

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-0045420

Owner: City of Gerald
Address: 106 East Fitzgerald, Gerald, MO 63037

Continuing Authority: Same as above
Address: Same as above

Facility Name: Gerald Wastewater Treatment Facility
Facility Address: 0.3 miles east of Wheeler Road & Route Y intersection, Gerald, MO 63037

Legal Description: NW ¼, NW ¼, Sec. 1, T42N, R4W, Franklin County
UTM Coordinates: X= 646246, Y= 4253600

Receiving Stream and ID: Cedar Fork (C) (3960)
First Classified Stream and ID: 8-20-13 MUDD V1.0 (C) (3960)
USGS Basin & Sub-watershed No.: (10300200-0406)

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 – POTW – SIC #4952

The use or operation of this facility shall be by or under the supervision of a Certified “C” Operator.

Influent lift station / bar screen / Biolac activated sludge system – aeration basin and clarifier / flow equalization basin / sludge holding basin / sludge is land applied.

Design population equivalent is 1,200.

Design flow is 150,000 gallons per day.

Actual flow is 93,000 gallons per day.

Design sludge production is 8.3 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 621.250 RSMo, Section 640.013 RSMo and Section 644.051.6 of the Law.

September 1, 2016
Effective Date

Sara Parker Pauley, Director, Department of Natural Resources

December 31, 2020
Expiration Date

John Madras, Director, Water Protection Program

OUTFALL #001	TABLE A-1 INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS
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The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The interim effluent limitations shall become effective on **September 1, 2016** and remain in effect through **August 31, 2020**. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

EFFLUENT PARAMETER(S)	UNITS	INTERIM EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Flow	MGD	*		*	once/day	24 hr. total
Biochemical Oxygen Demand ₅	mg/L		24	16.5	once/month	composite**
Total Suspended Solids	mg/L		33	22	once/month	composite**
<i>E. coli</i> (Note 1)	#/100mL		*	*	once/week	grab
Ammonia as N (Apr 1 – Sep 30) (Oct 1 – Mar 31)	mg/L	4.9 11.4		1.3 2.3	once/month	grab

MONITORING REPORTS SHALL BE SUBMITTED MONTHLY; THE FIRST REPORT IS DUE OCTOBER 28, 2016. THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

EFFLUENT PARAMETER(S)	UNITS	MINIMUM		MAXIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
pH – Units ***	SU	6.5		9.0	once/month	grab

MONITORING REPORTS SHALL BE SUBMITTED MONTHLY; THE FIRST REPORT IS DUE OCTOBER 28, 2016.

- * Monitoring requirement only.
- ** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.
- *** pH is measured in pH units and is not to be averaged.

Note 1 - Effluent 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. The Weekly Average for *E. coli* will be expressed as a geometric mean if more than one (1) sample is collected during a calendar week (Sunday through Saturday).

OUTFALL #001	TABLE A-2 FINAL 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 on September 1, 2020 and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:					
EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Flow	MGD	*		*	once/day	24 hr. total
Biochemical Oxygen Demand ₅	mg/L		24	16.5	once/month	composite**
Total Suspended Solids	mg/L		33	22	once/month	composite**
<i>E. coli</i> (Note 1, Page 3)	#/100mL		1,030	206	once/week	grab
Ammonia as N (Apr 1 – Sep 30) (Oct 1 – Mar 31)	mg/L	4.9 11.4		1.3 2.3	once/month	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>OCTOBER 28, 2020</u> . THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						
EFFLUENT PARAMETER(S)	UNITS	MINIMUM		MAXIMUM	MEASUREMENT FREQUENCY	SAMPLE TYPE
pH – Units ***	SU	6.5		9.0	once/month	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>OCTOBER 28, 2020</u> .						

* Monitoring requirement only.

** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

*** pH is measured in pH units and is not to be averaged.

Note 1 - Effluent 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. The Weekly Average for *E. coli* will be expressed as a geometric mean if more than one (1) sample is collected during a calendar week (Sunday through Saturday).

OUTFALL #001	TABLE A-3 FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS
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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 on **September 1, 2016** and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Oil & Grease	mg/L	15		10	once/quarter****	grab
Total Phosphorus	mg/L	*		*	once/quarter****	grab
Total Nitrogen	mg/L	*		*	once/quarter****	grab
Total Hardness	mg/L	*		*	once/quarter****	grab
Aluminum, Total Recoverable	µg/L	750		260	once/quarter****	grab
Arsenic, Total Recoverable	µg/L	*		*	once/quarter****	grab
Beryllium, Total Recoverable	µg/L	*		*	once/quarter****	grab
Cadmium, Total Recoverable	µg/L	0.5		0.5	once/quarter****	grab
Chromium III, Total Recoverable	µg/L	*		*	once/quarter****	grab
Chromium VI, Total Dissolved	µg/L	*		*	once/quarter****	grab
Copper, Total Recoverable	µg/L	31.7		17.6	once/quarter****	grab
Iron, Total Recoverable	µg/L	1,840		710	once/quarter****	grab
Lead, Total Recoverable	µg/L	16.2		8.8	once/quarter****	grab
Mercury, Total Recoverable	µg/L	*		*	once/quarter****	grab
Nickel, Total Recoverable	µg/L	212		76.9	once/quarter****	grab
Silver, Total Recoverable	µg/L	*		*	once/quarter****	grab
Zinc, Total Recoverable	µg/L	*		*	once/quarter****	grab

MONITORING REPORTS SHALL BE SUBMITTED QUARTERLY; THE FIRST REPORT IS DUE JANUARY 28, 2017.

* Monitoring requirement only.
**** See table on Page 4 for quarterly sampling requirements.

Minimum Sampling Requirements			
Quarter	Months	Effluent Parameters	Report is Due
First	January, February, March	Sample at least once during any month of the quarter	April 28 th
Second	April, May, June	Sample at least once during any month of the quarter	July 28 th
Third	July, August, September	Sample at least once during any month of the quarter	October 28 th
Fourth	October, November, December	Sample at least once during any month of the quarter	January 28 th

OUTFALL #001	TABLE A-4 WHOLE EFFLUENT TOXICITY FINAL 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 on September 1, 2016 and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:					
EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
Acute Whole Effluent Toxicity (See Special Condition #23)	TU _a	*			once/year	composite**
MONITORING REPORTS SHALL BE SUBMITTED <u>ANNUALLY</u> ; THE FIRST REPORT IS DUE <u>JANUARY 28, 2017</u> .						

TABLE B INFLUENT MONITORING REQUIREMENTS			
The facility is required to meet a removal efficiency of 85% or more as a monthly average. The monitoring requirements shall become effective on September 1, 2016 and remain in effect until expiration of the permit. To determine removal efficiencies, the influent wastewater shall be monitored by the permittee as specified below:			
SAMPLING LOCATION AND PARAMETER(S)	UNITS	MONITORING REQUIREMENTS	
		MEASUREMENT FREQUENCY	SAMPLE TYPE
Biochemical Oxygen Demand ₅	mg/L	once/quarter****	composite**
Total Suspended Solids	mg/L	once/quarter****	composite**
MONITORING REPORTS SHALL BE SUBMITTED <u>QUARTERLY</u> ; THE FIRST REPORT IS DUE <u>JANUARY 28, 2017</u> .			

* Monitoring requirement only.

** A 24-hour composite sample is composed of 48 aliquots (subsamples) collected at 30 minute intervals by an automatic sampling device.

**** See table below for quarterly sampling requirements.

Minimum Sampling Requirements			
Quarter	Months	Influent Parameters	Report is Due
First	January, February, March	Sample at least once during any month of the quarter	April 28 th
Second	April, May, June	Sample at least once during any month of the quarter	July 28 th
Third	July, August, September	Sample at least once during any month of the quarter	October 28 th
Fourth	October, November, December	Sample at least once during any month of the quarter	January 28 th

C. STANDARD CONDITIONS

In addition to specified conditions stated herein, this permit is subject to the attached Parts I, II, & III standard conditions dated August 1, 2014, May 1, 2013, and March 1, 2015, and hereby incorporated as though fully set forth herein.

D. SPECIAL CONDITIONS

1. This permit establishes final ammonia limitations based on Missouri's current Water Quality Standard. On August 22, 2013, the U.S. Environmental Protection Agency (EPA) published a notice in the Federal Register announcing of the final national recommended ambient water quality criteria for protection of aquatic life from the effects of ammonia in freshwater. The EPA's guidance, Final Aquatic Life Ambient Water Quality Criteria for Ammonia – Fresh Water 2013, is not a rule, nor automatically part of a state's water quality standards. States must adopt new ammonia criteria consistent with EPA's published ammonia criteria into their water quality standards that protect the designated uses of the water bodies. The Department of Natural Resources has initiated stakeholder discussions on how to best incorporate these new criteria into the State's rules. A date for when this rule change will occur has not been determined. Also, refer to Section VI of this permit's factsheet for further information including estimated future effluent limits for this facility. It is recommended the permittee view the Department's 2013 EPA criteria Factsheet located at <http://dnr.mo.gov/pubs/pub2481.htm>.
2. 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 including acute and chronic Whole Effluent Toxicity (WET) tests, or other information indicates changes are necessary to assure compliance with Missouri's Water Quality Standards.
 - (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.
 - (d) Incorporate the requirement to develop a pretreatment program pursuant to 40 CFR 403.8(a) when the Director of the Water Protection Program determines that a pretreatment program is necessary due to any new introduction of pollutants into the Publically Owned Treatment Works or any substantial change in the volume or character of pollutants being introduced. The permit as modified or reissued under this paragraph shall also contain any other requirements of the Clean Water Act then applicable.
3. All outfalls must be clearly marked in the field.
4. 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.
5. Report as no-discharge when a discharge does not occur during the report period.
6. Water Quality Standards
 - (a) To the extent required by law, 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;
 - (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.

D. SPECIAL CONDITIONS (continued)

7. Changes in existing pollutants or the addition of new pollutants to the treatment facility

The permittee must provide adequate notice to the Director of the following:

- (a) Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of CWA if it were directly discharging those pollutants; and
- (b) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
- (c) For purposes of this paragraph, adequate notice shall include information on:
 - (1) the quality and quantity of effluent introduced into the POTW, and
 - (2) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

8. Reporting of Non-Detects:

- (a) An analysis conducted by the permittee or their contracted laboratory shall be conducted in such a way that the precision and accuracy of the analyzed result can be enumerated.
- (b) The permittee shall not report a sample result as "Non-Detect" without also reporting the detection limit of the test. Reporting as "Non Detect" without also including the detection limit will be considered failure to report, which is a violation of this permit.
- (c) The permittee shall provide the "Non-Detect" sample result using the less than sign and the minimum detection limit (e.g. <10).
- (d) The permittee shall use one-half of the detection limit for the non-detect result when calculating monthly averages.
- (e) See Standard Conditions Part I, Section A, #4 regarding proper detection limits used for sample analysis.

9. It is a violation of the Missouri Clean Water Law to fail to pay fees associated with this permit (644.055 RSMo).

10. The permittee shall comply with any applicable requirements listed in 10 CSR 20-9, unless the facility has received written notification that the Department has approved a modification to the requirements. The monitoring frequencies contained in this permit shall not be construed by the permittee as a modification of the monitoring frequencies listed in 10 CSR 20-9. If a modification of the monitoring frequencies listed in 10 CSR 20-9 is needed, the permittee shall submit a written request to the Department for review and, if deemed necessary, approval.

11. The permittee shall develop and implement a program for maintenance and repair of the collection system. The recommended guidance is the US EPA's Guide For Evaluating Capacity, Management, Operation, And Maintenance (CMOM) Programs At Sanitary Sewer Collection Systems (Document number EPA 305-B-05-002) or the Departments' CMOM Model located at <http://dnr.mo.gov/env/wpp/permits/docs/cmom-template.doc>. For additional information regarding the Departments' CMOM Model, see the CMOM Plan Model Guidance document at <http://dnr.mo.gov/pubs/pub2574.htm>.

The permittee shall also submit a report to the St. Louis Regional Office annually, by January 28th, for the previous calendar year. The report shall contain the following information:

- (a) A summary of the efforts to locate and eliminate sources of excessive infiltration and inflow into the collection system serving the facility for the previous year.
- (b) A summary of the general maintenance and repairs to the collection system serving the facility for the previous year.
- (c) A summary of any planned maintenance and repairs to the collection system serving the facility for the upcoming calendar year. This list shall include locations (GPS, 911 address, manhole number, etc.) and actions to be taken.

12. Bypasses are not authorized at this facility unless they meet the criteria in 40 CFR 122.41(m). If a bypass occurs, the permittee shall report in accordance to 40 CFR 122.41(m)(3), and with Standard Condition Part I, Section B, subsection 2.b. Bypasses are to be reported to the St. Louis Regional Office or by using the online Sanitary Sewer Overflow/Facility Bypass Application, located at: <http://dnr.mo.gov/modnrcag/> during normal business hours or the Environmental Emergency Response hotline at 573-634-2436 outside of normal business hours. Blending, which is the practice of combining a partially-treated wastewater process stream with a fully-treated wastewater process stream prior to discharge, is not considered a form of bypass. If the permittee wishes to utilize blending, the permittee shall file an application to modify this permit to facilitate the inclusion of appropriate monitoring conditions.

13. The facility must be sufficiently secured to restrict entry by children, livestock and unauthorized persons as well as to protect the facility from vandalism.

14. At least one gate must be provided to access the wastewater treatment facility and provide for maintenance and mowing. The gate shall remain closed except when temporarily opened by; the permittee to access the facility, perform operational monitoring, sampling, maintenance, mowing, or for inspections by the Department. The gate shall be closed and locked when the facility is not staffed.

D. SPECIAL CONDITIONS (continued)

15. At least one (1) warning sign shall be placed on each side of the facility enclosure in such positions as to be clearly visible from all directions of approach. There shall also be one (1) sign placed for every five hundred feet (500') (150 m) of the perimeter fence. A sign shall also be placed on each gate. Minimum wording shall be SEWAGE TREATMENT FACILITY—KEEP OUT. Signs shall be made of durable materials with characters at least two inches (2") high and shall be securely fastened to the fence, equipment or other suitable locations.
16. An Operation and Maintenance (O & M) manual shall be maintained by the permittee and made available to the operator. The O & M manual shall include key operating procedures and a brief summary of the operation of the facility.
17. An all-weather access road shall be provided to the treatment facility.
18. The discharge from the wastewater treatment facility shall be conveyed to the receiving stream via a closed pipe or a paved or rip-rapped open channel. Sheet or meandering drainage is not acceptable. The outfall sewer shall be protected against the effects of floodwater, ice or other hazards as to reasonably insure its structural stability and freedom from stoppage. The outfall shall be maintained so that a sample of the effluent can be obtained at a point after the final treatment process and before the discharge mixes with the receiving waters.
19. Land application of biosolids shall be conducted in accordance with Standard Conditions III and a Department approved biosolids management plan. Land application of biosolids during frozen, snow covered, or saturated soil conditions in accordance with the additional requirements specified in WQ426 shall occur only with prior approval from the Department.
20. The berms of the basins shall be mowed and kept free of any deep-rooted vegetation, animal dens, or other potential sources of damage to the berms.
21. The facility shall ensure that adequate provisions are provided to prevent surface water intrusion into the basins and to divert stormwater runoff around the basins and protect embankments from erosion.
22. Once the pretreatment program for this facility is approved, the permittee shall implement and enforce it in accordance with the requirements of 10 CSR 20-6.100. The approved pretreatment program is hereby incorporated by reference.

The permittee shall submit to the Department on or before March 31st of each year a report briefly describing its pretreatment activities during the previous calendar year. At a minimum, the report shall include the following:

- (a) An updated list of the Permittee's Industrial Users, including their names and addresses, or a list of deletions and additions keyed to a previously submitted list. The Permittee shall provide a brief explanation of each deletion. This list shall identify which Industrial Users are subject to categorical pretreatment Standards and specify which Standards are applicable to each Industrial User. The list shall indicate which Industrial Users are subject to local standards that are more stringent than the categorical Pretreatment Standards. The Permittee shall also list the Industrial Users that are subject only to local Requirements;
- (b) A summary of the status of Industrial User compliance over the reporting period;
- (c) A summary of compliance and enforcement activities (including inspections) conducted by the Permittee during the reporting period; and
- (d) Any other relevant information requested by the Department.

Pursuant to 40 CFR 122.44(j)(2)(ii), the permittee shall submit to the Department a written technical evaluation of the need to revise local limits under 40 CFR 403.5(c)(1) along with the application for renewal of this permit.

