMPERATURE | C | * | | * | FSR | ONCE/MONTH |
| AMMONIA AS N | MG/L | 6.0 | | 3.0 | PEL | ONCE/MONTH |
| TOTAL NITROGEN | MG/L | * | | * | FSR | ONCE/MONTH |
| TOTAL PHOSPHORUS | MG/L | * | | * | FSR | ONCE/MONTH |
| ESCHERICHIA COLIFORM (E. COLI) | Note 1 | | | 126 | FSR | ONCE/WEEK |
| FECAL COLIFORM | Note 1 | 1000 | | 400 | FSR | ONCE/MONTH |

* Monitoring requirements only.

** The Monthly Average for Fecal Coliform or E. coli shall be reported as a Geometric Mean.

NOTE 1 COLONIES/100 ML

NOTE 2 WATER QUALITY-BASED EFFLUENT LIMITATION --WQBEL; OR MINIMALLY DEGRADING EFFLUENT LIMIT--MDEL; OR PREFERRED ALTERNATIVE EFFLUENT LIMIT-PEL; TECHNOLOGY-BASED EFFLUENT LIMIT-TBEL;OR NO DEGRADATION EFFLUENT LIMIT--NDEL; OR FSR --FEDERAL/STATE REGULATION; OR N/A--NOT APPLICABLE. ALSO, PLEASE SEE THE **GENERAL ASSUMPTIONS OF THE WQAR #4 & #5.**

## 9. RECEIVING WATER MONITORING REQUIREMENTS

No receiving water monitoring requirements recommended at this time.

## 10. DERIVATION AND DISCUSSION OF LIMITS

Wasteload allocations and limits were calculated using two methods:

1) Water quality-based – Using water quality criteria or water quality model results and the dilution equation below:

$$C = \frac{(C_s \times Q_s) + (C_e \times Q_e)}{(Q_e + Q_s)}$$ (EPA/505/2-90-001, Section 4.5.5)

Where C = downstream concentration
$C_s$ = upstream concentration
$Q_s$ = upstream flow
$C_e$ = effluent concentration
$Q_e$ = effluent flow

Chronic wasteload allocations were determined using applicable chronic water quality criteria (CCC: criteria continuous concentration) and applicable lake mixing zone volumes calculated using the prism method. Acute wasteload allocations were determined using applicable water quality criteria only due to the fact that a zone of initial dilution is not allowed for lakes.

Water quality-based maximum daily and average monthly effluent limitations were calculated using methods and procedures outlined in USEPA's "Technical Support Document For Water Quality-based Toxics Control" (EPA/505/2-90-001).

2) Alternative Analysis-based – Using the preferred alternative's treatment capacity for conventional pollutants such as $BOD_5$ and TSS that are provided by the consultant as the WLA, the significantly-

degrading effluent average monthly and average weekly limits are determined by applying the WLA as the average monthly (AML) and multiplying the AML by 1.5 to derive the average weekly limit (AWL). For toxic and nonconventional pollutant such as ammonia, the significantly-degrading effluent average monthly and daily maximum limits are determined by applying the WLA multiplied by 1.19 as the average monthly (AML), and multiplying the AML by 3.11 to derive the maximum daily limit. This is an accepted procedure that is defined in USEPA's "Technical Support Document For Water Quality-based Toxics Control" (EPA/505/2-90-001).

Note: Significantly-degrading effluent limits have been based on the authority included in Section III. Permit Consideration of the AIP. Also under 40 CFR 133.105, permitting authorities shall require more stringent limitations than equivalent to secondary treatment limitations for 1) existing facilities if the permitting authority determines that the 30-day average and 7-day average $BOD_5$ and SS effluent values that could be achievable through proper operation and maintenance of the treatment works, and 2) new facilities if the permitting authority determines that the 30-day average and 7-day average $BOD_5$ and SS effluent values that could be achievable through proper operation and maintenance of the treatment works, considering the design capability of the treatment process.

**10.1.** OUTFALL #001 – **MAIN FACILITY OUTFALL**

- **Flow**. In accordance with [40 CFR Part 122.44(i)(1)(ii)] the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the department, which may require the submittal of an operating permit modification.

- **Biochemical Oxygen Demand ($BOD_5$).** The applicant proposed preferred alternative effluent limits of 10 mg/L monthly average and 15 mg/L average weekly limits for $BOD_5$ was proposed in the Antidegradation Report. The proposed limits are more stringent than lakes effluent limits of 20 mg/L monthly average and 30 mg/L weekly average found in 10 CSR 20-7.015(3)(B).

  Per the Biochemical Oxygen Demand and Dissolved Oxygen Policy, dated December 31, 2009, the BOD effluent limits are protective of water quality and dissolved oxygen modeling and effluent limits are not required at this time.

- **Total Suspended Solids (TSS).** The applicant proposed preferred alternative effluent limits of 15 mg/L monthly average and 20 mg/L average weekly limit for TSS were proposed in the Antidegradation Report. The proposed limits aare more stringent than lakes effluent limits of 20 mg/L monthly average and 30 mg/L weekly average found in 10 CSR 20-7.015(3)(B).

- **pH.** pH shall be maintained in the range from six to nine (6.5 – 9.0) standard units [10 CSR 20-7.031(4)(E)].

- **Temperature.** Monitoring requirement only as ammonia toxicity varies by temperature.

- **Total Ammonia Nitrogen.** Applicant supplied an alternative analysis-based technology limit of 3.0 mg/L monthly average and 6.0 mg/L for daily maximum for preferred alternative treatment (see Appendix E) as year-round effluent limits. The applicant calculated the water quality based effluents, which were limited by the acute limits. The proposed average monthly limit of 3.0 mg/L is less than the WQBEL of 4.6 mg/L and the daily maximum of 6.0 mg/L is more stringent than the 12.1 mg/L of the WQBEL.