D. SPECIAL CONDITIONS (continued)

23. Acute Whole Effluent Toxicity (WET) tests shall be conducted as follows:
- (a) Freshwater Species and Test Methods: Species and short-term test methods for estimating the acute toxicity of NPDES effluents are found in the most recent edition of *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012; Table IA, 40 CFR Part 136). The permittee shall concurrently conduct 48-hour, static, non-renewal toxicity tests with the following species:
 - o The fathead minnow, *Pimephales promelas* (Acute Toxicity EPA Test Method 2000.0).
 - o The daphnid, *Ceriodaphnia dubia* (Acute Toxicity EPA Test Method 2002.0).
 - (b) Chemical and physical analysis of the upstream control sample and effluent sample shall occur immediately upon being received by the laboratory, prior to any manipulation of the effluent sample beyond preservation methods consistent with federal guidelines for WET testing that are required to stabilize the sample during shipping. Where upstream receiving water is not available or known to be toxic, other approved control water may be used.
 - (c) Test conditions must meet all test acceptability criteria required by the EPA Method used in the analysis.
 - (d) The Allowable Effluent Concentration (AEC) for this facility is 100% with the dilution series being: 100%, 50%, 25%, 12.5%, and 6.25%.
 - (e) All chemical and physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% effluent concentration.
 - (f) All chemical analyses shall be performed and results shall be recorded in the appropriate field of the report form. The parameters for chemical analysis include Temperature (°F), pH (SU), Conductivity (µmohs/cm), Dissolved Oxygen (mg/L), Total Residual Chlorine (mg/L), Un-ionized Ammonia (mg/L), Aluminum (µg/L), Arsenic (µg/L), Beryllium (µg/L), Cadmium (µg/L), Chromium III (µg/L), Chromium VI (µg/L), Copper (µg/L), Iron (µg/L), Lead (µg/L), Mercury (µg/L), Nickel (µg/L), Silver (µg/L), Zinc (µg/L), Total Alkalinity (mg/L), and Total Hardness (mg/L).
 - (g) The facility must submit a full laboratory report for all toxicity testing. The report must include a quantification of acute toxic units ($TU_a = 100/LC_{50}$) reported according to the test methods manual chapter on report preparation and test review. The Lethal Concentration 50 Percent (LC_{50}) is the effluent concentration that would cause death in 50 percent of the test organisms at a specific time.

E. SCHEDULE OF COMPLIANCE

The facility shall attain compliance with final effluent limitations as soon as reasonably achievable or no later than **4 years** of the effective date of this permit.

1. Within six months of the effective date of this permit, the permittee shall report progress made in attaining compliance with the final effluent limits.
2. The permittee shall submit interim progress reports detailing progress made in attaining compliance with the final effluent limits every 12 months from effective date.
3. Within **4 years** of the effective date of this permit, the permittee shall attain compliance with the final effluent limits.

Please submit progress reports to the Missouri Department of Natural Resources, St. Louis Regional Office, 7545 South Lindbergh, Suite 210, St. Louis, MO 63125.

**MISSOURI DEPARTMENT OF NATURAL RESOURCES
FACT SHEET
FOR THE PURPOSE OF RENEWAL
OF
MO-0045420
GERALD WASTEWATER TREATMENT FACILITY**

The Federal Water Pollution Control Act ("Clean Water Act" Section 402 Public Law 92-500 as amended) established the National Pollution Discharge Elimination System (NPDES) permit program. This program regulates the discharge of pollutants from point sources into the waters of the United States, and the release of stormwater from certain point sources. All such discharges are unlawful without a permit (Section 301 of the "Clean Water Act"). After a permit is obtained, a discharge not in compliance with all permit terms and conditions is unlawful. Missouri State Operating Permits (MSOPs) are issued by the Director of the Missouri Department of Natural Resources (Department) under an approved program, operating in accordance with federal and state laws (Federal "Clean Water Act" and "Missouri Clean Water Law" Section 644 as amended). MSOPs are issued for a period of five (5) years unless otherwise specified.

As per [40 CFR Part 124.8(a)] and [10 CSR 20-6.020(1)2.] a Factsheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the Missouri State Operating Permit (operating permit) listed below.

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

This Factsheet is for a Minor.

Part I – Facility Information

Facility Type: POTW - SIC #4952

Facility Description:

Influent lift station / bar screen / Biolac activated sludge system – aeration basin and clarifier / flow equalization basin / sludge holding basin / sludge is land applied.

Application Date: 07/30/15

Expiration Date: 12/31/15

OUTFALL(S) TABLE:

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
#001	0.233	Secondary	Domestic

Facility Performance History:

This facility was last inspected on December 16, 2015. The facility was found to be in non-compliance for a failure to comply with effluent limitations in their operating permit. A review of the past five years of monitoring data submitted by the permittee shows the following exceedances (month/year):

- Aluminum: 3/13, 12/13
- Ammonia: 1/12-4/12, 6/12, 5/14-8/14, 4/15-7/15, 9/15
- Arsenic: 3/13-9/14, 3/15-9/15
- BOD: 8/11, 10/11, 11/11, 1/12, 2/12, 4/12-6/12, 5/13, 6/13, 6/15
- Cadmium: 3/13-9/14, 3/15-9/15
- Copper: 6/13-12/13, 9/14, 3/15
- Iron: 12/15
- Lead: 3/13-9/14, 3/15-9/15
- Nickel: 9/14
- pH: 3/11
- TSS: 3/11, 8/11, 1/12-6/12, 8/12, 4/13, 12/13, 6/14, 9/14, 12/14, 1/15, 4/15, 6/15, 9/15

DMRs were not received for 6/11, 1/13, or 11/13.

Comments:

This facility is a Biolac activated sludge system. Biolac stands for Biological Aeration Chain systems. The process technology is an extended aeration or flow-through lagoon in conjunction with a moving fine bubble aeration device. This system replaced the wastewater lagoon, which was converted into the sludge holding basin. The City of Gerald also formerly had a wastewater lagoon on the southeastern side of the city, which has been closed and the permit terminated; all domestic wastewater in Gerald is now sent to this facility.

The City of Gerald is currently working with the Department to establish a pretreatment program.

This facility discharges to Cedar Fork 8-20-13 MUDD V1.0 (C) (3960) which is now classified as EPA has approved the Department's new stream classifications. A schedule of compliance has been included in the permit to meet final effluent limitations for *E. coli* which are protective of the WBC-B use designation of the stream.

Changes in this permit include the addition of *E. coli* limits, Total Nitrogen monitoring and the removal of Dissolved Oxygen limits. See Part VII of the Fact Sheet for further information regarding the addition and removal of effluent parameters. Special conditions were updated to include the addition of reporting of Non-detects requirements.

Part II – Operator Certification Requirements

As per [10 CSR 20-6.010(8) Terms and Conditions of a Permit], the permittee 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 20-9.020(2)(A)], requirements for operation by certified personnel shall apply to all wastewater treatment systems, if applicable, as listed below:

Owned or operated by or for a

- | | |
|--|---|
| <input checked="" type="checkbox"/> - Municipalities | <input type="checkbox"/> - Public Water Supply Districts |
| <input type="checkbox"/> - State agency | <input type="checkbox"/> - Private Sewer Company regulated by the Public Service Commission |
| <input type="checkbox"/> - Federal agency | <input type="checkbox"/> - State agency |
| <input type="checkbox"/> - Public Sewer District | <input type="checkbox"/> - Federal agency |
| <input type="checkbox"/> - County | |

Each of the above entities are only applicable if they have a Population Equivalent greater than two hundred (200) or fifty (50) or more service connections.

This facility currently requires an operator with a C Certification Level. Please see **Appendix - Classification Worksheet**. Modifications made to the wastewater treatment facility may cause the classification to be modified.

Operator's Name: Nick Grube
Certification Number: 9311
Certification Level: C

The listing of the operator above only signifies that staff drafting this operating permit have reviewed appropriate Department records and determined that the name listed on the operating permit application has the correct and applicable Certification Level.

Part III– Operational Monitoring

- As per [10 CSR 20-9.010(4)], the facility is required to conduct operational monitoring.

Part IV – Receiving Stream Information

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(4)].

RECEIVING STREAM(S) TABLE: OUTFALL #001

WATER-BODY NAME	CLASS	WBID	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
8-20-13 MUDD V1.0	C	3960	IRR, LWV, AQL, HHP, WBC-B, SCR	10300200-0406	Direct Discharge

* - Irrigation (IRR), Livestock & Wildlife Watering (LWW), Protection of Warm Water Aquatic Life (AQL), Human Health Protection (HHP), Cool Water Fishery (CLF), Cold Water Fishery (CDF), Whole Body Contact Recreation – Category A (WBC-A), Whole Body Contact Recreation – Category B (WBC-B), Secondary Contact Recreation (SCR), Drinking Water Supply (DWS), Industrial (IND), Groundwater (GRW).

RECEIVING STREAM(S) LOW-FLOW VALUES:

RECEIVING STREAM (C, E, P, P1)	LOW-FLOW VALUES (CFS)		
	1Q10	7Q10	30Q10
8-20-13 MUDD V1.0 (C)	0.0	0.0	0.0

MIXING CONSIDERATIONS

Mixing Zone: Not Allowed [10 CSR 20-7.031(5)(A)4.B.(I)(a)].

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

RECEIVING STREAM MONITORING REQUIREMENTS:

No receiving water monitoring requirements recommended at this time.

Receiving Water Body's Water Quality

This facility discharges to the Missouri River watershed which has an EPA approved TMDL for chlordane and PCBs in fish tissue. There are no Missouri facilities which discharge either directly to the Missouri River or to a tributary where the Missouri River is the first classified water body, that have that potential for discharging detectable amounts of PCBs or chlordane. Since chlordane and PCBs were banned in 1988 and 1977, respectively, there should be negligible discharge of chlordane and PCBs into streams from wastewater treatment plants and other point sources. Therefore, the WLA is set as zero pounds/day in this TMDL.

Part V – 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.

- 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(o); 40 CFR Part 122.44(l)] that requires a reissued permit to be as stringent as the previous permit with some exceptions. Limitations in this operating permit for the reissuance of this permit conform to the anti-backsliding provisions of Section 402(o) of the Clean Water Act, and 40 CFR Part 122.44.

- Information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance.

- Dissolved Oxygen limitations were removed. Effluent limitations for BOD₅ were calculated using the instream criteria for dissolved oxygen and are therefore protective of the instream criteria. Combining this with good historical performance and the fact that the receiving stream does not have an impairment or waste load allocation for dissolved oxygen, the department has determined that there is no reasonable potential for DO to cause an instream excursion of water quality standards.
- Effluent limitations were re-calculated for Ammonia based new information derived from discharge monitoring reports and on the current Missouri Water Quality Standards for Ammonia.
- Statistical analysis was conducted for all total recoverable metals and determined no reasonable potential for arsenic, beryllium, chromium III, chromium VI, mercury, silver, or zinc to cause or contribute to an instream excursion of water quality standards. Because of this, effluent limits for these parameters have been removed and replaced with monitoring only requirements.
- Effluent limitations were re-calculated for aluminum, cadmium, copper, iron, lead, and nickel based new information derived from discharge monitoring reports and on the current Missouri Water Quality Standards for these parameters.

- The Department determines that technical mistakes or mistaken interpretations of law were made in issuing the permit under section 402(a)(1)(b).

- This permit changes WET test requirements for the facility from a pass/fail requirement to monitoring only for toxic units. This change reflects modifications to Missouri's Effluent Regulation found at 10 CSR 20-7.015. 40 CFR 122.44(d)(1)(ii) requires the Department to establish effluent limitations that control all parameters which have the reasonable potential to cause or contribute to an excursion above any state water quality standard, including state narrative criteria. The previous permit imposed a pass/fail limitation without collecting sufficient data to make a reasonable potential determination. Furthermore, the method of reporting associated with the pass/fail limitation prevented the Department from gathering the data necessary to make a finding of reasonable potential. Implementation of the toxic unit monitoring requirement will allow the Department to implement numeric acute criteria in accordance with water quality standards established under §303 of the CWA.

ANTIDEGRADATION:

In accordance with Missouri's Water Quality Standard [10 CSR 20-7.031(3)], the Department is to document by means of Antidegradation Review that the use of a water body's available assimilative capacity is justified. Degradation is justified by documenting the socio-economic importance of a discharging activity after determining the necessity of the discharge.

- No degradation proposed and no further review necessary. Facility did not apply for authorization to increase pollutant loading or to add additional pollutants to their discharge.

AREA-WIDE WASTE TREATMENT MANAGEMENT & CONTINUING AUTHORITY:

As per [10 CSR 20-6.010(3)(B)], ...An applicant may utilize a lower preference continuing authority by submitting, as part of the application, a statement waiving preferential status from each existing higher preference authority, providing the waiver does not conflict with any area-wide management plan approved under section 208 of the Federal Clean Water Act or any other regional sewage service and treatment plan approved for higher preference authority by the Department.

BIOSOLIDS & SEWAGE SLUDGE:

Biosolids are solid materials resulting from domestic wastewater treatment that meet federal and state criteria for beneficial uses (i.e. fertilizer). 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://extension.missouri.edu/main/DisplayCategory.aspx?C=74>, items WQ422 through WQ449.

- Permittee land applies biosolids in accordance with Standard Conditions III and a Department approved biosolids management plan.

COMPLIANCE AND ENFORCEMENT:

Enforcement is the action taken by the Water Protection Program (WPP) to bring an entity into compliance with the Missouri Clean Water Law, its implementing regulations, and/or any terms and conditions of an operating permit. The primary purpose of the enforcement activity in the WPP is to resolve violations and return the entity to compliance.

- The facility is currently under enforcement action.

DISCHARGE MONITORING REPORTS:

On July 30, 2013, EPA proposed the Clean Water Act National Pollutant Discharge Elimination System (NPDES) Electronic Reporting Rule, which requires electronic reporting of NPDES information rather than the currently-required paper-based reports from permitted facilities. To comply with the upcoming federal rule, the Department is asking all permittees to begin submitting discharge monitoring data online. For permittees already using the Department's eDMR data reporting system, those permittees will be required to exclusively use the eDMR data reporting system.

- The permittee/facility is not currently using the eDMR data reporting system. To sign up for the eDMR system, visit the Department's eDMR page at <http://dnr.mo.gov/env/wpp/edmr.htm>.

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)].

Pretreatment programs are required at any POTW (or combination of POTW operated by the same authority) and/or municipality with a total design flow greater than 5.0 MGD and receiving industrial wastes that interfere with or pass through the treatment works or are otherwise subject to the pretreatment standards. Pretreatment programs can also be required at POTWs/municipals with a design flow less than 5.0 MGD if needed to prevent interference with operations or pass through.

Several special conditions pertaining to the permittee's pretreatment program may be included in the permit, and are as follows:

- Implementation and enforcement of the program,
- Annual pretreatment report submittal,
- Submittal of list of industrial users,
- Technical evaluation of need to establish local limitations, and
- Submittal of the results of the evaluation

- This permittee is developing a pretreatment program to be approved in accordance with the requirements of [40 CFR Part 403] and [10 CSR 20-6.100] and is expected to implement and enforce its approved program.

REASONABLE POTENTIAL ANALYSIS (RPA):

Federal regulation [40 CFR Part 122.44(d)(1)(i)] requires effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause or contribute to an in-stream excursion above narrative or numeric water quality standard.

In accordance with [40 CFR Part 122.44(d)(1)(iii)] if the permit writer determines that any given pollutant has the reasonable potential to cause, or contribute to an in-stream excursion above the WQS, the permit must contain effluent limits for that pollutant.

- A RPA was conducted on appropriate parameters. Please see **APPENDIX – RPA RESULTS**.

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 (BOD₅) and Total Suspended Solids (TSS) for Publicly Owned Treatment Works (POTWs)/municipals.

- Secondary Treatment is 85% removal [40 CFR Part 133.102(a)(3) & (b)(3)].

SANITARY SEWER OVERFLOWS (SSO) AND INFLOW AND INFILTRATION (I&I):

Sanitary Sewer Overflows (SSOs) are defined as untreated sewage releases and are considered bypassing under state regulation [10 CSR 20-2.010(11)] and should not be confused with the federal definition of bypass. SSOs result from a variety of causes including blockages, line breaks, and sewer defects that can either allow wastewater to backup within the collection system during dry weather conditions or allow excess stormwater and groundwater to enter and overload the collection system during wet weather conditions. SSOs can also result from lapses in sewer system operation and maintenance, inadequate sewer design and construction, power failures, and vandalism. SSOs include overflows out of manholes, cleanouts, broken pipes, and other into waters of the state and onto city streets, sidewalks, and other terrestrial locations.

Inflow and Infiltration (I&I) is defined as unwanted intrusion of stormwater or groundwater into a collection system. This can occur from points of direct connection such as sump pumps, roof drain downspouts, foundation drains, and storm drain cross-connections or through cracks, holes, joint failures, faulty line connections, damaged manholes, and other openings in the collection system itself. I&I results from a variety of causes including line breaks, improperly sealed connections, cracks caused by soil erosion/settling, penetration of vegetative roots, and other sewer defects. In addition, excess stormwater and groundwater entering the collection system from line breaks and sewer defects have the potential to negatively impact the treatment facility.

Missouri RSMo §644.026.1.(13) mandates that the Department issue permits for discharges of water contaminants into the waters of this state, and also for the operation of sewer systems. Such permit conditions shall ensure compliance with all requirements as established by sections 644.006 to 644.141. Standard Conditions Part I, referenced in the permit, contains provisions requiring proper operation and maintenance of all facilities and systems of treatment and control. Missouri RSMo §644.026.1.(15) instructs the Department to require proper maintenance and operation of treatment facilities and sewer systems and proper disposal of residual waste from all such facilities. To ensure that public health and the environment are protected, any noncompliance which may endanger public health or the environment must be reported to the Department within 24 hours of the time the permittee becomes aware of the noncompliance. Standard Conditions Part I, referenced in the permit, contains the reporting requirements for the permittee when bypasses and upsets occur. The permit also contains requirements for permittees to develop and implement a program for maintenance and repair of the collection system. The permit requires that the permittee submit an annual report to the Department for the previous calendar year that contains a summary of efforts taken by the permittee to locate and eliminate sources of excess I & I, a summary of general maintenance and repairs to the collection system, and a summary of any planned maintenance and repairs to the collection system for the upcoming calendar year.

- At this time, the Department recommends the US EPA's Guide for Evaluating Capacity, Management, Operation and Maintenance (CMOM) Programs At Sanitary Sewer Collection Systems (Document # EPA 305-B-05-002) or the Departments' CMOM Model located at <http://dnr.mo.gov/env/wpp/permits/docs/cmom-template.doc>. For additional information regarding the Departments' CMOM Model, see the CMOM Plan Model Guidance document at <http://dnr.mo.gov/pubs/pub2574.htm>. The CMOM identifies some of the criteria used to evaluate a collection system's management, operation, and maintenance and was intended for use by the EPA, state, regulated community, and/or third party entities. The CMOM is applicable to small, medium, and large systems; both public and privately owned; and both regional and satellite collection systems. The CMOM does not substitute for the Clean Water Act, the Missouri Clean Water Law, and both federal and state regulations, as it is not a regulation.

SCHEDULE OF COMPLIANCE (SOC):

Per 644.051.4 RSMo, a permit may be issued with a Schedule of Compliance (SOC) to provide time for a facility to come into compliance with new state or federal effluent regulations, water quality standards, or other requirements. Such a schedule is not allowed if the facility is already in compliance with the new requirement, or if prohibited by other statute or regulation. A SOC includes 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. *See also* Section 502(17) of the Clean Water Act, and 40 CFR §122.2. For new effluent limitations, the permit includes interim monitoring for the specific parameter to demonstrate the facility is not already in compliance with the new requirement. Per 40 CFR § 122.47(a)(1) and 10 CSR 20-7.031(11), compliance must occur as soon as possible. If the permit provides a schedule for meeting new water quality based effluent limits, a SOC must include an enforceable, final effluent limitation in the permit even if the SOC extends beyond the life of the permit.

A SOC is not allowed:

- For effluent limitations based on technology-based standards established in accordance with federal requirements, if the deadline for compliance established in federal regulations has passed. 40 CFR § 125.3.
- For a newly constructed facility in most cases. Newly constructed facilities must meet applicable effluent limitations when discharge begins, because the facility has installed the appropriate control technology as specified in a permit or antidegradation review. A SOC is allowed for a new water quality based effluent limit that was not included in a previously public noticed permit or antidegradation review, which may occur if a regulation changes during construction.
- To develop a TMDL, UAA, or other study associated with development of a site specific criterion. A facility is not prohibited from conducting these activities, but a SOC may not be granted for conducting these activities.

In order to provide guidance to Permit Writers in developing SOCs, and attain a greater level of consistency, on April 9, 2015 the Department issued an updated policy on development of SOCs. This policy provides guidance to Permit Writers on the standard time frames for schedules for common activities, and guidance on factors that may modify the length of the schedule such as a Cost Analysis for Compliance.

- The time given for effluent limitations of this permit listed under Interim Effluent Limitation and Final Effluent Limitations were established in accordance with [10 CSR 20-7.031(11)]. The facility has been given a schedule of compliance to meet final effluent limits for *E. coli*. The four year schedule of compliance allowed for this facility should provide adequate time to evaluate operations, obtain an engineering report, hold a bond election, obtain a construction permit and implement upgrades required to meet effluent limits. The schedule has been established at 4 years in accordance with the Department's "Schedule of Compliance, Policy for Staff Drafting Operating Permits". Please see the Cost Analysis for Compliance attached as an appendix to the permit for further detail on how the socio-economic status of the community has impacted this SOC.

STORMWATER 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 stormwater 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 *Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators*, (Document number EPA 833-B-09-002) [published by the United States Environmental Protection Agency (USEPA) in February 2009], 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 Stormwater 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 stormwater discharges.

- At this time, the permittee is not required to develop and implement a SWPPP.

VARIANCE:

As per the Missouri Clean Water Law § 644.061.4, variances shall be granted for such period of time and under such terms and conditions as shall be specified by the commission in its order. The variance may be extended by affirmative action of the commission. In no event shall the variance be granted for a period of time greater than is reasonably necessary for complying with the Missouri Clean Water Law §§644.006 to 644.141 or any standard, rule or regulation promulgated pursuant to Missouri Clean Water Law §§644.006 to 644.141.

- This operating permit is not drafted under premises of a petition for variance.

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 total amount of pollutant that may be discharged into that stream without endangering its water quality.

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

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

Where C = downstream concentration C_e = effluent concentration
Cs = upstream concentration Q_e = effluent flow
Q_s = upstream 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:

There are two general types of effluent limitations, technology-based effluent limits (TBELs) and water quality based effluent limits (WQBELs). If TBELs do not provide adequate protection for the receiving waters, then WQBEL must be used.

- Cochran Engineering prepared, on behalf of the City of Gerald, the *Gerald Wastewater Treatment Facility Antidegradation*. Dissolved oxygen modeling analysis was submitted for review with the report. See Appendix – Water Quality and Antidegradation Review for further information.

WATER QUALITY STANDARDS:

Per [10 CSR 20-7.031(4)], 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.

- The permittee is required to conduct WET test for this facility.

Under the federal Clean Water Act (CWA) §101(a)(3), requiring WET testing is reasonably appropriate for site-specific Missouri State Operating Permits for discharges to waters of the state issued under the National Pollutant Discharge Elimination System (NPDES). WET testing is also required by 40 CFR 122.44(d)(1). WET testing ensures that the provisions in the 10 CSR 20-6.010(8)(A)7. and the Water Quality Standards 10 CSR 20-7.031(4)(D),(F),(G),(I)2.A & B are being met. Under [10 CSR 20-6.010(8)(A)4], the Department may require other terms and conditions that it deems necessary to assure compliance with the Clean Water Act and related regulations of the Missouri Clean Water Commission. In addition the following MCWL apply: §§644.051.3 requires the Department to set permit conditions that comply with the MCWL and CWA; 644.051.4 specifically references toxicity as an item we must consider in writing permits (along with water quality-based effluent limits, pretreatment, etc...); and 644.051.5 is the basic authority to require testing conditions. WET test will be required by facilities meeting the following criteria:

- Facility is a designated Major.
- Facility continuously or routinely exceeds its design flow.
- Facility exceeds its design population equivalent (PE) for BOD₅ whether or not its design flow is being exceeded.
- Facility (whether primarily domestic or industrial) alters its production process throughout the year.
- Facility handles large quantities of toxic substances, or substances that are toxic in large amounts.
- Facility has Water Quality-based Effluent Limitations for toxic substances (other than NH₃)
- Facility is a municipality with a Design Flow ≥ 22,500 gpd.
- Other – please justify.

40 CFR 122.41(m) - BYPASSES:

The federal Clean Water Act (CWA), Section 402 prohibits wastewater dischargers from “bypassing” untreated or partially treated sewage (wastewater) beyond the headworks. A bypass is defined as an intentional diversion of waste streams from any portion of a treatment facility, [40 CFR 122.41(m)(1)(i)]. Additionally, Missouri regulation 10 CSR 20-7.015(9)(G) states a bypass means the intentional diversion of waste streams from any portion of a treatment facility, except in the case of blending, to waters of the state. Only under exceptional and specified limitations do the federal regulations allow for a facility to bypass some or all of the flow from its treatment process. Bypasses are prohibited by the CWA unless a permittee can meet all of the criteria listed in 40 CFR 122.41(m)(4)(i)(A), (B), & (C). Any bypasses from this facility are subject to the reporting required in 40 CFR 122.41(l)(6) and per Missouri’s Standard Conditions I, Section B, part 2.b. Additionally, Anticipated Bypasses include bypasses from peak flow basins or similar devices designed for peak wet weather flows.

- This facility does not anticipate bypassing.

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

- This facility does not discharge to a 303(d) listed stream.

- This facility discharges to the Missouri River watershed which has an EPA approved TMDL for chlordane and PCBs in fish tissue. There are no Missouri facilities which discharge either directly to the Missouri River or to a tributary where the Missouri River is the first classified water body, that have that potential for discharging detectable amounts of PCBs or chlordane. Since chlordane and PCBs were banned in 1988 and 1977, respectively, there should be negligible discharge of chlordane and PCBs into streams from wastewater treatment plants and other point sources. Therefore, the WLA is set as zero pounds/day in this TMDL.

Part VI –2013 Water Quality Criteria for Ammonia

Upcoming changes to the Water Quality Standard for ammonia may require significant upgrades to wastewater treatment facilities.

On August 22, 2013, the U.S. Environmental Protection Agency (EPA) finalized new water quality criteria for ammonia, based on toxicity studies of mussels and gill breathing snails. Missouri's current ammonia criteria are based on toxicity testing of several species, but did not include data from mussels or gill breathing snails. Missouri is home to 69 of North America's mussel species, which are spread across the state. According to the Missouri Department of Conservation nearly two-thirds of the mussel species in Missouri are considered to be "of conservation concern". Nine species are listed as federally endangered, with an additional species currently proposed as endangered and another species proposed as threatened.

The adult forms of mussels that are seen in rivers, lakes, and streams are sensitive to pollutants because they are sedentary filter feeders. They vacuum up many pollutants with the food they bring in and cannot escape to new habitats, so they can accumulate toxins in their bodies and die. But very young mussels, called glochidia, are exceptionally sensitive to ammonia in water. As a result of a citizen suit, the EPA was compelled to conduct toxicity testing and develop ammonia water quality criteria that would be protective if young mussels may be present in a waterbody. These new criteria will apply to any discharge with ammonia levels that may pose a reasonable potential to violate the standards. Nearly all discharging domestic wastewater treatment facilities (cities, subdivisions, mobile home parks, etc.), as well as certain industrial and stormwater dischargers with ammonia in their effluent, will be affected by this change in the regulations.

When new water quality criteria are established by the EPA, states must adopt them into their regulations in order to keep their authorization to issue permits under the National Pollutant Discharge Elimination System (NPDES). States are required to review their water quality standards every three years, and if new criteria have been developed they must be adopted. States may be more protective than the Federal requirements, but not less protective. Missouri does not have the resources to conduct the studies necessary for developing new water quality standards, and therefore our standards mirror those developed by the EPA; however, we will utilize any available flexibility based on actual species of mussels that are native to Missouri and their sensitivity to ammonia.

Many treatment facilities in Missouri are currently scheduled to be upgraded to comply with the current water quality standards. But these new ammonia standards may require a different treatment technology than the one being considered by the permittee. It is important that permittees discuss any new and upcoming requirements with their consulting engineers to ensure that their treatment systems are capable of complying with the new requirements. The Department encourages permittees to construct treatment technologies that can attain effluent quality that supports the EPA ammonia criteria.

Ammonia toxicity varies by temperature and by pH of the water. Assuming a stable pH value, but taking into account winter and summer temperatures, Missouri includes two seasons of ammonia effluent limitations. Current effluent limitations in this permit are:

Summer – 4.9 mg/L daily maximum, 1.3 mg/L monthly average.
Winter – 11.4 mg/L daily maximum, 2.3 mg/L monthly average.

Under the new EPA criteria, where mussels of the family Unionidae are present or expected to be present, the estimated effluent limitations for a facility in a location such as this that discharges to a receiving stream with no mixing will be:

Summer – 2.3 mg/L daily maximum, 0.6 mg/L monthly average.
Winter – 8.5 mg/L daily maximum, 2.0 mg/L monthly average.

These estimated limits above are based in part on the actual performance of the plant at the time of the drafting of this permit and should not be construed as future effluent limitations. Future effluent limits, based on the EPA's 2013 water quality criteria for ammonia, will depend in part on the actual performance of the facility at the time the permit is renewed.

Operating permits for facilities in Missouri must be written based on current statutes and regulations. Therefore permits will be written with the existing effluent limitations until the new standards are adopted. To aid permittees in decision making, an advisory will be added to permit Fact Sheets notifying permittees of the expected effluent limitations for ammonia. When setting schedules of compliance for ammonia effluent limitations, consideration will be given to facilities that have recently constructed upgraded facilities to meet the current ammonia limitations.

For more information on this topic feel free to contact the Missouri Department of Natural Resources, Water Protection Program, Water Pollution Control Branch, Operating Permits Section at (573) 751-1300.

Part VII – Effluent Limits Determination

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 lists 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)] Subsurface Water [10 CSR 20-7.015(7)]
 Lake or Reservoir [10 CSR 20-7.015(3)] All Other Waters [10 CSR 20-7.015(8)]
 Losing [10 CSR 20-7.015(4)]

OUTFALL #001 – MAIN FACILITY OUTFALL EFFLUENT LIMITATIONS TABLE:

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type ****
Flow	MGD	1	*		*	*/*	Daily	Monthly	T
BOD ₅	mg/L	4		24	16.5	24/16.5	Monthly	Monthly	C
TSS	mg/L	4		33	22	33/22	Monthly	Monthly	C
<i>Escherichia coli</i> **	#/100mL	1, 3		1030	206	***	Weekly	Monthly	G
Ammonia as N (Apr 1 –Sep 30)	mg/L	2, 3	4.9		1.3	4.6/1.7	Monthly	Monthly	G
Ammonia as N (Oct 1 – Mar 31)	mg/L	2, 3	11.4		2.3	5.5/2.7	Monthly	Monthly	G
Oil & Grease	mg/L	1, 3	15		10	15/10	Quarterly	Quarterly	G
Total Nitrogen	mg/L	1	*		*	***	Quarterly	Quarterly	G
Total Phosphorus	mg/L	1	*		*	*/*	Quarterly	Quarterly	G
Total Hardness	mg/L	7	*		*	*/*	Quarterly	Quarterly	G
Aluminum, Total Recoverable	µg/L	2, 3	750		260	229/114	Quarterly	Quarterly	G
Arsenic, Total Recoverable	µg/L	2, 3	*		*	15/8	Quarterly	Quarterly	G
Beryllium, Total Recoverable	µg/L	2, 3	*		*	4.5/2.2	Quarterly	Quarterly	G
Cadmium, Total Recoverable	µg/L	2, 3	0.5		0.5	0.4/0.2	Quarterly	Quarterly	G
Chromium III, Total Recoverable	µg/L	2, 3	*		*	127/64	Quarterly	Quarterly	G
Chromium VI, Total Dissolved	µg/L	2, 3	*		*	10/5	Quarterly	Quarterly	G
Copper, Total Recoverable	µg/L	2, 3	31.7		17.6	14/7	Quarterly	Quarterly	G
Iron, Total Recoverable	µg/L	2, 3	1,840		710	620/310	Quarterly	Quarterly	G
Lead, Total Recoverable	µg/L	2, 3	16.2		8.8	5.3/2.7	Quarterly	Quarterly	G
Mercury, Total Recoverable	µg/L	2, 3	*		*	0.5/0.3	Quarterly	Quarterly	G
Nickel, Total Recoverable	µg/L	2, 3	212		76.9	77/39	Quarterly	Quarterly	G
Silver, Total Recoverable	µg/L	2, 3	*		*	8.6/4.3	Quarterly	Quarterly	G
Zinc, Total Recoverable	µg/L	2, 3	*		*	178/89	Quarterly	Quarterly	G
Acute Whole Effluent Toxicity	TUa	1, 9	*			Pass/Fail	Annually	Annually	C
PARAMETER	Unit	Basis for Limits	Minimum		Maximum	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type
pH	SU	1	6.5		9.0	6.5/9.0	Monthly	Monthly	G

* - Monitoring requirement only.

** - #/100mL; the Monthly Average for *E. coli* is a geometric mean.

*** - Parameter was not previously established in previous state operating permit.

**** - C = 24-hour composite

G = Grab

T = 24-hr. total

Basis for Limitations Codes:

- | | | |
|--|---------------------------|-----------------------------------|
| 1. State or Federal Regulation/Law | 4. Antidegradation Review | 7. Best Professional Judgment |
| 2. Water Quality Standard (includes RPA) | 5. Antidegradation Policy | 8. TMDL or Permit in lieu of TMDL |
| 3. Water Quality Based Effluent Limits | 6. Water Quality Model | 9. WET Test Policy |

OUTFALL #001 – DERIVATION AND DISCUSSION OF LIMITS:

- **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 (BOD₅).** The Gerald Antidegradation report modeled the existing dissolved oxygen concentration in the stream and compared it to the expected dissolved oxygen concentration with the proposed BOD5 limits. See Appendix – Water Quality and Antidegradation Review.
- **Total Suspended Solids (TSS).** The Gerald Antidegradation report modeled the existing dissolved oxygen concentration in the stream and compared it to the expected dissolved oxygen concentration with the proposed BOD5 limits. See Appendix – Water Quality and Antidegradation Review.
- **Escherichia coli (E. coli).** Monthly average of 206 per 100 mL as a geometric mean and Weekly Average of 1030 per 100 mL as a geometric mean during the recreational season (April 1 – October 31), to protect Whole Body Contact Recreation (B) designated use of the receiving stream, as per 10 CSR 20-7.031(5)(C). An effluent limit for both monthly average and weekly average is required by 40 CFR 122.45(d). The Geometric Mean is calculated by multiplying all of the data points and then taking the nth root of this product, where n = # of samples collected. For example: Five E. coli samples were collected with results of 1, 4, 6, 10, and 5 (#/100mL). Geometric Mean = 5th root of (1)(4)(6)(10)(5) = 5th root of 1,200 = 4.1 #/100mL.
- **Total Ammonia Nitrogen.** Early Life Stages Present Total Ammonia Nitrogen criteria apply [10 CSR 20-7.031(5)(B)7.C. & Table B3]. Background total ammonia nitrogen = 0.01 mg/L. No mixing considerations allowed; therefore, WLA = appropriate criterion.