- **Total Nitrogen.** Monitoring requirement only as the proposed facility has small flows and though it is difficult to quantify, it is the best professional judgment that there will be no net increase in total nitrogen concentration. The proposed facility discharges to Lake of the Ozarks, which is on the proposed 303(d) list for nutrients. The department has adopted nutrient criteria for discharges to lakes and reservoirs in 10 CSR 20-7.031(4)(N)(3)(B), however has not developed an approved implementation procedure for total nitrogen. Wasteload allocation and effluent limits will be established upon issuance of the total maximum daily load (TMDL) for Lake of the Ozarks. Appendix F provides the data sheets on Orenco Advantex performance for nutrients.

- **Total Phosphorus.** Monitoring requirement only as the proposed facility has small flows and though it is difficult to quantify, it is the best professional judgment that there will be no net increase in total phosphorus concentration. The proposed facility discharges to Lake of the Ozarks, which is on the proposed 303(d) list for nutrients. The department has adopted nutrient criteria for discharges to lakes and reservoirs in 10 CSR 20-7.031(4)(N)(3)(B), however has not developed an approved implementation procedure for total phosphorus. Wasteload allocation and effluent limits will be established upon issuance of the total maximum daily load (TMDL) for Lake of the Ozarks. Appendix F provides the data sheets on Orenco Advantex performance for nutrients.

- **Fecal Coliform**. Discharge shall not contain more than a monthly geometric mean of 400 colonies/ 100 mL and a daily maximum of 1000 colonies/100 mL during the recreational season (April 1 – October 31) [10 CSR 20-7.015(3)(B)3]. Future renewals of the facility operating permit will contain effluent limitations for E. coli that will replace fecal coliform as the applicable bacteria criteria in Missouri's water quality standards when Missouri adopts the implementation of the E. coli standards. Also, please see **GENERAL ASSUMPTIONS OF THE WQAR #7.**

- **E. coli**. Discharge shall not contain more than a monthly geometric mean of 126 colonies/ 100 mL during the recreational season (April 1 – October 31). This facility will be required to have E. coli effluent limitations when Missouri adopts the implementation of the E. coli effluent regulations. The department may establish a weekly average or daily maximum to help ensure the monthly average is met. In the proposed rule, weekly monitoring is required during the recreational season. Also, please see **GENERAL ASSUMPTIONS OF THE WQRS #7.**

## 11. ANTIDEGRADATION REVIEW PRELIMINARY DETERMINATION

The proposed new facility discharge, Rehme on the Lake, 555 gpd will result in significant degradation of the Wood Hollow Cove of Lake of the Ozarks. The Delta ECOPOD was determined to be the base case technology (lowest cost alternative that meets technology and water quality based effluent limitations. The cost effectiveness of the other technologies were evaluated, and the Orenco Advantex fabric filter system was determined to be the preferred alternative, as there was information available on meeting effluent limits.

Per the requirements of the AIP, the effluent limits in this review were developed to be protective of beneficial uses and to attain the highest statutory and regulatory requirements. MDNR has determined that the submitted review is sufficient and meets the requirements of the AIP. No further analysis is needed for this discharge.

Reviewer: Leasue Meyers
Date: 05/24/2010
Unit Chief: John Rustige, P.E.

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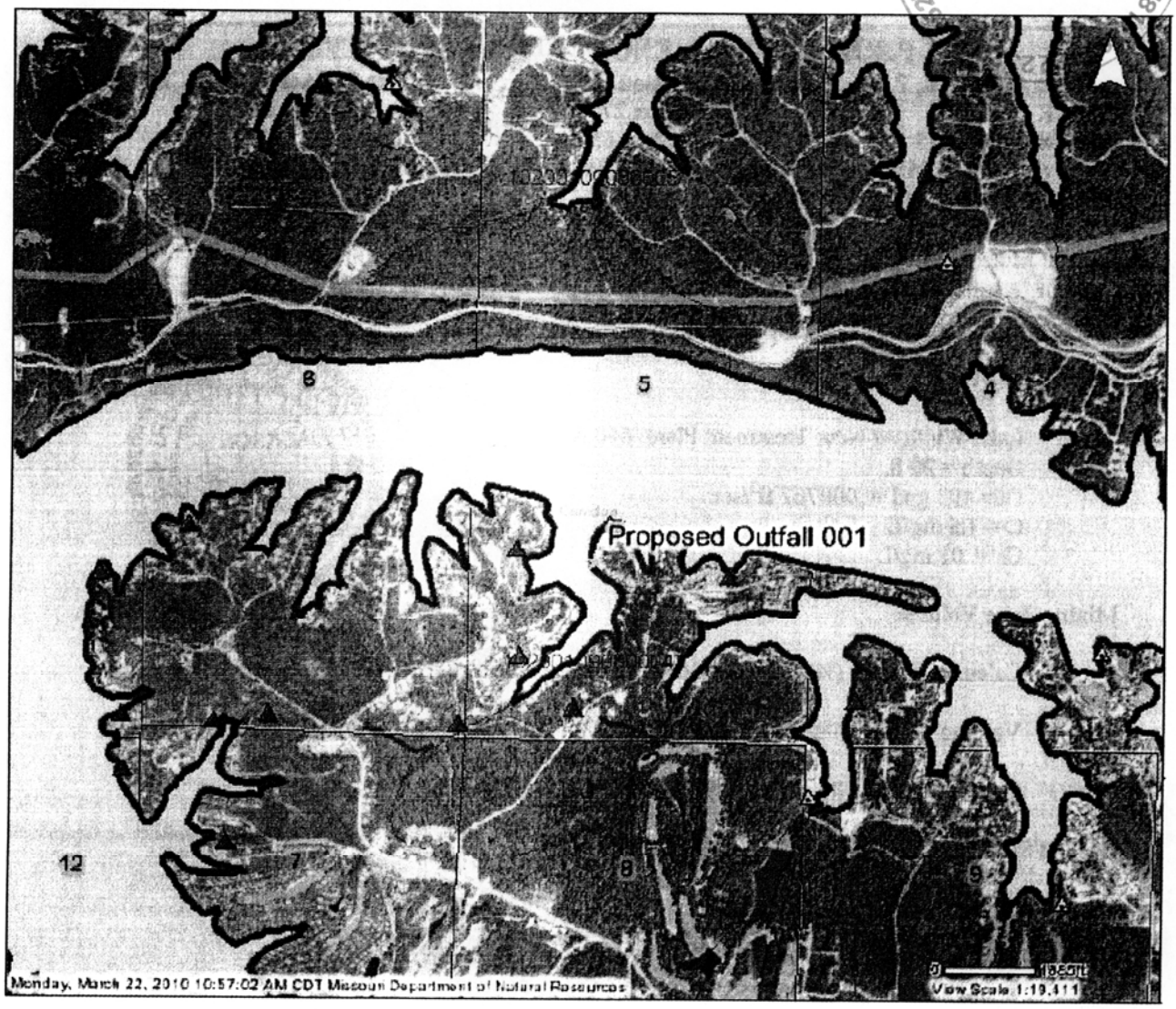
Appendix A: Map of discharge location