Season	Temp (°C)	pH (SU)	Total Ammonia Nitrogen CCC (mg/L)	Total Ammonia Nitrogen CMC (mg/L)
Summer	26	7.8	1.5	12.1
Winter	6	7.8	3.1	12.1

Summer: April 1 – September 30

Chronic WLA: $C_e = ((0.233 + 0.0)1.5 - (0.0 * 0.01))/0.233$
 $C_e = 1.5 \text{ mg/L}$

Acute WLA: $C_e = ((0.233 + 0.0)12.1 - (0.0 * 0.01))/0.233$
 $C_e = 12.1 \text{ mg/L}$

$LTA_c = 1.5 \text{ mg/L} (0.670) = 1.01 \text{ mg/L}$
 $LTA_a = 12.1 \text{ mg/L} (0.206) = 2.50 \text{ mg/L}$

[CV = 0.99, 99th Percentile, 30 day avg.]
 [CV = 0.99, 99th Percentile]

Use most protective number of LTA_c or LTA_a.

MDL = 1.01 mg/L (4.85) = **4.9 mg/L**
 AML = 1.01 mg/L (1.32) = **1.3 mg/L**

[CV = 0.99, 99th Percentile]
 [CV = 0.99, 95th Percentile, n =30]

Winter: October 1 – March 31

Chronic WLA: $C_e = ((0.233 + 0.0)3.1 - (0.0 * 0.01))/0.233$
 $C_e = 3.1 \text{ mg/L}$

Acute WLA: $C_e = ((0.233 + 0.0)12.1 - (0.0 * 0.01))/0.233$
 $C_e = 12.1 \text{ mg/L}$

$LTA_c = 3.1 \text{ mg/L} (0.593) = 1.84 \text{ mg/L}$
 $LTA_a = 12.1 \text{ mg/L} (0.161) = 1.94 \text{ mg/L}$

[CV = 1.32, 99th Percentile, 30 day avg.]
 [CV = 1.32, 99th Percentile]

Use most protective number of LTA_c or LTA_a.

MDL = 1.84 mg/L (6.23) = **11.4 mg/L**
 AML = 1.84 mg/L (1.44) = **2.3 mg/L**

[CV = 1.32, 99th Percentile]
 [CV = 1.32, 95th Percentile, n =30]

- **Oil & Grease.** Conventional pollutant, effluent limitation for protection of aquatic life; 10 mg/L monthly average, 15 mg/L daily maximum.
- **Total Phosphorus and Total Nitrogen.** Monitoring required for facilities greater than 100,000 gpd design flow per 10 CSR 20-7.015(9)(D)7. Total Nitrogen shall be determined by testing for Total Kjeldahl Nitrogen (TKN) and Nitrate + Nitrite and reporting the sum of the results (reported as N). Nitrate + Nitrite can be analyzed together or separately.
- **pH.** 6.5-9.0 SU. pH limitations of 6.0-9.0 SU [10 CSR 20-7.015] are not protective of the in-stream Water Quality Standard, which states that water contaminants shall not cause pH to be outside the range of 6.5-9.0 SU. No mixing zone is allowed due to the classification of the receiving stream, therefore the water quality standard must be met at the outfall.

Metals

Effluent limitations for total recoverable metals were developed using methods and procedures outlined in the “Technical Support Document for Water Quality-based Toxic Controls” (EPA/505/2-90-001) and “The Metals Translator: Guidance For Calculating a Total Recoverable Permit Limit from a Dissolved Criterion” (EPA 823-B-96-007). General warm-water fishery criteria apply and a water hardness of 253 mg/L is used in the conversion below.

Due to the absence of contemporaneous effluent and instream data for total recoverable metals, dissolved metals, hardness, and total suspended solids with which to calculate metals translators, partitioning between the dissolved and absorbed phases was assumed to be minimal (Section 5.7.3, EPA/505/2-90-001). Freshwater criteria conversion factors for dissolved metals were used as the metals translator as recommended in guidance (Section 1.3, 1.5.3, and Table 1, EPA 823-B-96-007). If concurrent site-specific data for total recoverable metals, dissolved metals, hardness, and total suspended solids are provided to the Department, partitioning evaluations may be considered and site-specific translators developed.

METAL	CONVERSION FACTORS	
	ACUTE	CHRONIC
Aluminum	NA	NA
Arsenic	NA	NA
Beryllium	NA	NA
Cadmium	0.905	0.870
Chromium III	0.316	0.860
Chromium VI	NA	NA
Copper	0.960	0.960
Iron	NA	NA
Lead	0.656	0.656
Mercury	0.850	NA
Nickel	0.998	0.997
Silver	0.850	NA
Zinc	0.978	0.986

Conversion factors for Cd and Pb are hardness dependent. Values calculated using equation found in Section 1.3 of EPA 823-B-96-007 and hardness = 253 mg/L.

- **Arsenic, Beryllium, Chromium III, Mercury, Silver, Zinc, Total Recoverable and Chromium VI, Total Dissolved.** Monitoring only; statistical analysis conducted using the past five years of monitoring data submitted by the permittee shows no reasonable potential for these parameters to cause or contribute to an instream excursion of water quality standards.
- **Aluminum, Total Recoverable.** Protection of Aquatic Life Acute Criteria = 750 µg/L (no chronic criteria).

Acute WLA: $C_e = ((0.233 + 0.0)750 - (0.0 * 0.0))/0.233$
 $C_e = 750 \mu\text{g/L}$

$LTA_a = 750 (0.145) = 108.42 \mu\text{g/L}$

[CV = 1.50, 99th Percentile]

MDL = 108.42 (6.92) = **750 µg/L**

[CV = 1.50, 99th Percentile]

AML = 108.42 (2.40) = **260 µg/L**

[CV = 1.50, 95th Percentile, n = 4]

- **Cadmium, Total Recoverable.** Protection of Aquatic Life Chronic Criteria = 0.5 µg/L, Acute Criteria = 11.7 µg/L.

$$\begin{aligned}\text{Chronic} &= 0.5/0.905 = 0.54 \text{ } \mu\text{g/L} \\ \text{Acute} &= 11.7/0.870 = 12.95 \text{ } \mu\text{g/L}\end{aligned}$$

$$\begin{aligned}\text{Chronic WLA: } C_e &= ((0.233 + 0.0)0.54 - (0.0 * 0.0))/0.233 \\ &C_e = 0.54 \text{ } \mu\text{g/L} \\ \text{Acute WLA: } C_e &= ((0.233 + 0.0)12.95 - (0.0 * 0.0))/0.233 \\ &C_e = 12.95 \text{ } \mu\text{g/L}\end{aligned}$$

$$\begin{aligned}\text{LTA}_c &= 0.54 (1.00) = 0.54 \text{ } \mu\text{g/L} && [\text{CV} = 0.0, 99^{\text{th}} \text{ Percentile}] \\ \text{LTA}_a &= 12.95 (1.00) = 12.95 \text{ } \mu\text{g/L} && [\text{CV} = 0.0, 99^{\text{th}} \text{ Percentile}]\end{aligned}$$

Use most protective number of LTA_c or LTA_a.

$$\begin{aligned}\text{MDL} &= 0.54 (1.00) = \mathbf{0.5 \text{ } \mu\text{g/L}} && [\text{CV} = 0.0, 99^{\text{th}} \text{ Percentile}] \\ \text{AML} &= 0.54 (1.00) = \mathbf{0.5 \text{ } \mu\text{g/L}} && [\text{CV} = 0.0, 95^{\text{th}} \text{ Percentile, } n = 4]\end{aligned}$$

- **Copper, Total Recoverable.** Protection of Aquatic Life Chronic Criteria = 19.8 µg/L, Acute Criteria = 32.2 µg/L.

$$\begin{aligned}\text{Chronic} &= 19.8/0.960 = 20.62 \text{ } \mu\text{g/L} \\ \text{Acute} &= 32.2/0.960 = 33.56 \text{ } \mu\text{g/L}\end{aligned}$$

$$\begin{aligned}\text{Chronic WLA: } C_e &= ((0.233 + 0.0)20.62 - (0.0 * 0.0))/0.233 \\ &C_e = 20.62 \text{ } \mu\text{g/L} \\ \text{Acute WLA: } C_e &= ((0.233 + 0.0)33.56 - (0.0 * 0.0))/0.233 \\ &C_e = 33.56 \text{ } \mu\text{g/L}\end{aligned}$$

$$\begin{aligned}\text{LTA}_c &= 20.62 (0.595) = 12.28 \text{ } \mu\text{g/L} && [\text{CV} = 0.48, 99^{\text{th}} \text{ Percentile}] \\ \text{LTA}_a &= 33.56 (0.387) = 13.0 \text{ } \mu\text{g/L} && [\text{CV} = 0.48, 99^{\text{th}} \text{ Percentile}]\end{aligned}$$

Use most protective number of LTA_c or LTA_a.

$$\begin{aligned}\text{MDL} &= 12.28 (2.58) = \mathbf{31.7 \text{ } \mu\text{g/L}} && [\text{CV} = 0.48, 99^{\text{th}} \text{ Percentile}] \\ \text{AML} &= 12.28 (1.43) = \mathbf{17.6 \text{ } \mu\text{g/L}} && [\text{CV} = 0.48, 95^{\text{th}} \text{ Percentile, } n = 4]\end{aligned}$$

- **Iron, Total Recoverable.** Protection of Aquatic Life Chronic Criteria = 1000 µg/L (no acute criteria).

$$\begin{aligned}\text{Chronic WLA: } C_e &= ((0.233 + 0.0)1000 - (0.0 * 0.0))/0.233 \\ &C_e = 1000 \text{ } \mu\text{g/L}\end{aligned}$$

$$\text{LTA}_c = 1000 (0.352) = 352.1 \text{ } \mu\text{g/L} \quad [\text{CV} = 1.07, 99^{\text{th}} \text{ Percentile}]$$

$$\begin{aligned}\text{MDL} &= 352.1 (5.22) = \mathbf{1840 \text{ } \mu\text{g/L}} && [\text{CV} = 1.07, 99^{\text{th}} \text{ Percentile}] \\ \text{AML} &= 352.1 (2.02) = \mathbf{710 \text{ } \mu\text{g/L}} && [\text{CV} = 1.07, 95^{\text{th}} \text{ Percentile, } n = 4]\end{aligned}$$

- **Lead, Total Recoverable.** Protection of Aquatic Life Chronic Criteria = 6.8 µg/L, Acute Criteria = 174 µg/L.

$$\begin{aligned}\text{Chronic} &= 6.8/0.656 = 10.37 \text{ } \mu\text{g/L} \\ \text{Acute} &= 174/0.656 = 266.02 \text{ } \mu\text{g/L}\end{aligned}$$

$$\begin{aligned}\text{Chronic WLA: } C_e &= ((0.233 + 0.0)10.37 - (0.0 * 0.0))/0.233 \\ C_e &= 10.37 \text{ } \mu\text{g/L} \\ \text{Acute WLA: } C_e &= ((0.233 + 0.0)266.02 - (0.0 * 0.0))/0.233 \\ C_e &= 266.02 \text{ } \mu\text{g/L}\end{aligned}$$

$$\begin{aligned}\text{LTA}_c &= 10.37 (0.582) = 6.0 \text{ } \mu\text{g/L} && [\text{CV} = 0.50, 99^{\text{th}} \text{ Percentile}] \\ \text{LTA}_a &= 266.02 (0.373) = 99.29 \text{ } \mu\text{g/L} && [\text{CV} = 0.50, 99^{\text{th}} \text{ Percentile}]\end{aligned}$$

Use most protective number of LTA_c or LTA_a.

$$\begin{aligned}\text{MDL} &= 6.0 (2.68) = \mathbf{16.2 \text{ } \mu\text{g/L}} && [\text{CV} = 0.50, 99^{\text{th}} \text{ Percentile}] \\ \text{AML} &= 6.0 (1.45) = \mathbf{8.8 \text{ } \mu\text{g/L}} && [\text{CV} = 0.50, 95^{\text{th}} \text{ Percentile, } n = 4]\end{aligned}$$

- **Nickel, Total Recoverable.** Protection of Aquatic Life Chronic Criteria = 114.4 µg/L, Acute Criteria = 1028 µg/L.

$$\begin{aligned}\text{Chronic} &= 114.4/0.997 = 114.46 \text{ } \mu\text{g/L} \\ \text{Acute} &= 1028/0.998 = 1029.57 \text{ } \mu\text{g/L}\end{aligned}$$

$$\begin{aligned}\text{Chronic WLA: } C_e &= ((0.233 + 0.0)114.45 - (0.0 * 0.0))/0.233 \\ C_e &= 114.45 \text{ } \mu\text{g/L} \\ \text{Acute WLA: } C_e &= ((0.233 + 0.0)1029.57 - (0.0 * 0.0))/0.233 \\ C_e &= 1029.57 \text{ } \mu\text{g/L}\end{aligned}$$

$$\begin{aligned}\text{LTA}_c &= 114.45 (0.305) = 34.9 \text{ } \mu\text{g/L} && [\text{CV} = 1.23, 99^{\text{th}} \text{ Percentile}] \\ \text{LTA}_a &= 1029.57 (0.165) = 169.53 \text{ } \mu\text{g/L} && [\text{CV} = 1.23, 99^{\text{th}} \text{ Percentile}]\end{aligned}$$

Use most protective number of LTA_c or LTA_a.

$$\begin{aligned}\text{MDL} &= 34.9 (6.07) = \mathbf{212 \text{ } \mu\text{g/L}} && [\text{CV} = 1.23, 99^{\text{th}} \text{ Percentile}] \\ \text{AML} &= 34.9 (2.21) = \mathbf{76.9 \text{ } \mu\text{g/L}} && [\text{CV} = 1.23, 95^{\text{th}} \text{ Percentile, } n = 4]\end{aligned}$$

Whole Effluent Toxicity

- **Acute Whole Effluent Toxicity.** Monitoring requirement only. Monitoring is required to determine if reasonable potential exists for this facility's discharge to exceed water quality standards.

Acute and/or Chronic Allowable Effluent Concentrations (AECs) for facilities that discharge to Waters of the State lacking designated uses, Class C, Class P (with default Mixing Considerations), or Lakes [10 CSR 20-7.031(5)(A)4.B.(IV)(b)] are 100%, 50%, 25%, 12.5%, & 6.25%.

- **Parameters Removed.** Dissolved Oxygen limitations were removed as a determination was made that there is no reasonable potential for DO to cause an instream excursion of water quality standards. Effluent limitations for BOD₅ were calculated using the instream criteria for dissolved oxygen and are therefore protective of the instream criteria. Combining this with good historical performance and the fact that the receiving stream does not have an impairment or waste load allocation for dissolved oxygen, the department has determined that there is no reasonable potential for DO to cause an instream excursion of water quality standards.

Sampling Frequency Justification:

Oil and grease sampling and reporting frequency was adjusted from monthly to quarterly. Weekly sampling is required for *E. coli*, per 10 CSR 20-7.015(9)(D)6.A. For all other parameters, sampling and reporting frequency has been found to be appropriate; therefore, it was retained from the previous permit.

Sampling Type Justification:

As per 10 CSR 20-7.015, BOD₅, TSS, and WET test samples collected for mechanical plants shall be a 24 hour composite sample. Grab samples, however, must be collected for pH, Ammonia as N, *E. coli*, Oil & Grease, metals, Total Nitrogen, and Total Phosphorus. This is due to the holding time restriction for *E. coli*, the volatility of Ammonia, and the fact that pH cannot be preserved and must be sampled in the field. As Ammonia, Oil & Grease, metals, Total Nitrogen, and Total Phosphorus samples must be immediately preserved, these samples are to be collected as a grab.

Part VIII – Cost Analysis for Compliance

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

- The Department is required to determine “findings of affordability” because the permit applies to a combined or separate sanitary sewer system for a publically-owned treatment works.

Cost Analysis for Compliance - The Department has made a reasonable search for empirical data indicating the permit is affordable. The search consisted of a review of Department records that might contain economic data on the community, a review of information provided by the applicant as part of the application, and public comments received in response to public notices of this draft permit. If the empirical cost data was used by the permit writer, this data may consist of median household income, any other ongoing projects that the Department has knowledge, and other demographic financial information that the community provided as contemplated by Section 644. 145.3. See **Appendix – Cost Analysis for Compliance**

Part IX – 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.

PERMIT SYNCHRONIZATION:

The Department of Natural Resources is currently undergoing a synchronization process for operating permits. Permits are normally issued on a five-year term, but to achieve synchronization many permits will need to be issued for less than the full five years allowed by regulation. The intent is that all permits within a watershed will move through the Watershed Based Management (WBM) cycle together will all expire in the same fiscal year. This will allow further streamlining by placing multiple permits within a smaller geographic area on public notice simultaneously, thereby reducing repeated administrative efforts. This will also allow the Department to explore a watershed based permitting effort at some point in the future. Renewal applications must continue to be submitted within 180 days of expiration, however, in instances where effluent data from the previous renewal is less than 4 years old, that data may be re-submitted to meet the requirements of the renewal application. If the permit provides a schedule of compliance for meeting new water quality based effluent limits beyond the expiration date of the permit, the time remaining in the schedule of compliance will be allotted in the renewed permit. This permit will expire in the 4th Quarter of calendar year 2020.

PUBLIC NOTICE:

The Department shall give public notice that a draft permit has been prepared and its issuance is pending. Additionally, public notice will be issued if a public hearing is to be held because of a significant degree of interest in and water quality concerns related to a draft permit. No public notice is required when a request for a permit modification or termination is denied; however, the requester and permittee must be notified of the denial in writing. The Department must issue public notice of a pending operating permit or of a new or reissued statewide general permit. The public comment period is the length of time not less than 30 days following the date of the public notice which interested persons may submit written comments about the proposed permit. For persons wanting to submit comments regarding this proposed operating permit, then please refer to the Public Notice page located at the front of this draft operating permit. The Public Notice page gives direction on how and where to submit appropriate comments.

- The Public Notice period for this operating permit was from April 8, 2016 – May 10, 2016. No comments were received.

DATE OF FACT SHEET: MARCH 1, 2016

COMPLETED BY:

**ANGELA FALLS, ENVIRONMENTAL SPECIALIST
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WATER PROTECTION PROGRAM
OPERATING PERMITS SECTION - DOMESTIC WASTEWATER UNIT
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Appendices

APPENDIX - CLASSIFICATION WORKSHEET:

ITEM	POINTS POSSIBLE	POINTS ASSIGNED
Maximum Population Equivalent (P.E.) served (Max 10 pts.)	1 pt./10,000 PE or major fraction thereof.	-
Maximum: 10 pt Design Flow (avg. day) or peak month; use greater (Max 10 pts.)	1 pt. / MGD or major fraction thereof.	-
EFFLUENT DISCHARGE RECEIVING WATER SENSITIVITY:		
Missouri or Mississippi River	0	-
All other stream discharges except to losing streams and stream reaches supporting whole body contact	1	-
Discharge to lake or reservoir outside of designated whole body contact recreational area	2	-
Discharge to losing stream, or stream, lake or reservoir area supporting whole body contact recreation	3	3
PRELIMINARY TREATMENT - Headworks		
Screening and/or comminution	3	3
Grit removal	3	-
Plant pumping of main flow (lift station at the headworks)	3	3
PRIMARY TREATMENT		
Primary clarifiers	5	-
Combined sedimentation/digestion	5	-
Chemical addition (except chlorine, enzymes)	4	-
REQUIRED LABORATORY CONTROL – performed by plant personnel (highest level only)		
Push – button or visual methods for simple test such as pH, Settleable solids	3	-
Additional procedures such as DO, COD, BOD, titrations, solids, volatile content	5	5
More advanced determinations such as BOD seeding procedures, fecal coliform, nutrients, total oils, phenols, etc.	7	-
Highly sophisticated instrumentation, such as atomic absorption and gas chromatograph	10	-
ALTERNATIVE FATE OF EFFLUENT		
Direct reuse or recycle of effluent	6	-
Land Disposal – low rate	3	-
High rate	5	-
Overland flow	4	-
Total from page ONE (1)	----	14

APPENDIX - CLASSIFICATION WORKSHEET (CONTINUED):

ITEM	POINTS POSSIBLE	POINTS ASSIGNED
VARIATION IN RAW WASTE (highest level only) (DMR exceedances and Design Flow exceedances)		
Variation do not exceed those normally or typically expected	0	-
Recurring deviations or excessive variations of 100 to 200 % in strength and/or flow	2	2
Recurring deviations or excessive variations of more than 200 % in strength and/or flow	4	-
Raw wastes subject to toxic waste discharge	6	-
SECONDARY TREATMENT		
Trickling filter and other fixed film media with secondary clarifiers	10	-
Activated sludge with secondary clarifiers (including extended aeration and oxidation ditches)	15	15
Stabilization ponds without aeration	5	-
Aerated lagoon	8	-
Advanced Waste Treatment Polishing Pond	2	-
Chemical/physical – without secondary	15	-
Chemical/physical – following secondary	10	-
Biological or chemical/biological	12	-
Carbon regeneration	4	-
DISINFECTION		
Chlorination or comparable	5	-
Dechlorination	2	-
On-site generation of disinfectant (except UV light)	5	-
UV light	4	-
SOLIDS HANDLING - SLUDGE		
Solids Handling Thickening	5	5
Anaerobic digestion	10	-
Aerobic digestion	6	-
Evaporative sludge drying	2	-
Mechanical dewatering	8	-
Solids reduction (incineration, wet oxidation)	12	-
Land application	6	6
Total from page TWO (2)	----	28
Total from page ONE (1)	---	14
Grand Total	---	42

- A: 71 points and greater
- B: 51 points – 70 points
- C: 26 points – 50 points
- D: 0 points – 25 points

APPENDIX – RPA RESULTS:

Parameter	CMC*	RWC Acute*	CCC*	RWC Chronic*	n**	Range max/min	CV***	MF	RP Yes/No
Total Ammonia as Nitrogen (Summer) mg/L	12.1	111.76	1.5	111.76	12.00	24.2/0.28	0.99	4.62	YES
Total Ammonia as Nitrogen (Winter) mg/L	12.1	133.20	3.1	133.20	17.00	26.5/0.12	1.32	5.03	YES
Total Ammonia as Nitrogen (Summer) mg/L (<i>future</i>)	3.4	111.76	0.7	111.76	12.00	24.2/0.28	0.99	4.62	YES
Total Ammonia as Nitrogen (Winter) mg/L (<i>future</i>)	8.1	133.20	2.3	133.20	17.00	26.5/0.12	1.32	5.03	YES
Aluminum, Total Recoverable	750.0	4244.08	NA	NA	17.00	740/15	1.50	5.74	YES
Arsenic, Total Recoverable	NA	NA	20.0	15.00	17.00	15/15	0.00	1.00	NO
Beryllium, Total Recoverable	NA	NA	5.0	1.00	17.00	1/1	0.00	1.00	NO
Cadmium, Total Recoverable	12.9	2.00	0.5	2.00	17.00	2/2	0.00	1.00	YES
Chromium III, Total Recoverable	3856.5	4.66	184.3	4.66	10.00	3.2/2	0.19	1.46	NO
Chromium VI, Total Dissolved	15.0	5.00	10.0	5.00	17.00	5/5	0.00	1.00	NO
Copper, Total Recoverable	33.6	39.36	20.6	39.36	10.00	16/2.9	0.48	2.46	YES
Iron, Total Recoverable	NA	NA	1000.0	5737.53	17.00	1400/39	1.07	4.10	YES
Lead, Total Recoverable	266.0	21.37	10.4	21.37	17.00	10/3	0.50	2.14	YES
Mercury, Total Recoverable	2.8	0.34	0.5	0.34	17.00	0.2/0.02	0.33	1.69	NO
Nickel, Total Recoverable	1029.6	219.41	114.5	219.41	17.00	45/2	1.28	4.88	YES
Silver, Total Recoverable	18.7	2.00	NA	NA	17.00	2/2	0.00	1.00	NO
Zinc, Total Recoverable	263.6	103.60	261.5	103.60	17.00	55/15	0.41	1.88	NO

N/A – Not Applicable

* - Units are (µg/L) unless otherwise noted.

** - If the number of samples is 10 or greater, then the CV value must be used in the WQBEL for the applicable constituent. If the number of samples is < 10, then the default CV value must be used in the WQBEL for the applicable constituent.

*** - Coefficient of Variation (CV) is calculated by dividing the Standard Deviation of the sample set by the Mean of the same sample set.

RWC – Receiving Water Concentration. It is the concentration of a toxicant or the parameter toxicity in the receiving water after mixing (if applicable).

n – Is the number of samples.

MF – Multiplying Factor. 99% Confidence Level and 99% Probability Basis.

RP – Reasonable Potential. It is where an effluent is projected or calculated to cause an excursion above a water quality standard based on a number of factors including, as a minimum, the four factors listed in 40 CFR 122.44(d)(1)(ii).

Reasonable Potential Analysis is conducted as per (TSD, EPA/505/2-90-001, Section 3.3.2). A more detailed version including calculations of this RPA is available upon request.

APPENDIX – FACILITY LAYOUT:



APPENDIX – COST ANALYSIS FOR COMPLIANCE:

**Missouri Department of Natural Resources
Water Protection Program
Cost Analysis for Compliance
(In accordance with RSMo 644.145)**

**Gerald WWTF, Permit Renewal
City of Gerald
Missouri State Operating Permit #MO-0045420**

Section 644.145 RSMo requires the Department of Natural Resources (DNR) to make a “finding of affordability” when “issuing permits under” or “enforcing provisions of” state or federal clean water laws “pertaining to any portion of a combined or separate sanitary sewer system for publicly-owned treatment works.”

This cost analysis is based on data available to the Department as provided by the permittee and data obtained from readily available sources. For the most accurate analysis, it is essential that the permittee provides the Department with current information about the City’s financial and socioeconomic situation. The financial questionnaire available to permittees on the DNR website (<http://dnr.mo.gov/forms/780-2511-f.pdf>) should have been submitted with the permit renewal application. If it was not received with the renewal application, the Department sent a request to complete it with the welcome letter. The Department currently uses software to estimate the cost for reconstruction of a treatment plant titled CAPDEWORKS (CapDet). CapDet is a preliminary design and costing software program from Hydromantis¹ for wastewater treatment plants that uses national indices, such as the Marshall and Swift Index and Engineering News Records Cost Index for pricing in development of capital, operating, maintenance, material, and energy costs for each treatment technology. As the program works from national indices and each community is unique in its budget commitments and treatment design, the estimated costs are expected to be higher than actual costs. The cost estimates located within this document are for the construction of a disinfection system that is the most practical to facilitate compliance with new requirements. For the most accurate analysis, it is essential that the permittee provides the Department with current information about the City’s financial and socioeconomic situation.

Current Facility Description: Influent lift station / bar screen / Biolac activated sludge system – aeration basin and clarifier / flow equalization basin / sludge holding basin / sludge is land applied.

Flow evaluated: 150,000 gallons per day

Residential Connections:	<u>521</u>
Commercial Connections:	<u>66</u>
Industrial Connections:	<u>10</u>
Total Connections for this facility:	<u>597</u>

New Permit Requirements:

The permit requires compliance with new effluent limitations for *E. coli*, which may require the design, construction and operation of different treatment technology. To calculate the estimated user cost per 5,000 gallons, the Department used the equations currently being used in the Financial Assistance Center’s rate calculator. The equations account for replacement of equipment during the life of the treatment facility, debt retirement, capital costs, and an inflation factor. The calculator evaluates technologies through CapDet at a range of flows, then, using a linear interpolation, develops a spreadsheet outlining costs for treatment systems. Because the methods used to derive the analysis estimate costs that are greater than actual costs associated with an upgrade, it reflects a conservative estimate anticipated for a community. An overestimation of costs is due to the fact that it is not possible for the permit writer to determine what existing equipment and structures will be reused in the upgraded facility before an engineer completes a facility design.

The permit also requires compliance with new monitoring requirements for total nitrogen.

The size of the facility evaluated for upgrades was chosen based on the permitted design flow. If significant population growth is expected in the community, or if a significant portion of the flow is due to I&I, the flows used in the Facility Plan prepared by a consulting engineer may be different than this flow.

Anticipated Costs Associated with Complying with the New Requirements:

Cost associated with disinfection:

The total present worth to add UV disinfection treatment is estimated at \$243,798 (*CAPDEWORKS cost estimator was used*). This cost, if financed through user fees, might cost each household approximately \$2.47 per month. Due to the design limitations in the CapDet cost estimator, the costs for disinfection have been over estimated. For any flows less than 100,000 gpd, CapDet assumes a flow of 100,000 gpd when estimating the cost for UV disinfection. The assumptions for chlorine disinfection are that the chlorine used will either be in the liquid or gas phase and not the tablets which are used by many smaller facilities.

Cost associated with new sampling requirements:

The total cost estimated for new quarterly monitoring requirements is \$300 annually. This cost, if financed through user fees, might cost each household an extra \$0.04 per month. A community sets their user rates based on several factors. The percentage of the current user rate that is available to cover new debt is unknown to the Department.

This cost analysis does not dictate that a permittee will upgrade their facility, or how they will comply with the new permit requirements. For any questions associated with the *CAPDEWORKS cost estimator*, please contact the Engineering Section at (573) 751-6621.

(1) A community's financial capability and ability to raise or secure necessary funding;

Current User Rates:	<u>\$20.00</u>
Rate Capacity or Pay as You Go Option:	<u>Pay as You Go</u>
Municipal Bond Rating (if applicable):	<u>not provided by permittee</u>
Bonding Capacity: <i>(General Obligation Bond capacity allowed by constitution: cities=up to 20% of taxable tangible property sewer districts or villages=up to 5% of taxable tangible property)</i>	<u>not provided by permittee</u>
Current outstanding debt for the City:	<u>not provided by permittee</u>
Amount within the current user rate used toward payments on outstanding debt related to the current wastewater infrastructure:	<u>not provided by permittee</u>

(2) Affordability of pollution control options for the individuals or households at or below the median household income level of the community;

A Current Costs

Current operating costs (exclude depreciation):	<u>not provided by permittee</u>
Current user rate:	<u>\$20.00</u>

B Estimated Costs for Disinfection

Estimated total present worth of pollution control*:	<u>\$243,798</u>
Estimated capital cost of pollution control**:	<u>\$175,667</u>
Annual cost of operation and maintenance***:	<u>\$5,467</u>
Estimated user cost for disinfection per household per month:	<u>\$2.47</u>
Estimated resulting user cost per household per month****:	<u>\$22.47</u>
Estimated resulting user cost per household per month plus the amount within the current user rate used toward payments on outstanding debt:	<u>not provided by permittee</u>
Median household income(MHI) ² :	<u>\$41,528</u>
Cost per household as a percent of median household income ³ :	<u>0.65%</u>
Estimated cost per household per month plus the amount within the current user rate used toward payments on outstanding debt as a percent of median household income:	<u>not provided by permittee</u>

CAPDET estimates the total present worth to finance a new disinfection system to be approximately \$243,798. If financed through user costs, the future user costs have the potential to be estimated at \$22.47 per month. These costs assume a 5% interest rate over 20 years for mechanical treatment. It is the Department’s opinion that a UV disinfection system is the most practical treatment option for the design flow of this facility.

- * Total Present Worth includes a five percent interest rate to construct and perform annual operation and maintenance of the system over the term of the loan.
- ** Capital Cost includes project costs from CapDet with design, inspection and contingency costs.
- *** O&M cost shown in Table B includes operations, maintenance, materials, chemical and electrical costs for the facility on an annual basis. It includes items that are expected to replace during operations, such as pumps. O&M is estimated between 15% and 45% of the user cost.
- **** The Estimated User Cost shown in Table B is composed of two factors, Operation & Maintenance (O&M), and Debt Retirement Costs.

(3) An evaluation of the overall costs and environmental benefits of the control technologies;

The investment in wastewater treatment will provide several social, environmental and economic benefits. Improved wastewater provides benefits such as avoided health costs due to water-related illness, enhanced environmental ecosystem quality, and improved natural resources. The preservation of natural resources has been proven to increase the economic value and sustainability of the surrounding communities. Maintaining Missouri’s water quality standards fulfill the goals of **restoring** and **maintaining** the chemical, physical and biological integrity of **the receiving stream**; and, where attainable, to achieves a level of water quality that provides for the protection and propagation of fish, shellfish, wildlife and recreation in and on the water.

Disinfection

E. coli is a species of bacteria that normally live in the intestines of humans and warm-blooded animals. While some strains of *E. coli* are harmless, there are several strains that can cause severe diarrhea, abdominal cramps, and severe kidney failure. The people most susceptible to these consequences are young children, the elderly and those with weakened immune systems. The receiving stream that your facility discharges to contains the WBC-B designated use to protect human health in accordance with Water Quality Standards (10 CSR 20-7.031) and the Clean Water Act. The disinfection of wastewater effluent benefits human health by reducing exposure to disease-causing bacteria, such as *E.coli*, and viruses and reducing health care costs to those infected by contaminated water. The City of Gerald should construct and install a disinfection system at the treatment facility in order to protect human health as well as meet water quality standards.