# Rehme on the Lake WWTF




1 to 19,411
Section 05 T38N R16W Camden County
+3808549/-09242307
New Facility

Appendix B: Ammonia Calculations

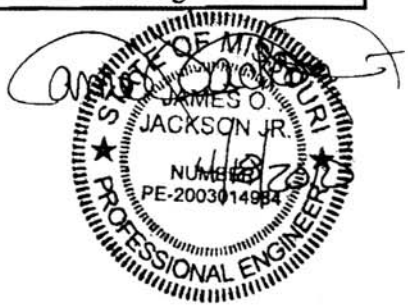
The proposed values in the Ammonia calculations are less stringent than the effluent limits in the summary forms, Appendix E. Effluent limits from Appendix E were used in the WQAR.

**LAKE PROFESSIONAL ENGINEERING SERVICES, INC.**

| **Bowden Campbell, P.E.** | **James O. Jackson, Jr., P.E.** | **James O. Jackson, MSCE** |
|---|---|---|
| HCR 30 Box 59 | P.O. Box 27 | P.O. Box 27 |
| Warsaw, MO 65355 | Camdenton, MO 65020 | Camdenton, MO 65020 |
| Phone 660-438-9856 | Phone 573-873-3898 | Phone 573-873-3898 |
| Mobile 573-480-7100 | Mobile 573-216-9663 | Mobile 573-216-7934 |


Project: Mike Rehme
Cal. For: Ammonia Calculations
Date: April 2, 2010

Project No: 9145
Cal. By: JOJJR
Cal. Page 1 of 1




Mixing Zone Parameters:

Lake Width At New Treatment Plant: 640 ft.
Depth = 20 ft.
Qe= 493 gpd = .000767 $ft^3$/sec
C = 1.5 mg/L
Cs = .01 mg/L

Mixing Zone Volume

Calculate Width: (¼)(640 ft) = 160 ft. Therefore use 100 ft.+

Volume = Triangular Prism = LxWxDx1/2 = (100 ft)(100 ft)(20 ft)(1/2) = 100,000 $ft^3$

Flow = (100,000 $ft^3$/day)(1 day/86,400 sec) = 1.16 $ft^3$/sec

Look at Summer

Ce = (((Qe +Qs)C)-(Qs*Cs))/Qe

Chronic WLA Ce = (((.000767 +1.16)1.5-(1.16*.01))/.000767 = 2,255 mg/L
Acute WLA Ce = (((.000767 +0.0)12.1-(0.0*.01))/.000767 = 12.1 mg/L

| | |
|---|---|
| LTAc = 2255 mg/L(0.780) = 1,759 mg/L | CV=0.6, 99th Percentile, 30 day avg. |
| LTAa = 12.1 mg/L(0.321) = 3.9 mg/L | CV=0.6, 99th Percentile |
| MDL = 3.9 mg/L(3.11) = 12.1 mg/L | CV=0.6, 99th Percentile |
| AML = 3.9 mg/L(1.19) = 4.6 mg/L | CV=0.6, 95th Percentile, n=30 |

Winter not calculated due to acute value being more protective than the chronic value. Winter chronic value is higher than the summer value used.