Nutrient Monitoring

Nutrients are mineral compounds that are required for organisms to grow and thrive. Of the six (6) elemental macronutrients, Nitrogen and Phosphorus are generally not readily available and limit growth of organisms. Excess nitrogen and phosphorus will cause a shift in the ecosystem’s food web. Once excess nitrogen and phosphorus are introduced into a waterbody, some species’ populations will dramatically increase, while other populations will not be able to sustain life. Competition and productivity are two factors in which nutrients can alter aquatic ecosystems and the designated uses of a waterbody. For example, designated uses, such as drinking water sources and recreational uses become impaired when algal blooms take over a waterbody. These blooms can cause foul tastes and odors in the drinking water, unsightly appearance, and fish mortality in the waterbody. Some algae also produce toxins that may cause serious adverse health conditions such as liver damage, tumor promotion, paralysis, and kidney damage. The monitoring requirements for Nitrogen and Phosphorus have been added to the permit to provide data regarding the health of the receiving stream’s aquatic life. A healthy ecosystem is beneficial as it provides reduced impacts on human and aquatic health as well as recreational opportunities.

(4) Inclusion of ongoing costs of operating and maintaining the existing wastewater collection and treatment system, including payments on outstanding debts for wastewater collection and treatment systems when calculating projected rates:

The community did not provide the Department with information, nor could it be found through readily available data.

(5) An inclusion of ways to reduce economic impacts on distressed populations in the community, including but not limited to low and fixed income populations. This requirement includes but is not limited to:

- (a) Allowing adequate time in implementation schedules to mitigate potential adverse impacts on distressed populations resulting from the costs of the improvements and taking into consideration local community economic considerations.
- (b) Allowing for reasonable accommodations for regulated entities when inflexible standards and fines would impose a disproportionate financial hardship in light of the environmental benefits to be gained.

Socioeconomic Data^{4-6:}

Potentially Distressed Populations – City of Gerald	
Unemployment	4.1%
Adjusted Median Household Income (MHI)	\$41,528
Percent Change in MHI (1990-2012)	+42.7%
Percent Population Growth/Decline (1990-2012)	+18.8%
Change in Median Age in Years (1990-2012)	+0.4
Percent of Households in Poverty	20.5%
Percent of Households Relying on Food Stamps	21.3%

Opportunity for cost savings or cost avoidance:

- If available, connection to a larger centralized sewer system in the area may be more cost effective for the community.
- An opportunity may exist for the relocation of the point of discharge to a receiving stream capable of a greater mixing zone.
- The permittee may apply for State Revolving Fund (SRF) financial support in order to help fund a Capital Improvements Plan. Other loans and grants also exist for which the facility may be eligible. Contact information for the Department’s Financial Assistance Center (FAC) and more information can be found on the Department’s website at <http://dnr.mo.gov/env/wpp/srf/wastewater-assistance.htm>.

Opportunity for changes to implementation/compliance schedule, new technology, site specific criteria, use attainability analysis:

- The facility may propose changes to the schedule of compliance based on their own cost estimate or financial information.
- An integrated plan may be an appropriate option if they community needs to meet other environmental obligations as well as the new requirements within this permit. The integrated plan needs to be well thought out with specific timeframes built into the management plan that the municipality can reasonably commit to. The plan should be designed that will allow each municipality to meet their Clean Water Act obligations by maximizing their infrastructure improvement dollars through the appropriate sequencing of work.
- If the permittee can demonstrate that the proposed pollution controls result in substantial and widespread economic and social impact, the permittee may use Factor 6 of the Use Attainability Analysis (UAA) 40 CFR 131.10(g)(6) in the form of a

variance. This process is completed by determining the treatment type with the highest attainable effluent quality that would not result in a socio-economic hardship. This process could potentially become expensive in itself.

(6) An assessment of other community investments and operating costs relating to environmental improvements and public health protection;

The community did not report any other investments relating to environmental improvements.

(7) An assessment of factors set forth in the United States Environmental Protection Agency's guidance, including but not limited to the "Combined Sewer Overflow Guidance for Financial Capability Assessment and Schedule Development" that may ease the cost burdens of implementing wet weather control plans, including but not limited to small system considerations, the attainability of water quality standards, and the development of wet weather standards;

Secondary indicators for consideration:

Indicators	Strong (3 points)	Mid-Range (2 points)	Weak (1 point)	Score
Bond Rating Indicator	Above BBB or Baa	BBB or Baa	Below BBB or Baa	not provided
Overall Net Debt as a % of Full Market Property Value	Below 2%	2% - 5%	Above 5%	not provided
Unemployment Rate	>1% below Missouri average of 4.1%	± 1% of Missouri average of 4.1%	>1% above Missouri average of 4.1%	2
Median Household Income	More than 25% above Missouri MHI (\$49,008)	± 25% of Missouri MHI (\$49,008)	More than 25% below Missouri MHI (\$49,008)	2
Percent of Households in Poverty*	>10% below Missouri average of 11.7%	± 10% of Missouri average of 11.7%	>10% above Missouri average of 11.7%	2
Percent of Households Relying on Food Stamps*	>5% below Missouri average of 10.6%	± 5% of Missouri average of 10.6%	>5% above Missouri average of 10.6%	1
Property Tax Revenues as a % of Full Market Property Value	Below 2%	2% - 4%	Above 4%	not provided
Property Tax Collection Rate	Above 98%	94% - 98%	Below 94%	2

* Financial Capability Indicators are specific to the State of Missouri

Financial Capability (FCI) Indicators Average Score: 1.8
Residential Indicator (RI, from Criteria #2 above): 0.65%

Financial Capability Matrix:

Financial Capability Indicators Score from above ↓	Residential Indicator (User cost as a % of MHI)		
	Low (Below 1%)	Mid-Range (Between 1.0% and 2.0%)	High (Above 2.0%)
Weak (below 1.5)	Medium Burden	High Burden	High Burden
Mid-Range (1.5 – 2.5)	Low Burden	Medium Burden	High Burden
Strong (above 2.5)	Low Burden	Medium Burden	High Burden

Estimated Financial Burden for Disinfection: Low Burden

The resulting financial burden has been determined by comparing the Financial Capability Indicator score (FCI) with the Residential Indicator (RI) stated in Criteria #2. The cost associated with a disinfection system could result in a Low financial burden placed on the community due to the Mid-Range FCI paired with the Low RI.

(8) An assessment of any other relevant local community economic condition.

The community did not report any other relevant local economic conditions.

The Department contracted with Wichita State University to complete an assessment tool that would allow for predictions on rural Missouri community populations and future sustainability. The purpose of the study is to use a statistical modeling analysis in order to determine factors associated with each rural Missouri community that would predict the future population changes that could occur in each community. A stepwise regression model was applied to 19 factors which were determined as predictors of rural population change in Missouri. The model established a hierarchy of the predicting factors which allowed the model to place a weighted value on each of the factors. A total of 745 rural towns and villages in Missouri received a weighted value for each of the predicting factors. The weighted values for each town / village were then added together to determine an overall decision score. The overall decision scores were then divided into five categories and each town was assigned to a different categorical group based on the overall decision score.

The categorical groups were developed from the range of overall scores across all rural towns and villages within Missouri. The range covers 1,191 score points (-245 to 946).

Based on the assessment tool, the City of Gerald has been determined as a category 5 community. This means that the City of Gerald is predicted to be stable over time.

Conclusion and Finding

As a result of new regulations, the Department is proposing modifications to the current operating permit that may require the permittee to upgrade the facility and construct new control technologies and to increase monitoring.

The Department considered the eight (8) criteria presented in subsection 644.145.3 when evaluating the cost associated with the relevant actions. The Department estimates the resulting monthly user costs for a new disinfection system in order to meet new *E.coli* effluent limits could be \$22.47. Using this analysis, the Department finds that a UV disinfection system is the most practical and affordable option for your community. The construction and operation of a UV disinfection system will ensure that the individuals within the community will not be required to make unreasonable sacrifices in their essential lifestyle or spending patterns or undergo hardships in order to make the projected monthly payments for sewer connections.

In accordance with 40 CFR § 122.47(a)(1) and 10 CSR 20-7.031(11), compliance must occur as soon as possible. Therefore, based on this analysis including the Rural Population Sustainability Assessment Tool the City of Gerald has received a four (4) year schedule of compliance for the design and construction of a UV disinfection system.

The Department is committed to reassessing the cost analysis for compliance at renewal to determine if the initial schedule of compliance will accommodate the socioeconomic data and financial capability of the community at that time. By working more closely with your community, the Department and permittees will be able to identify opportunities to extend the schedule of compliance, if appropriate. Because each community is unique, we want to make sure that you have the opportunity to consider all your options and tailor solutions to best meet your community's needs. The Department understands the economic challenges associated with achieving compliance, and is committed to using all available tools to make an accurate and practical finding of affordability for the communities in the State.

This determination is based on readily available data and may overestimate the financial impact on the community. The community's facility plan that is submitted as a part of the construction permit process includes a discussion of community details, what the community can afford, existing obligations, future growth potential, an evaluation of options available to the community with cost information, and a discussion on no-discharge alternatives. The cost information provided through the facility plan process, which is developed by the community and their engineer, is more comprehensive of the community's individual factors in relation to selected treatment technology and costing information.

References:

1. <http://www.hydrumantis.com/>
2. The Median Household Income was found using the American Community Survey by the U.S. Census Bureau
3. $(22.47 / (41,528 / 12)) * 100 = 0.65\%$
4. Unemployment data was obtained from Missouri Department of Economic Development (June 2015) – <http://www.missourieconomy.org/pdfs/ure11506.pdf>
5. Population trend data was obtained from online at: 2012 Census Bureau Population Data - http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?_afpt=table, 2000 Census Bureau Population Data - <http://www.census.gov/popest/data/cities/totals/2009/tables/SUB-EST2009-04-29.xls>, 1990 Census Bureau Population Data - <http://www.census.gov/prod/cen1990/cp1/cp-1-27.pdf>
6. Poverty data – American Community Survey- <http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=>

Water Quality and Antidegradation Review

*For the Protection of Water Quality and Determination of Effluent Limits for Discharge to
Cedar Fork*

by

Gerald Wastewater Treatment Facility



November 23, 2009;
Revised September 22, 2010

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1. FACILITY INFORMATION

FACILITY NAME: City of Gerald North WWTF NPDES #: MO-0045420

FACILITY TYPE/DESCRIPTION:

Current design flow at the North Lagoon is 55,000 gpd with and the East Lagoon (MO-0045390) has a design flow of 107,500 gpd. The plan with the upgrade is to close the East Lagoon and have all wastewater treated at the treatment plant where the North Lagoon is currently located. The East Lagoon will be closed and a pump station established and pumped to the North treatment site. The current permit contains monitoring only for select metals, while Gerald works with the department to establish a pretreatment program. The North Lagoon flows appear to be affected by inflow and infiltration, as a review of the discharge monitoring reports for the last three years (2008-2010) show an average flow of 135,000 gpd. Gerald is proposing to expand the North Lagoon and retrofit it with a Biolac system and equalization basin. The new design flow will be 150,000 gpd (0.15 MGD).

EDU*: Ozark/Moreau/Loutre ECOREGION: Ozark Highland/ Central Plateau
 8- DIGIT HUC: 10300200 LATITUDE/LONGITUDE: x= 646298; y= 4253592
 COUNTY: Franklin LEGAL DESCRIPTION: NW ¼ NE ¼ NW ¼ Sec.1, T42N, R4W

* - Ecological Drainage Unit

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:

During the previous 5 year cycle, there were multiple permit effluent exceedances for BOD₅ and TSS. Also multiple times the pH was below effluent limits. Also there was multiple discharge monitoring reports that were submitted late or not submitted.

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	RECEIVING WATERBODY	DISTANCE TO CLASSIFIED SEGMENT (MI)
001	0.233	Secondary	Unnamed Tributary to Cedar Fork	~3.5

3. RECEIVING WATERBODY INFORMATION

WATERBODY NAME	CLASS	WBID	LOW-FLOW VALUES (CFS)			DESIGNATED USES**
			1Q10	7Q10	30Q10	
Unnamed Tributary to Cedar Fork	U	--	0	0	0	General Criteria
Cedar Fork	C	1668	0	0	0	AQL, LWW, WBC(B)***

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

*** UAA conducted on Cedar Fork in 2007 with the recommendation to retain use.

RECEIVING WATER BODY SEGMENT #1: Unnamed Tributary to Cedar Fork

Upper end segment UTM or Lat/Long coordinates: x= 646298; y= 4253592

Lower end segment UTM or Lat/Long coordinates: x= 646341; y= 4254667(Congfluence with Unnamed Tributary to Cedar Fork)

4. GENERAL COMMENTS

Cochran Engineering prepared, on behalf of the City of Gerald, the *Gerald Wastewater Treatment Facility Antidegradation*. No Geohydrological Evaluation was submitted with the request; however, the receiving waterbody is not losing but gaining (Appendix A: Map). Dissolved oxygen modeling analysis was submitted for review. Information found in the submitted report and in the summary forms provided by the applicant in Appendix D was used to develop this review document.

The Antidegradation Review is being revised to incorporate information received by the department's pretreatment program. Water quality based effluent limits (WQBELs) were calculated for ammonia and all metals in the current permit. Effluent limits will be imposed for ammonia and the metals; including the metals identified by pretreatment that are not in the current permit. If through the development of local limits in the pretreatment program, the facility is unable to meet the proposed effluent limits for metal, an Alternatives Analysis Antidegradation Review will be required.

Biolac stands for Biological Aeration Chain systems. The process technology is an extended aeration or flow-through lagoon in conjunction with a moving fine bubble aeration device. These systems have been used primarily in the South on systems averaging flows less than 2 MGD (USEPA, Assessment of the Biolac Technology; EPA430/09-90-013 and Parkson Biolac Technology Brochure). In EPA's assessment, BOD₅ and TSS removal efficiencies were greater than 90%. Based on the information available, the Biolac system should produce effluent at or below the effluent limits proposed in the Antidegradation Report.

5. ANTIDEGRADATION REVIEW INFORMATION

The following is a review of the *City of Gerald Antidegradation Report* dated June 2009 and revised October 2009. The department revised the Water Quality Antidegradation Review Sheet based on information received regarding the pretreatment industries in September 2010.

5.1. TIER DETERMINATION

Below is a list of pollutants of concern reasonably expected to be in the discharge (see Appendix B: 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).

For *Escherichia Coli*, the Gerald plant is more than 3 miles from a waterbody containing whole body contact as a designated use. However bacteria were included on the list as potential pollutants of concern, in the event the waterbodies are reclassified and whole body contact may be added. Disinfection is not addressed at this time.

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

- Tier Determination and Effluent Summary
- Attachment B, Tier 2 with minimal degradation.

5.2. EXISTING WATER QUALITY

MDNR will not distinguish between total recoverable and dissolved POCs.

TABLE 1: POLLUTANTS OF CONCERN AND TIER DETERMINATION

POLLUTANTS OF CONCERN	TIER	DEGRADATION	COMMENT
BOD ₅		Non-degrading	
Total Suspended Solids (TSS)	*	Non-degrading	
Ammonia		Non-degrading	
pH	**	Not determined	Permit limits apply only
Total Phosphorus		Not determined	Discovered in Survey of Industries
Oil and Grease		Not determined	Permit limits apply only
Aluminum, Total Recoverable	2	Minimal	
Arsenic, Total Recoverable	2	Minimal	
Beryllium, Total Recoverable	2	Minimal	
Cadmium, Total Recoverable	2	Minimal	DMR submittals above criteria
Chromium III, Total Recoverable	2	Minimal	Discovered in Survey of Industries
Chromium VI, Total Dissolved	2	Minimal	DMR submittals above criteria
Copper, Total Recoverable	2	Minimal	Discovered in Survey of Industries
Iron, Total Recoverable	2	Minimal	
Lead, Total Recoverable	2	Minimal	DMR submittals above criteria
Mercury	2	Minimal	DMR submittals above criteria
Nickel, Total Recoverable	2	Minimal	
Silver, Total Recoverable	2	Minimal	DMR submittals above criteria
Zinc, Total Recoverable	2	Minimal	DMR submittals above criteria
Escherichia coli (E. coli)	2	Minimal	

Tier determination not possible: * No in-stream standards for these parameters. ** Standards for these parameters are ranges

5.3. ASSIMILATIVE CAPACITY CALCULATIONS

Currently Gerald does not have permit limits for ammonia or metals. The applicant proposed for BOD₅ and TSS to be non-degrading based on design flow. The department recalculated the current BOD₅ and TSS loads based on the average daily flow, and the effluent limits proposed lead to a decrease in loading in the stream. Effluent limits for ammonia and metals were set to be minimally degrading. Table 2 summarizes the Reasonable Potential Analysis completed on the metals and ammonia. For ammonia, the department had 18 samples for summer and 12 samples for winter. For the metals, the department had 5 data points for each parameter evaluated.