Therefore use: 4.5 mg/L Average Monthly Limits
6.7 mg/L Maximum Daily Limits

Appendix C: Natural Heritage Review

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WATER PROTECTION PR

# Natural Heritage Review
# On-line LEVEL 1 REPORT

***Print this page and use/attach as documentation that your project has consulted with the Missouri Department of Conservation and the U.S. Fish and Wildlife Service about species of conservation concern. No further consultation about this project is necessary.***

February 16, 2010

**Your login and project information below:**

| | |
|---|---|
| User ID: | 994 |
| First Name: | Jim |
| Last Name: | Jackson |
| Email Address: | jimjacksonjr@charter.net |
| Business: | Lake Professional Engineering Services, Inc. |
| Project: | Wastewater |
| Project: | none selected |
| Project: | none selected |
| Project: | Wastewater |
| Project: | Wastewater |

**Your query information below:**

| User ID | Response Level | Township | Range | Section | Direction | Latitude | Longitude | Point Line | UTM North | UTM East | Rectangle | TimeStamp |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 994 | | | | | | 38.1482 | -92.7083 | | 0 | 0 | | 2/16/2010 10:04:15 PM |
| 994 | | | | | | 38.1482 | -92.7083 | | 0 | 0 | | 2/16/2010 10:06:33 PM |
| 994 | | 39 | 16 | 5 | W | 0 | 0 | | 0 | 0 | | 2/16/2010 10:08:30 PM |
| 994 | | 39 | 16 | 5 | W | 0 | 0 | | 0 | 0 | | 2/16/2010 10:10:45 PM |
| 994 | | 39 | 16 | 5 | W | 0 | 0 | | 0 | 0 | | 2/16/2010 10:12:15 PM |
| 994 | | 39 | 16 | 5 | W | 0 | 0 | | 0 | 0 | | 2/16/2010 10:14:39 PM |

**Wastewater**

**Wastewater – storm sewer, sanitary sewer, treatment plant, discharge**

Clean Water Act permits issued by other agencies regulate both construction and operation of wastewater and storm water systems, and provide many important protections for fish and wildlife resources throughout the project area and at some distance downstream.

Fish and wildlife almost always benefit when unnatural pollutants are removed from water, and concerns are minimal if (a) the project area includes no protected species or restricted habitat identified in this report, and (b) construction is managed to minimize erosion and sedimentation/runoff to nearby streams and lakes, including adherence to any "Clean Water Permit" conditions.

Revegetation of disturbed areas is recommended to minimize erosion, as is restoration with of native plant species compatible with the local landscape and for wildlife needs. Annual ryegrass may be combined with native perennials for quicker green-up. Avoid aggressive exotic perennials such as crown vetch and sericea lespedeza.

Management Recommendations for Construction Projects Affecting Missouri Streams and Rivers is a Conservation Department publication available at http://www.mdc.mo.gov/documents/nathis/endangered/streams.pdf

We provide no suggestions for this project type.

We provide no suggestions for this project type.

**Wastewater**

**Wastewater – storm sewer, sanitary sewer, treatment plant, discharge**

Clean Water Act permits issued by other agencies regulate both construction and operation of wastewater and storm water systems, and provide many important protections for fish and wildlife resources throughout the project area and at some distance downstream.

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**Wastewater**

**Wastewater – storm sewer, sanitary sewer, treatment plant, discharge**

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Fish and wildlife almost always benefit when unnatural pollutants are removed from water, and concerns are minimal if (a) the project area includes no protected species or restricted habitat identified in this report, and (b) construction is managed to minimize erosion and sedimentation/runoff to nearby streams and lakes, including adherence to any "Clean Water Permit" conditions.

Revegetation of disturbed areas is recommended to minimize erosion, as is restoration with of native plant species compatible with the local landscape and for wildlife needs. Annual ryegrass may be combined with native perennials for quicker green-up. Avoid aggressive exotic perennials such as crown vetch and sericea lespedeza.

Management Recommendations for Construction Projects Affecting Missouri Streams and Rivers is a Conservation Department publication available at http://www.mdc.mo.gov/documents/nathis/endangered/streams.pdf

**Cautions related to species/habitats of concern or project type. Please reflect these concerns and recommendations in your plans** :

• Even if records of species/habitats of concern do not exist, there is a possibility that your project will encounter a species of concern that is not on record. In Missouri, 93% of the land is in private ownership, and most of that has never been checked for endangered species. Animals move over varying ranges, and in time both animal and plant populations can move.

• If your project encounters and potentially affects a federally-listed species, immediately report it to the U.S. Fish and Wildlife Service or Missouri Department of Conservation.

**No further consultation with the U.S. Fish and Wildlife Service or the Missouri Department of Conservation is necessary.** Print this document to establish compliance with requirements to consult with U.S. Fish and Wildlife Service and the Missouri Department of Conservation about this project.

If you need additional information, please contact:

MDC Natural Heritage Review
Policy Coordination Unit
P.O. Box 180
Jefferson City , MO 65102-0180
(Phone 573-522-4115 ext. 3250 )
www.mdc.mo.gov

or

U.S. Fish and Wildlife Service Ecological Services
101 Park Deville Drive , Suite A
Columbia , Missouri 65203-0007
(Phone 573-234-2132 )

Appendix D: Geohydrologic Evaluation

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**Missouri Department Of Natural Resources**
Division of Geology and Land Survey
P.O. Box 250
Rolla, Missouri 65402-0250
Phone - 573.368.2161 Fax - 573.368.2111
E-mail - gspgeol@dnr.mo.gov

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WATER PROTECTION PROGRAM

Project ID Number **LWE10048**

County **CAMDEN**

[redacted]

Project **Michael Rehme RFB** Quadrangle **LAKE OZARK**

Location **NE1/4 NE1/4 NW1/4 S1/2** Section **5** Township **39 N** Range **16 W**

Additional Location Information **Part Lot 21, Leo's Sub., Sioux Trails, Blue A-Frame**

Latitude **38** Deg **8** Min **55** Sec Longitude **92** Deg **42** Min **31** Sec

[redacted]
Michael Rehme (636) 391-8910
14700 White Lane Court, St. Louis, MO 63017

[redacted] Lake Professional Engineering
James Jackson, Jr. (573) 873-3898
P.O. Box 27, Camdenton, MO 65020

**Previous Reports** ☑ **Not Applicable**
**Date**
**Identification Number**
**Fiscal Year**

[redacted]
- ○ Mechanical treatment plant
- ◉ Recirculating filter bed
- ○ Earthen lagoon with discharge
- ○ Earthen holding basin
- ○ Land application
- ○ Other type of facility

[redacted]
- ○ Animal
- ◉ Human
- ○ Process or industrial
- ○ Leachate
- ○ Other waste type

[redacted]
- ◉ PPG
- ○ WWLF-SRF
- ○ Non-Point Source

[redacted]
- ○ Plans were submitted
- ○ Site was investigated by NRCS
- ○ Soil or geotechnical data were submitted

[redacted] **12/15/2009** [redacted] ◉ Gaining ○ Losing ○ No discharge

[redacted]
- ◉ Slight
- ○ Moderate
- ○ Severe

[redacted]
- ○ Not applicable
- ◉ Slight
- ○ Moderate
- ○ Severe

[redacted]
- ○ < 4%
- ○ 4% to 8%
- ◉ 8% to 15%
- ○ > 15%

[redacted]
- ○ Broad uplands
- ○ Ridgetop
- ◉ Hillslope
- ○ Narrow ravine
- ○ Floodplain
- ○ Alluvial plain
- ○ Terrace
- ○ Sinkhole

[redacted] The bedrock is Ordovician-age Gasconade Dolomite.

[redacted] Surficial materials are composed of 1-2 feet of stoney clay.

Project ID Number **LWE10048**



[redacted]

○ Installation of clay pad ○ Diversion of subsurface flow ○ Rock excavation
○ Compaction ○ Artificial sealing ○ Limit excavation depth

[redacted]

○ Partical size analysis ○ Standard Proctor density ○ Permeability coefficient for undisturbed sample
○ Atterburg limits ○ Overburden thickness ○ Permeability coefficient for remolded sample

[redacted]

○ Groundwater elevation ○ Direction of groundwater flow ○ 25-year flood level ○ 100-year flood level

[redacted]

○ Before exploration ○ During construction ○ After construction ◉ Not necessary

[redacted]

A site evaluation was performed on December 15, 2009 for the proposed recirculating filter bed. The goal of such an evaluation is to determine the geologic and hydrologic elements of the site as they relate to the facility construction, geologic collapse potential, and the potential for groundwater contamination in the event that treatment failure occurs.

Discharge from the proposed recirculating filter bed will migrate 10 feet along the bedrock-surficial material interface or through the upper weathered portion of the Gasconade Dolomite and in to the Lake of the Ozarks. The lake is considered to be a gaining setting for discharge purposes.

The uppermost bedrock is the Ordovician-age Gasconade Dolomite. The bedrock unit is a light to medium gray, medium crystalline, cherty dolomite. The unit has experienced some fracturing and weathering, resulting in a moderate to high permeability. The bedrock consists of zero to two feet of cherty clay residuum with high to moderate permeability.

Based on the geologic and hydrologic characteristics observed during the site visit, this site receives a slight overall geologic limitations rating and a slight collapse potential rating. The proposed excavation depth of 6 feet will require the removal of bedrock materials.

This document is a preliminary report. It is not a permit. Additional data may be required by the Department of Natural Resources prior to the issuance of a permit. This report is valid only at the above location and becomes invalid one year after the report date below.

Report By: Christopher B. Vierrether Christopher B. Vierrether Report Date: 12/21/2009

CC WPP, SWRO

STATE OF MISSOURI
LARRY D. PIERCE
RG0179
REGISTERED GEOLOGIST

Appendix E: Antidegradation Review Summary Attachments

The attachments that follow contain summary information provided by the applicant, Rehme on the Lake.

1) Tier Determination and Effluent Limit Summary Sheet.
2) Attachment A.

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WATER PROTECTION PROGRAM

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH
**WATER QUALITY REVIEW ASSISTANCE/ANTIDEGRADATION REVIEW REQUEST**
PRE-CONSTRUCTION REVIEW FOR PROTECTION OF BENEFICIAL USES AND DEVELOPING EFFLUENT LIMITS

TYPE OF PROJECT
☐ Grant ☐ SRF Loan ☒ All Other Projects

| REQUESTER | TELEPHONE NUMBER WITH AREA CODE |
|---|---|
| James O Jackson Jr Lake Professional Engineering | 573-873-3898 |
| **PERMITTEE** | **TELEPHONE NUMBER WITH AREA CODE** |
| Mike Rehme | 636-391-8910 |

**REASON FOR REQUEST**
☒ New Discharge (See Instruction #9) ☐ Upgrade (No expansion) (See AIP) ☐ Expansion

DESCRIPTION OF PROPOSED ACTIVITY:
New advantex discharge System with UV Light

**FACILITY INFORMATION**

| FACILITY NAME | MSOP NUMBER (IF APPLICABLE) |
|---|---|
| Rehme on the Lake | |
| **COUNTY** | **SIC / NAICS CODE** |
| Camden | 4952 |

METHOD OF BACTERIA COMPLIANCE
☐ Chlorine Disinfection ☒ Ultraviolet Disinfection ☐ Ozone ☐ Not Applicable

WATER QUALITY ISSUES
None

Water quality issues include: effluent limit compliance issues, notice (s) of violation, water body beneficial uses not attained or supported, etc.

| OUTFALL | LOCATION (LAT/LONG OR LEGAL DESCRIPTION) | MAPPED[1] (CHECK) | RECEIVING WATER BODY[2] |
|---|---|---|---|
| 1 | N38° 8.89' W92° 42.50' | ☒ | Lake of the Ozarks |
| | | ☐ | |
| | | ☐ | |

[1] Attach topographic map (See www.dnr.mo.gov/internetmapviewer/) with outfall location(s) clearly marked. For additional outfalls, attach a separate form.
[2] See general instructions for discharges to streams.

| OUTFALL | NEW DESIGN FLOW ** (MGD) | TREATMENT TYPE | EFFLUENT TYPES* |
|---|---|---|---|
| 1 | .000555 | Fabric Filter | Domestic Wastewater |
| | | | |
| | | | |

* Describe predominating character of effluent. Example: domestic wastewater, municipal wastewater, industrial wastewater, storm water, mining leachate, etc.
** If expansion, indicate new design flow.