For ammonia, the department used the discharge monitoring reports to get the average seasonal concentration. For summer the average summer concentration was 9.6 mg/L and for winter average concentration was 6.06 mg/L. The department calculated the decay for the 3.5 miles to the classified stream using the Boning's Equation. See Appendix B for the Water Quality Based Effluent limits for the current design flow (0.055 MGD), average daily flow (0.135 MGD), and at the proposed design flow (0.15 MGD). Appendix B contains the calculation of the minimally degrading effluent limits based on the average daily flow. The applicant had proposed minimally degrading effluent limits. In Appendix B, the department compared the water quality based effluent limits at the proposed flows, the minimally degrading effluent limits, and what the applicant proposed. For effluent limits, the department used the most stringent effluent limits, so for summer the effluent limits proposed by the applicant were used and for winter, the department calculated minimal degrading effluent limits were more stringent. With these effluent limits, the loading is less than or equal to the current loading to the stream, and below the WQBELs.

For the metals, the water quality based effluent limits are the same as the stream is unclassified thus the wasteload allocation equals the criteria. The facility has performed quarterly monitoring for over two years and there are limited numbers of data points available. With the data available, the department used the maximum reported sample point for stream load, unless the maximum sample concentration was above the chronic criteria to calculate stream load at the average daily flow. Gerald had proposed to continue monitoring only, however from the data available and the Reasonable Potential Analysis performed (Table 2), the department feels effluent limits are necessary. The department calculated a minimal increase in stream loading based on either the current maximum load or the chronic criteria. Chronic criteria was used to protect the uses in the downstream Class C stream. Appendix C provides the calculation for minimal degrading effluent limits. If the facility feels it cannot meet the minimal degrading effluent limits, an Antidegradation Review is required with an alternatives analysis of options in treating the metals. See Subsection 5.4 for Pretreatment Discussion.

TABLE 2: REASONABLE POTENTIAL ANALYSIS SUMMARY

Pollutants of Concern	CMC*	RWC Acute	CCC	RWC Chronic	Maximum	Reasonable Potential
Aluminum, TR	750	554.7	N.A.	N.A.	180.0	**
Arsenic, TR	N.A.	N.A.	20	35.8	15.0	Yes
Beryllium, TR	N.A.	N.A.	5	2.36	1	**
Cadmium, TR	10.4	17.2	0.5	17.2	4.0	Yes
Chromium VI, TD	15	468.1	10	468.1	70.0	Yes
Iron, TR	NA	NA	1000	992.4	590.0	Yes
Mercury, TR	2.4	23.5	0.5	23.5	2.0	Yes
Lead, TR	203	171.7	8	171.7	100.0	Yes
Nickel, TR	860	524.8	96	524.8	85.0	Yes
Silver, TR	13	224.9	N.A.	NA	50.0	Yes
Zinc, TR	220	9634.6	220	9634.6	400.0	Yes
Ammonia-summer (mg/L)	12.1	61.9	1.5	61.9	19.9	Yes
Ammonia-winter (mg/L)	12.1	23.15	3.1	23.15	13.60	Yes

TR= total recoverable, TD= total dissolved

* All concentrations in µg/L, except for ammonia.

** Based on the limited number of samples, limits are being recommended even though it appears there is not reasonable potential.

5.4. PRETREATMENT CALCULATIONS

Minimal degradation was selected for the other pollutants of concern. The Department has been working with the City of Gerald to establish a pretreatment program. To apply antidegradation to the pollutants of concern, the department's procedure is to calculate mass loading at the current average daily flow (0.135 MGD) and allow 10 % increase in loading to account for the minimal degradation absent an alternatives analysis. In Appendix C, the effluent limits are calculated for the water quality based effluent limits and the minimally degrading effluent limits. MDNR recommends the permit contain concentration effluent limits to be consistent with other pretreatment facilities in the state. Minimal degrading effluent limits can be expressed in either concentration based or mass loading. Table 4 is in concentration based to avoid two sets of effluent limits, if mass loading effluent limits are used, concentration based limits are required also to meet the Water Quality Standards.

Future renewals of the permit should conduct the reasonable potential based on the Water Quality Criteria in 10 CSR 20-7 Table A. Minimal degradation effluent limits shall be retained in the future renewals unless an Antidegradation Review is conducted for expansion or new pollutants of concern. The reasonable potential analysis above was conducted based on existing Water Quality Criteria. Table C-1 in Appendix C compares the existing water quality based effluent limits to the minimally degrading effluent limits. Based on the discharge monitoring reports and a reasonable potential analysis, MDNR is recommending metal effluent limits.

To help the City in developing local limits, Table 3 provides the maximum daily load and monthly average load. The loads correspond to the minimal degrading effluent limits proposed in Table 4: Effluent Limits under the Derivation and Discussion Subsection. MDNR recommends the permit contain concentration effluent limits to be consistent with other pretreatment facilities in the state.

For a new pollutant of concern, the City may pursue a minimal degrading effluent limits in their antidegradation review.

TABLE 3: MASS LOADING

POLLUTANT OF CONCERN	MAXIMUM DAILY (LBS/DAY)	MONTHLY AVERAGE (LBS/DAY)
Aluminum, Total Recoverable	0.29	0.14
Arsenic, Total Recoverable	0.019	0.010
Beryllium, Total Recoverable	0.56	0.28
Cadmium, Total Recoverable	0.00047	0.0002
Chromium III, Total Recoverable	0.16	0.080
Chromium VI, Total Dissolved	0.12	0.062
Copper, Total Recoverable	0.017	0.009
Iron, Total Recoverable	0.77	0.39
Lead, Total Recoverable	0.0067	0.0033
Mercury, Total Recoverable	0.0006	0.0003
Nickel, Total Recoverable	0.097	0.048
Silver, Total Recoverable	0.011	0.005
Zinc, Total Recoverable	0.22	0.11

5.5. DEMONSTRATION OF NECESSITY AND SOCIAL AND ECONOMIC IMPORTANCE

Missouri’s antidegradation implementation procedures specify that if the proposed activity does not result in significant degradation then a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance are not required.

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 supercede 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.

7. MIXING CONSIDERATIONS

Mixing Zone (MZ): Not Allowed [10 CSR 20-7.031(4)(A)4.B.(I)(a)].

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

8. PERMIT LIMITS AND INFORMATION

WASTELOAD ALLOCATION STUDY CONDUCTED (Y OR N):	N	USE ATTAINABILITY ANALYSIS CONDUCTED (Y OR N):	Y*	WHOLE BODY CONTACT USE RETAINED (Y OR N):	Y
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*UAA conducted in July 2007, with the recommendation to retain WBC in Cedar Fork Creek.

WET TEST (Y OR N):	Y	FREQUENCY:	ONCE/YEAR	AEC:	100%	METHOD:	MULTIPLE
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TABLE 4: EFFLUENT LIMITS

PARAMETER	UNITS	DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	WQBEL (NOTE 1)	MONITORING FREQUENCY
FLOW	MGD	*		*	FSR	once/day
BOD ₅	MG/L		24	16.5	NDL	once/month
TSS	MG/L		33	22	NDL	once/month
pH	SU	**		**	FSR	once/month
TEMPERATURE	°C	*		*	N/A	once/month
OIL & GREASE	MG/L	15		10	FSR	once/month
AMMONIA AS N (APR 1- SEPT 30)	MG/L	4.6		1.7	NDL	once/month
AMMONIA AS N (OCT 1- MARCH 31)	MG/L	5.5		2.7	NDL	once/month
TOTAL PHOSPHORUS	MG/L	*		*	FSR	once/month
HARDNESS	MG/L	*		*	N/A	once/month
ALUMINUM, TR	µG/L	229		114	MDEL	ONCE/MONTH
ARSENIC, TR	µG/L	15		8	MDEL	ONCE/MONTH
BERYLLIUM, TR	µG/L	4.5		2.2	MDEL	ONCE/MONTH
CADMIUM, TR	µG/L	0.4		0.2	MDEL	ONCE/MONTH
CHROMIUM III, TR	µG/L	127		64	MDEL	ONCE/MONTH
CHROMIUM VI, TD	µG/L	10		5.0	MDEL	ONCE/MONTH
COPPER, TR	µG/L	14		7	MDEL	ONCE/MONTH
IRON, TR	µG/L	620		310	MDEL	ONCE/MONTH
LEAD, TR	µG/L	5.3		2.7	MDEL	ONCE/MONTH
MERCURY, TR	µG/L	0.5		0.3	MDEL	ONCE/MONTH
NICKEL, TR	µG/L	77		39	MDEL	ONCE/MONTH
SILVER, TR	µG/L	8.6		4.3	MDEL	ONCE/MONTH
ZINC, TR	µG/L	178		89	MDEL	ONCE/MONTH

* - Monitoring requirements only.

**-pH shall be maintained between 6.5-9.0 and shall not be averaged.

NOTE 1 – WATER QUALITY-BASED EFFLUENT LIMITATION --WQBEL; OR MINIMALLY DEGRADING EFFLUENT LIMIT--MDEL; OR TECHNOLOGY-BASED EFFLUENT LIMIT-TBEL; OR NO DEGRADATION LIMIT--NDL; OR FSR --FEDERAL/STATE REGULATION; OR N/A--NOT APPLICABLE. ALSO, PLEASE SEE THE **GENERAL ASSUMPTIONS OF THE WQAR #4 & #5**.

***This facility is required to meet a removal efficiency of 85% or more for BOD₅ and TSS. Influent BOD₅ and TSS data should be reported to ensure removal efficiency requirements are met.

Minimal degrading effluent limits can be expressed in either concentration based or mass loading. Table 4 is in concentration based to avoid two sets of effluent limits, if mass loading effluent limits are used, concentration based limits are required also to meet the Water Quality Standards.

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:

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

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). Acute wasteload allocations were determined using applicable water quality criteria (CMC: criteria maximum concentration).

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) Assimilative capacity based – Using existing water quality (EWQ), water quality criteria, and the facility assimilative capacity ratio within the following equation:

$$C_{d2} = [(C_c \times (Q_s + Q_{d2}) - C_s \times (Q_s + Q_{d1})) \text{FAC}_{\text{ratio}} + Q_{d1} \times C_{d1}] / Q_{d2}$$

Where: C_c = downstream concentration, the Water Quality Standard (WQS)

Q_s = Stream 7Q10 flow (ft³/s)

Q_{d1} = Current effluent flow (ft³/s)

Q_{d2} = Proposed effluent design flow (ft³/s)

C_s = combined stream concentrations (calculated using EWQ, permitted discharges)

C_{d1} = effluent concentration of the current facility

C_{d2} = effluent concentration of the proposed facility

FAC_{ratio} = facility assimilative capacity ratio (calculated or assumed)

Chronic wasteload allocations (WLA_c) were determined using applicable chronic water quality criteria (CCC: criteria continuous concentration) and upstream stream flow without mixing considerations. Acute wasteload allocations are only determined in the absence of applicable chronic criteria.

The minimally-degrading effluent average monthly and daily maximum limits are determined by applying the WLA_c as the daily maximum (MDL) and dividing the MDL by 2.0 to derive the average monthly 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: Minimally-degrading effluent limits have been based on the authority included in Section III. Permit Consideration of the AIP.

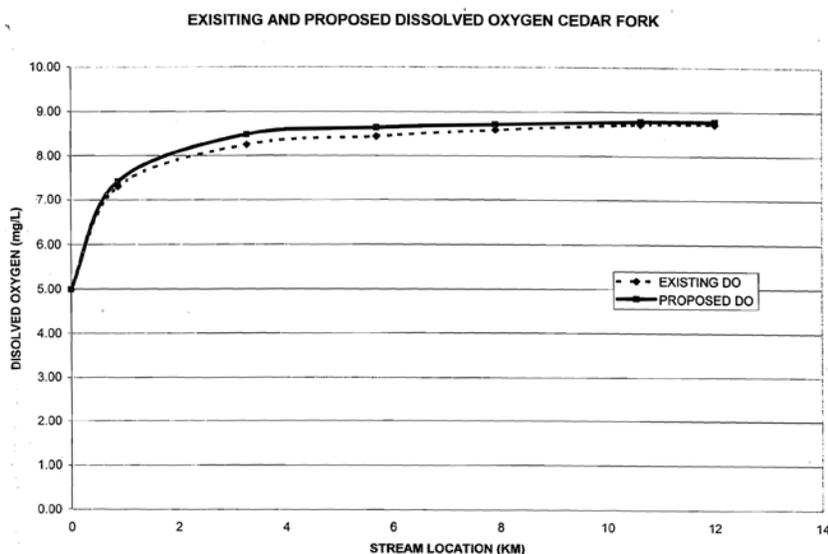
10.1. OUTFALL #001 – MAIN FACILITY OUTFALL

- **Flow.** In accordance with [40 CFR Part 122.44(i)(1)(ii)] the volume of effluent discharged from the 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 (BOD₅).** The applicant proposed non-degrading BOD₅ limits based on permitted flow of 0.055 MGD. Those limits would be AML=16.5 mg/L and MDL=24 mg/L. Based on average daily flow, the proposed effluent limits would be a decrease in loading, see Table below. The Gerald Antidegradation report modeled the existing dissolved oxygen concentration in the stream and compared it to the expected dissolved oxygen concentration with the proposed BOD₅ limits. Influent monitoring may be required for this facility in its Missouri State Operating Permit.

As a result of this analysis, MDNR staff concludes that the above mentioned effluent limits are protective of beneficial uses and existing water quality.

	Existing Limits (mg/L)	Existing Flow (MGD)	Existing Loading (lbs/day)	Permitted Flow (MGD)	Permitted Loading (lbs/day)	Proposed Limits (mg/L)	Proposed Flow (MGD)	Loading (lbs/day)	% Change
BOD ₅	65	0.135	71.38	0.55	29.82	24	0.15	29.93	-41.9%
	45	0.135	50.51	0.55	20.64	16.5	0.15	20.58	-40.7%
TSS	90	0.135	101.0	0.55	41.28	33	0.15	41.15	-40.7%
	60	0.135	67.34	0.55	27.52	22	0.15	27.44	-40.7%



- Total Suspended Solids (TSS).** The applicant proposed non-degrading TSS limits based on permitted design flow of 0.055 MGD. Those limits would be AML=22 mg/L and MDL=33 mg/L. Based on average daily flow, the proposed effluent limits would be a decrease in loading, see Table above. Influent monitoring may be required for this facility in its Missouri State Operating Permit.
- Oil & Grease.** Conventional pollutant, [10 CSR 20-7.031, Table A]. Effluent limitation for protection of aquatic life; 10 mg/L monthly average, 15 mg/L daily maximum.
- pH.** pH shall be maintained in the range from six to nine (6.5 – 9.0) standard units [10 CSR 20-7.015 (8)(A)2.].
- Temperature.** Monitoring requirement only. Temperature affects the toxicity of Ammonia

- **Total Ammonia Nitrogen** Applicant proposed minimal degradation for ammonia. The applicant proposed a daily max based on decay based of 3.5 miles to the classified section of 4.6 mg/l summer daily max and 7.9 mg/l winter daily max. The department calculated non-degrading limits based on the average daily flow (0.135 MGD). When reviewing the discharge monitoring reports, the average summer concentration was 9.62 mg/L and the average winter concentration was 6.8 mg/L. Appendix B contains the department's minimally/non-degrading limits compared to the WQBELs and the applicant's proposed effluent limits. Whatever was the most stringent was used, which for summer are the applicant proposed effluent limits and for winter are the department calculated minimally/non-degrading effluent limits. These limits are protective of the Water Quality Standards, as 2.8 mg/L is the default average monthly limit for a Class C stream in the winter.

	Maximum Daily (mg N/L)	Average Monthly (mg N/L)
Summer	4.6	1.7
Winter	5.5	2.7

- **Total Phosphorus**. Monitoring only as pollutant was identified as a pollutant of concern in the Survey of Industries conducted for Pretreatment. At this time, the department does not have standards for Total Phosphorus in Streams, but is in the process of developing criteria.
- **E. Coli**. At this time, the facility is not required to monitor for E. Coli as it is 3.5 miles from a classified waterbody with Whole Body Contact as a beneficial use. However, the facility and the consulting engineer are aware that the state is in the process of reclassifying a number of waterbodies and included bacteria as potential pollutant of concern. This facility may be required to have E. coli effluent limitations when Missouri adopts the implementation of the E. coli effluent regulations and reclassifies streams. At this time the facility is not planning on adding disinfection or monitoring for bacteria. Also, please see **GENERAL ASSUMPTIONS OF THE WQAR #7**.
- **Hardness, Total as CaCO₃** Monitoring to verify hardness of effluent discharged from this outfall. Metals toxicity is influenced by total hardness.

- **Metals**

Effluent limitations for total recoverable metals were developed using methods and procedures outlined in EPA/505/2-90-001 and “The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion” (EPA 823-B-96-007). General warm-water fishery criteria apply and water hardness = 162 mg/L.

Due to the absence of contemporaneous effluent and instream data for total recoverable metals, dissolved metals, hardness, and total suspended solids with which to calculate metals translators, partitioning between the dissolved and adsorbed phases was assumed to be minimal (Section 5.7.3, EPA/505/2-90-001). Freshwater criteria conversion factors for dissolved metals were used as the metals translator as recommended in guidance (Section 1.3, 1.5.3, and Table 1, EPA 823-B-96-007). If concurrent site-specific data for total recoverable metals, dissolved metals, hardness, and total suspended solids are provided to the department, partitioning evaluations may be considered and site-specific translators developed.