☒ Checked for rare or endangered species and provided determination with this request. See Instruction #8.

**ANTIDEGRADATION REVIEW SUBMISSION:**

See attached Antidegradation instructions. Applicant supplied a summary within:
☒ Tier Determination and Effluent Limit Summary
☒ Attachment A – Significant Degradation
☐ Attachment B – Minimal Degradation
☐ Attachment C – Temporary degradation
☐ Attachment D – Tier 1 Review
☐ No Degradation Evaluation – Conclusion of Antidegradation Review

See general instructions. Additional information may be needed to complete your request. Your request may be returned if items are missing. Revised submittal will be considered a new submittal.

| SIGNATURE | DATE |
|---|---|
| X | 4/22/10 |
| PRINT NAME | |
| Michael Rehme | |

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MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
**ANTIDEGRADATION REVIEW SUMMARY**
**TIER DETERMINATION AND EFFLUENT LIMIT SUMMARY**

**1. FACILITY**

| NAME | TELEPHONE NUMBER WITH AREA CODE |
|---|---|
| Rehme on the Lake | 636-391-8910 |

| ADDRESS (PHYSICAL) | CITY | STATE | ZIP CODE |
|---|---|---|---|
| Pt. Lot 21 Leo's Subdivision | Osage Beach | MO | 65065 |

**2. RECEIVING WATER BODY SEGMENT #1**

NAME: Lake of the Ozarks

2.1 UPPER END OF SEGMENT (Location of discharge)
UTM _____ OR Lat N38° 8.89' Long W92° 42.50'

2.2 LOWER END OF SEGMENT
UTM _____ OR Lat N38° 8.74' Long W92° 42.90'

Per the Missouri Antidegradation Rule and Implementation Procedure, or AIP, the definition of a segment, "a segment is a section of water that is bound, at a minimum, by significant existing sources and confluences with other significant water bodies."

**3. WATER BODY SEGMENT #2 (IF APPLICABLE)**

NAME

3.1 UPPER END OF SEGMENT
UTM _____ OR Lat _____, Long _____

3.2 LOWER END OF SEGMENT
UTM _____ OR Lat _____, Long _____

**4. WATER BODY SEGMENT #3 (IF APPLICABLE)**

NAME

4.1 UPPER END OF SEGMENT
UTM _____ OR Lat _____, Long _____

4.2 LOWER END OF SEGMENT
UTM _____ OR Lat _____, Long _____

**5. PROJECT INFORMATION**

**Is the receiving water body an Outstanding National Resource Water, an Outstanding State Resource Water, or drainage thereto?**

☐ Yes ☒ No

In Tables D and E of 10 CSR 20-7.031, Outstanding National Resource Waters and Outstanding State Resource Water are listed. Per the Antidegradation Implementation Procedure Section 1.B.3., "any degradation of water quality is prohibited in these waters unless the discharge only results in temporary degradation." Therefore, if degradation is significant or minimal, the Antidegradation Review will be denied.

**Will the proposed discharge of all pollutants of concern, or POCs, result in no net increase in the ambient water quality concentration of the receiving water after mixing?**

☐ Yes ☒ No

If yes, submit a summary table showing the levels of each pollutant of concern before and after the proposed discharge in the receiving water and then complete Attachment B for the first downstream classified water body segment.

**Will the discharge result in temporary degradation?**

☐ Yes ☒ No

If yes, complete Attachment C.

**Has the project been determined as non-degrading?**

☐ Yes ☒ No

If yes, complete No Degradation Evaluation – Conclusion of Antidegradation Review form.
Submit with the appropriate Construction Permit Application as no antidegradation review is required.

**If yes to one of the above questions, skip to Section 8 - Wet Weather.**

## 6. EXISTING WATER QUALITY DATA OR MODEL SUMMARY

Obtaining Existing Water Quality is possible by three methods according to the Antidegradation Implementation Procedure Section II.A.1.: (1) using previously collected data with an appropriate Quality Assurance Project Plan, or QAPP (2) collecting water quality data by approved the Missouri Department of Natural Resources methodology or (3) using an appropriate water quality model. QAPPs must be submitted to the department for approval well in advance (six months) of the proposed activity. Provide all the appropriate corresponding data and reports which were approved by the department Water Quality Monitoring and Assessment Section.

**Date existing water quality data was provided by the Water Quality Monitoring and Assessment Section:**

**Approval date of the QAPP by the Water Quality Monitoring and Assessment Section:**

**Approval date of the project sampling plan by the Water Quality Monitoring and Assessment Section:**

**Approval date of the data collected for all appropriate pollutants of concern by the Water Quality Monitoring and Assessment Section:**

**Comments/Discussion:**

## 7. POLLUTANTS OF CONCERN AND TIER DETERMINATION(S)

Pollutants of Concern to be considered include those pollutants reasonably expected to be present in the discharge per the Antidegradation Implementation Procedure Section II.S. The tier protection levels are specified and defined in rule at 10 CSR 20-7.031 (2).

**Water Body Segment One**
**Pollutants of Concern and Tier Determination(s)**

| Tier 1 | Tier 2 with Minimal Degradation | Tier 2 with Significant Degradation |
|---|---|---|
| | | DO * |
| | | Fecal * |
| | | Ammonia * |
| | | TSS * |
| | | BOD-5 * |

**Note:** Add an asterisk to items that you only assume are Tier 2 with significant degradation.

**Water Body Segment Two**
**Pollutants of Concern and Tier Determination(s)**

| Tier 1 | Tier 2 with Minimal Degradation | Tier 2 with Significant Degradation |
|---|---|---|
| | | DO * |
| | | Fecal * |
| | | Ammonia * |
| | | TSS * |
| | | BOD * |

- For pollutants of concern that are Tier 2 with significant degradation, complete Attachment A.
- For pollutants of concern that are Tier 2 with minimal degradation, complete Attachment B.
- For pollutants of concern that are Tier 1, complete Attachment D. Additionally, a Tier 2 review must be conducted for each pollutant of concern on the appropriate water body segment.

## 8. WET WEATHER ANTICIPATIONS

If an applicant anticipates excessive inflow or infiltration and pursues approval from the department to bypass secondary treatment, a feasibility analysis is required. The feasibility analysis must comply with the criteria of all applicable state and federal regulations including 40 CFR 122.41(m)(4). Attach the feasibility analysis to this report.

**What is the Wet Weather Flow Peaking Factor in relation to design flow?** 1

**Wet Weather Design Summary:** I/I infiltration

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MO 780-2025 (05-09)

## 9. SUMMARY OF THE PROPOSED ANTIDEGRADATION REVIEW EFFLUENT LIMITS

What are the proposed pollutants of concern and their respective effluent limits that the selected treatment option will comply with:

| Pollutant of Concern | Units | Wasteload Allocation | Average Monthly Limit | Daily Maximum Limit |
|---|---|---|---|---|
| BOD5 | mg/L | | 10 | |
| TSS | mg/L | | 15 | |
| Dissolved Oxygen | mg/L | | 5 | |
| Ammonia Summer | | | 3.0 | |
| Bacteria (E. Coli) | #Col/100mg | | 126 | |
| Fecal | #Col/100mg | | 400 | |
| Ammonia Winter | | | 3.0 | |
| | | | | |
| | | | | |
| | | | | |

These proposed limits must not violate water quality standards, be protective of beneficial uses and achieve the highest statutory and regulatory requirements.

Attach the Antidegradation Review report and all supporting documentation.

**CONSULTANT:** I have prepared or reviewed this form and all attached reports and documentation. The conclusion proposed is consistent with the Antidegradation Implementation Procedure and current state and federal regulation.

SIGNATURE: James O Jackson Jr | DATE: 2/10/2010

NAME AND OFFICIAL TITLES: James O Jackson Jr Engineer

COMPANY NAME: Lake Professional Engineering Services Inc

ADDRESS: PO Box 27 | CITY: Camdenton | STATE: MO | ZIP CODE: 65020

TELEPHONE NUMBER WITH AREA CODE: 573-873-3898 | E-MAIL ADDRESS:

**OWNER:** I have read and reviewed the prepared documents and agree with this submittal.

SIGNATURE: [signature] | DATE: 1/22/10

NAME AND OFFICIAL TITLES: Michael Rehme Owner

ADDRESS: 14700 White Lane Ct | CITY: St. Louis | STATE: MO | ZIP CODE: 63017

TELEPHONE NUMBER WITH AREA CODE: 636-391-8910 | E-MAIL ADDRESS:

**CONTINUING AUTHORITY:** Continuing Authority is the permanent organization that will be responsible for the operation, maintenance and modernization of the facility. The regulatory requirement regarding continuing authority is found in 10 CSR 20-6.010(3) available at www.sos.mo.gov/adrules/csr/current/10csr/10c20-6a.pdf.

I have read and reviewed the prepared documents and agree with this submittal.

SIGNATURE: [signature] | DATE: 1/22/10

NAME AND OFFICIAL TITLES: Michael Rehme Owner

ADDRESS: 14700 White Lane Ct. | CITY: St. Louis | STATE: MO | ZIP CODE: 63017

TELEPHONE NUMBER WITH AREA CODE: 636-391-8910 | E-MAIL ADDRESS:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH
**ANTIDEGRADATION REVIEW SUMMARY**
**ATTACHMENT A: TIER 2 – SIGNIFICANT DEGRADATION**

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WATER PROTECTION PROGRAM

**1. FACILITY**

NAME: Rehme on the Lake
TELEPHONE NUMBER WITH AREA CODE: 636-391-8910
ADDRESS (PHYSICAL): A Lot 21 Leo's Subdivision
CITY: Osage Beach
STATE: MO
ZIP CODE: 65065

**2. RECEIVING WATER BODY SEGMENT #1**

NAME: Lake of the Ozarks

**3. WATER BODY SEGMENT #2 (IF APPLICABLE)**

NAME:

**4. IDENTIFYING ALTERNATIVES**

Supply a summary of the alternatives considered and the level of treatment attainable with regards to the alternative. "For Discharges likely to cause significant degradation, an analysis of non-degrading and less-degrading alternatives must be provided," as stated in the Antidegradation Implementation Procedure Section II.B.1. Per 10 CSR 20-6.010(4)(D)1., the feasibility of a no-discharge system must be considered. Attach all supportive documentation in the Antidegradation Review report.

**Non-degrading alternatives:** Land application, OnSite Septic, regional system,

**Alternatives ranging from less-degrading to degrading including Preferred Alternative (All must meet water quality standards):**

| Alternatives | Level of Treatment Attainable for each Pollutant of Concern | | | | | |
|---|---|---|---|---|---|---|
| | BOD (mg/L) | TSS (mg/L) | Ammonia as N Summer (mg/L) | Bacteria (E. Coli) (#/100mL) | Dissolved Oxygen mg/L | Ammonia Winter mg/L |
| Delta EcoPod | 20 | 20 | 3.0 | 126 | 5 | 3.0 |
| Bio-Microbics | 20 | 20 | 3.0 | 126 | 5 | 3.0 |
| Extended Air | 20 | 20 | 3.0 | 126 | 5 | 3.0 |
| Sand Filter | 10 | 15 | 3.0 | 126 | 5 | 3.0 |
| Zabel Scat | 10 | 15 | 3.0 | 126 | 5 | 3.0 |
| Orenco Advantex | 10 | 15 | 3.0 | 126 | 5 | 3.0 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**Identifying Alternatives Summary:** Base technology is delta EcoPOD. Preferred is Orenco Advantex. Attached report discussed all degrading & non degrading options considered. The report details why non degrading options were not chosen to be proposed based on practicality, economics & other issues.

## 5. DETERMINATION OF THE REASONABLE ALTERNATIVE

Per the Antidegradation Implementation Procedure Section II.B.2, "a reasonable alternative is one that is practicable, economically efficient and affordable." Provide basis and supporting documentation in the Antidegradation Review report.

**Practicability Summary:**

"The practicability of an alternative is considered by evaluating the effectiveness, reliability, and potential environmental impacts," according to the Antidegradation Implementation Procedure Section II.B.2.a. Examples of factors to consider, including secondary environmental impacts, are given in the Antidegradation Implementation Procedure Section II.B.2.a.

Land application, On-Site treatment, Subsurface application, and Subsurface treatment was found to be not technically feasible.
Ecopod, Microfast, Fabric Filter, Sand Filter, & Extended aeration were all found to meet effective & reliability issues as well as environmental factors

**Economic Efficiency Summary:**

Alternatives that are deemed practicable must undergo a direct cost comparison in order to determine economic efficiency. Means to determine economic efficiency are provided in the Antidegradation Implementation Procedure Section II.B.2.b.

Present worth economic analysis showed the cost effective Alternative to be Delta Ecopod. However the Orenco Advantex is the proposed Alternative

**Affordability Summary:**

Alternatives identified as most practicable and economically efficient are considered affordable if the applicant does not supply an affordability analysis. An affordability analysis per the Antidegradation Implementation Procedure Section II.B.2.c, "may be used to determine if the alternative is too expensive to reasonably implement."

Not performed

**Preferred Chosen Alternative:**

Advantex Fabric Filter

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**Reasons for Rejecting the other Evaluated Alternatives:**

Size needed in available area & aesthetics

**Comments/Discussion:**

All alternatives are capable of meeting Water quality Standards

## 6. SOCIAL AND ECONOMIC IMPORTANCE OF THE PREFERRED ALTERNATIVE

If the preferred alternative will result in significant degradation, then it must be demonstrated that it will allow important economic and social development in accordance to the Antidegradation Implementation Procedure Section II.E. Social and Economic Importance is defined as the social and economic benefits to the community that will occur from any activity involving a new or expanding discharge.

**Identify the affected community:**

The affected community is defined in 10 CSR 20-7.031(2)(B) as the community "in the geographical area in which the waters are located.: Per the Antidegradation Implementation Procedure Section II.E.1, "the affected community should include those living near the site of the proposed project as well as those in the community that are expected to directly or indirectly benefit from the project."

Vacationers + people who enjoy the Lake of the Ozarks as well as the Lake owners of the Lake of the Ozarks

**Identify relevant factors that characterize the social and economic conditions of the affected community:**

Examples of social and economic factors are provided in the Antidegradation Implementation Procedure Section II.E.1., but specific community examples are encouraged.

Increase tax base to the Community.

**Describe the important social and economic development associated with the project:**

Determining benefits for the community and the environment should be site specific and in accordance with the Antidegradation Implementation Procedure Section II.E.1.

Removal of a failing Septic System

**PROPOSED PROJECT SUMMARY:**

Provide treatment for 1 house + 1 future home for working class families
Provides monitored sewage treatment at acceptable discharge levels utilizing Orenco's Advantex fabric filter

Attach the Antidegradation Review report and all supporting documentation. This is a technical document, which must be signed, sealed and dated by a registered professional engineer of Missouri.

**CONSULTANT:** I have prepared or reviewed this form and all attached reports and documentation. The conclusion proposed in consistent with the Antidegradation Implementation Procedure and current state and federal regulations.

| SIGNATURE | DATE |
|---|---|
| [signature] | 2/10/2010 |

| PRINT NAME | LICENSE # : |
|---|---|
| James O. Jackson Jr | PE 2003014984 |

| TELEPHONE NUMBER WITH AREA CODE | E-MAIL ADDRESS: |
|---|---|
| 573-873-3878 | |

**OWNER:** I have read and reviewed the prepared documents and agree with this submittal.

| SIGNATURE | DATE |
|---|---|
| [signature] | 1/22/10 |

**CONTINUING AUTHORITY:** I have read and reviewed the prepared documents and agree with this submittal.

| SIGNATURE | DATE |
|---|---|
| [signature] | 1/22/10 |

## Appendix F: Orenco Advantex Performance

Attached are the Orenco Advantex Performance Summaries available from www.orenco.com
The first attachment summarizes BOD, TSS, and fecal coliform performance. The second attachment summarizes total nitrogen, total phosphorus, and ammonia removal.

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