METAL	CONVERSION FACTORS	
	ACUTE	CHRONIC
Aluminum	NA	NA
Arsenic	NA	NA
Beryllium	NA	NA
Cadmium	0.924	0.889
Chromium III	0.316	0.860
Chromium VI	0.982	0.962
Copper	0.96	0.96
Iron	NA	NA
Lead	0.721	0.721
Nickel	0.998	0.997
Silver	0.85	N.A.
Zinc	0.98	0.98

Conversion factors for Cd, Pb, Ni and Zn are hardness dependent. Values calculated using equation found in Section 1.3 of EPA 823-B-96-007 and hardness = 162 mg/L.

$$C_e = \frac{((Q_e + Q_s) * C) - (Q_s * C_s)}{Q_e}$$

- **Aluminum, Total Recoverable.** In Appendix C, the water quality based effluent limits were calculated along with the current stream load based on the maximum concentration reported in the discharge monitoring reports plus a load increase of less than 10% of the criteria. The loads were then converted to concentrations. For Aluminum, the minimal degradation concentration limits were more protective of the stream and its available assimilative capacity. Protection of Aquatic Life Acute Criteria (CMC) = 750 µg/L.

MDL= 229 µg/L
 AML= 114 µg/L

- **Arsenic Total Recoverable.** In Appendix C, the water quality based effluent limits were calculated along with the current stream load based on the maximum concentration reported in the discharge monitoring reports plus a load increase of less than 10% of the criteria. The loads were then converted to concentrations. For Arsenic, the minimal degradation concentration limits were more protective of the stream and its available assimilative capacity. Protection of Aquatic Life Chronic Criteria (CMC) = 20 µg/L.

MDL= 15 µg/L
 AML= 8 µg/L

- **Beryllium Total Recoverable.** In Appendix C, the water quality based effluent limits were calculated along with the current stream load based on the maximum concentration reported in the discharge monitoring reports plus a load increase of less than 10% of the criteria. The loads were then converted to concentrations. For Beryllium, the minimal degradation concentration limits were more protective of the stream and its available assimilative capacity. Protection of Aquatic Life Chronic Criteria (CMC) = 5 µg/L.

MDL= 4.5 µg/L

AML= 2.2 µg/L

- **Cadmium, Total Recoverable.** In Appendix C, the water quality based effluent limits were calculated. For calculating current stream load, the chronic criterion was used instead of the maximum reported concentration as the maximum concentration was above the chronic criteria. To calculate minimal degrading effluent limits it was stream load plus a less than 10% increase of the criteria. For Cadmium, the minimal degrading effluent limits are slightly more stringent than the water quality based effluent limits, as both are based on criteria. Protection of Aquatic Life Chronic (CMC) = 0.34µg/L and Acute Criteria (CCC) = 7.60 µg/L.

Chronic = 0.34/0.889 = 0.39 µg/L

Acute = 7.60/0.924 = 8.23 µg/L

MDL= 0.4 µg/L

AML= 0.2 µg/L

- **Chromium III, Total Recoverable.** Chromium III was identified as a potential pollutant of concern during the Pretreatment Survey of Industries. In Appendix C, the water quality based effluent limits were calculated. For calculating current stream load, the chronic criterion was used instead of the maximum reported concentration as there is no data currently available for Chromium III. To calculate minimal degrading effluent limits it was stream load plus a less than 10% increase of the criteria. For Chromium III, the minimal degrading effluent limits are slightly more stringent than the water quality based effluent limits, as both are based on criteria. Protection of Aquatic Life Chronic (CMC) = 110.04 µg/L and Acute Criteria (CCC) = 845.89 µg/L.

Acute: 845.89/0.316=2676.9 µg/L

Chronic: 110.04/0.860=128.0 µg/L

MDL= 127 µg/L

AML= 64 µg/L

- **Chromium VI, Total Dissolved.** In Appendix C, the water quality based effluent limits were calculated. For calculating current stream load, the chronic criterion was used instead of the maximum reported concentration as the maximum concentration was above the chronic criteria. To calculate minimal degrading effluent limits it was stream load plus a less than 10% increase of the criteria. For Chromium VI, the minimal degrading effluent limits are slightly more stringent than the water quality based effluent limits, as both are based on criteria. Protection of Aquatic Life Chronic (CMC) = 10 µg/L and Acute Criteria (CCC) = 15 µg/L.

Chronic = 10 µg/L

Acute = 15 µg/L

MDL= 10 µg/L

AML= 5 µg/L

- **Copper, Total Recoverable.** Copper was identified as a potential pollutant of concern during the Pretreatment Survey of Industries. In Appendix C, the water quality based effluent limits were calculated. For calculating current stream load, the chronic criterion was used instead of the maximum reported concentration as there is no data currently available for Copper. To calculate minimal degrading effluent limits it was stream load plus a less than 10% increase of the criteria. For Copper, the minimal degrading effluent limits are slightly more stringent than the water quality based effluent limits, as both are based on criteria. Protection of Aquatic Life Chronic (CMC) = 13.52 µg/L and Acute Criteria (CCC) = 21.17 µg/L.

Acute: $21.17/0.96=22.0 \mu\text{g/L}$
Chronic: $13.52/0.96=14.1 \mu\text{g/L}$

MDL= $14 \mu\text{g/L}$
AML= $7.0 \mu\text{g/L}$

- **Iron Total Recoverable.** In Appendix C, the water quality based effluent limits were calculated along with the current stream load based on the maximum concentration reported in the discharge monitoring reports plus a load increase of less than 10% of the criteria. The loads were then converted to concentrations. For Iron, the minimal degradation concentration limits were more protective of the stream and its available assimilative capacity. Protection of Aquatic Life Chronic Criteria (CMC) = $1000 \mu\text{g/L}$.

MDL= $620 \mu\text{g/L}$
AML= $310 \mu\text{g/L}$

- **Lead, Total Recoverable.** In Appendix C, the water quality based effluent limits were calculated. For calculating current stream load, the chronic criterion was used instead of the maximum reported concentration as the maximum concentration was above the chronic criteria. To calculate minimal degrading effluent limits it was stream load plus a less than 10% increase of the criteria. For Lead, the minimal degrading effluent limits are slightly more stringent than the water quality based effluent limits, as both are based on criteria. Protection of Aquatic Life (CMC) = $4.24 \mu\text{g/L}$ and Acute Criteria (CCC) = $108.69 \mu\text{g/L}$.

Chronic = $4.24/0.721 = 5.9 \mu\text{g/L}$
Acute = $108.69/0.721 = 150.8 \mu\text{g/L}$

MDL= $5.3 \mu\text{g/L}$
AML= $2.7 \mu\text{g/L}$

- **Mercury, Total Recoverable.** In Appendix C, the water quality based effluent limits were calculated. For calculating current stream load, the chronic criterion was used instead of the maximum reported concentration as the maximum concentration was above the chronic criteria. To calculate minimal degrading effluent limits it was stream load plus a less than 10% increase of the criteria. For Mercury, the minimal degrading effluent limits are slightly more stringent than the water quality based effluent limits, as both are based on criteria. Protection of Aquatic Life (CMC) = $0.5 \mu\text{g/L}$ and Acute Criteria (CCC) = $2.4 \mu\text{g/L}$.

MDL= $0.5 \mu\text{g/L}$
AML= $0.3 \mu\text{g/L}$

- **Nickel Total Recoverable.** In Appendix C, the water quality based effluent limits were calculated. For calculating current stream load, the chronic criterion was used instead of the maximum reported concentration as the maximum concentration was above the chronic criteria. To calculate minimal degrading effluent limits it was stream load plus a less than 10% increase of the criteria. For Nickel, the minimal degrading effluent limits are slightly more stringent than the water quality based effluent limits, as both are based on criteria. Protection of Aquatic Life Chronic Criteria (CMC) = $78.26 \mu\text{g/L}$ and Acute Criteria (CCC) = $704.69 \mu\text{g/L}$.

Chronic = $78.26/0.997 = 78.26 \mu\text{g/L}$
Acute = $704.69/0.998 = 706.1 \mu\text{g/L}$

MDL= $77 \mu\text{g/L}$
AML= $39 \mu\text{g/L}$

- **Silver, Total Recoverable.** In Appendix C, the water quality based effluent limits were calculated. For calculating current stream load, the chronic criterion was used instead of the maximum reported concentration as the maximum concentration was above the chronic criteria. To calculate minimal degrading effluent limits it was stream load plus a less than 10% increase of the criteria. For Silver, the minimal degrading effluent limits are slightly more stringent than the water quality based effluent limits, as both are based on criteria. Protection of Aquatic Life Acute Criteria (CCC) = 7.39 µg/L.

$$\text{Acute} = 7.39/0.850 = 8.7 \text{ } \mu\text{g/L}$$

$$\text{MDL} = 8.6 \text{ } \mu\text{g/L}$$

$$\text{AML} = 4.3 \text{ } \mu\text{g/L}$$

- **Zinc, Total Recoverable.** In Appendix C, the water quality based effluent limits were calculated. For calculating current stream load, the chronic criterion was used instead of the maximum reported concentration as the maximum concentration was above the chronic criteria. To calculate minimal degrading effluent limits it was stream load plus a less than 10% increase of the criteria. For Zinc, the minimal degrading effluent limits are slightly more stringent than the water quality based effluent limits, as both are based on criteria. Protection of Aquatic Life (CMC) = 176.7 µg/L and Acute Criteria (CCC) = 176.7 µg/L.

$$\text{Chronic} = 176.7/0.980 = 180 \text{ } \mu\text{g/L}$$

$$\text{Acute} = 176.7/0.980 = 180 \text{ } \mu\text{g/L}$$

$$\text{MDL} = 178 \text{ } \mu\text{g/L}$$

$$\text{AML} = 89 \text{ } \mu\text{g/L}$$

11. ANTIDegradation REVIEW PRELIMINARY DETERMINATION

The proposed expansion to 0.15 MGD and by retrofitting a Biolac system to Gerald's North Lagoon will result in minimal degradation of the segment identified as the Unnamed Tributary to Cedar Fork. Per the requirements of the AIP, the effluent limits in this review were developed to be protective of beneficial uses and to retain the remaining assimilative capacity. MDNR has determined that the submitted review is sufficient and meets the requirements of the AIP. However in the development of the pretreatment program, the facility may be subject to another antidegradation review if more pollutants of concern are discovered or if the facility cannot achieve the effluent limits proposed. The effluent limits in the WQAR reflect either water quality based effluent limits or no-degrading effluent limits; all effluent limits should be reviewed by the construction permit engineer prior to permit issuance. At this time, no further analysis is needed for this discharge.

Reviewer: Leasue J. Meyers

Date: 11/23/2009; revised 09/22/2010

Unit Chief: John Rustige, PE

Monitoring and effluent limits contained within this document have been developed in accordance with EPA guidelines using the best available data and are believed to be consistent with Missouri's Water Quality Standards and Effluent Regulations. If additional water quality data or anecdotal information are available that may affect the recommended monitoring and effluent limits, please forward these data and information to the author.

Appendix A: Map of Discharge Location



Appendix B: Boning's Equation for WQBEL Ammonia limits

When reviewing the discharge monitoring reports, the summer average concentration was 9.62 mg/L and the winter average concentration was 6.06 mg/L. For minimal degradation/non-degrading effluent limits, the current loading was calculated. The effluent limits proposed by the permittee are more stringent than the non-degrading effluent limits. For winter, the non-degrading effluent limits are slightly more stringent than proposed. When comparing the effluent limits to the default limits of a Class C stream, the non-degrading limits are slightly less stringent. However, with the decay of 3.5 miles from the discharge point to Cedar Fork (C), the non-degrading effluent limits are protective.

Summer= (9.62 mg/L*8.314*0.135 MGD) = 10.80 lbs/day

Winter= (6.06 mg/L*8.314*0.135 MGD)= 6.802 lbs/day

To calculate minimally degrading effluent limits

Summer =10.80 lbs/day/8.314/0.155= 8.7 mg/L

MDL=8.7 mg/L

AML= 8.7/2= 4.3 mg/L

To calculate minimally degrading effluent limits

Winter =6.802 lbs/day/8.314/0.155= 5.5 mg/L

MDL=5.5 mg/L

AML= 5.5/2= 2.7 mg/L

Table B-1: Department Calculated Minimal/Non-degrading Effluent Limits

	Maximum Daily (mg N/L)	Average Monthly (mg N/L)
Summer	8.7	4.3
Winter	5.5	2.7

The applicant proposed the effluent limits below as their minimally degrading effluent limits.

Table B-2: Applicant proposed minimal degrading effluent limits

	Maximum Daily (mg N/L)	Average Monthly (mg N/L)
Summer	4.6	1.7
Winter	7.9	3.0

Table B-3: Comparison of Seasonal Ammonia Limits

SEASON	EFFLUENT LIMITS (MG N/L)					
	WQBEL* (0.15 MGD)		APPLICANT PROPOSED		MDEL/NDEL	
	MDL	AML	MDL	AML	MDL	AML
SUMMER	3.7	1.4	4.6	1.7	8.7	4.3
WINTER	7.5	2.8	7.9	3.0	5.5	2.7

*WQBEL are for a Class C stream with no decay.

Appendix C: Metal Effluent Limit Calculations

As the facility does not have permit limits for metals currently and is above design flow, the department calculated loading at the current average flow (0.135 MGD) plus loading of 9.9% of the standard at the average daily flow. This method was used to allow minimal degradation based on actual flow, rather than design flow. For the pollutants that the discharge monitoring reports are above criteria, the minimally degrading effluent limits were calculated at the chronic criteria. For the hardness dependent metals, the state default of 162 mg/L was used to calculate criteria.

Minimal degrading effluent limits can be expressed in either concentration based or mass loading. Table 4 of the Antidegradation Review is in concentration based to avoid two sets of effluent limits, if mass loading effluent limits are used, concentration based limits are required also to meet the Water Quality Standards.

Aluminum

Water Quality Based Effluent Limits

$$\text{Acute WLA: } C_e = ((0.233 + 0.0)750 - (0.0 * 0.0))/0.233$$

$$C_e = 750 \mu\text{g/L}$$

$$\text{LTA}_a = 750 (0.321) = \mathbf{240.75 \mu\text{g/L}} \quad [\text{CV} = 0.6, 99^{\text{th}} \text{ Percentile}]$$

$$\text{MDL} = 240.75(3.11) = 749 \mu\text{g/L} \quad [\text{CV} = 0.6, 99^{\text{th}} \text{ Percentile}]$$

$$\text{AML} = 240.75(1.55) = 373 \mu\text{g/L} \quad [\text{CV} = 0.6, 95^{\text{th}} \text{ Percentile, } n = 4]$$

Minimally degrading Effluent Limits

Maximum Concentration from DMRs = 180 $\mu\text{g/L}$

Criteria: 750 $\mu\text{g/L}$ (criteria-10 CSR 20-7)

9.9% of Criteria: 74 $\mu\text{g/L}$

Average Daily Flow= 0.135 MGD

Current loading= $(0.180\text{mg/L} * 0.135\text{MGD} * 8.314) = 0.202 \text{ lbs/day}$

Minimal increase in loading= $(0.074 * 0.135 * 8.314) = 0.083 \text{ lbs/day}$

Expansion load= $0.202 + 0.083 = 0.285 \text{ lbs/day}$

Concentration= $(0.285 / 8.314 / 0.150) = 0.229 \text{ mg/L}$

MDL= 229 $\mu\text{g/L}$

AML= $229 / 2.0 = 114 \mu\text{g/L}$

Arsenic

Water Quality Based Effluent Limits

$$\text{Chronic WLA: } C_e = ((0.233 + 0.0)20 - (0.0 * 0.0))/0.233$$

$$C_e = 20 \mu\text{g/L}$$

$$\text{LTA}_c = 20 (0.527) = \mathbf{10.54 \mu\text{g/L}} \quad [\text{CV} = 0.6, 99^{\text{th}} \text{ Percentile}]$$

$$\text{MDL} = 10.54(3.11) = 33 \mu\text{g/L} \quad [\text{CV} = 0.6, 99^{\text{th}} \text{ Percentile}]$$

$$\text{AML} = 10.54(1.55) = 16 \mu\text{g/L} \quad [\text{CV} = 0.6, 95^{\text{th}} \text{ Percentile, } n = 4]$$

Minimally degrading Effluent Limits

Maximum Concentration from DMRs = 15 $\mu\text{g/L}$

Criteria: 20 $\mu\text{g/L}$ (criteria-10 CSR 20-7)

9.9% of Criteria: 1.98 $\mu\text{g/L}$

Average Daily Flow= 0.135 MGD

Current loading= $(0.015\text{mg/L} * 0.135\text{MGD} * 8.314) = 0.0168 \text{ lbs/day}$

Minimal increase in loading= $(0.00198 * 0.135 * 8.314) = 0.0022 \text{ lbs/day}$

Expansion load= $0.0168 + 0.0022 = 0.019 \text{ lbs/day}$

Concentration= $(0.019 / 8.314 / 0.150) = 0.015 \text{ mg/L}$

MDL= 15 $\mu\text{g/L}$

AML= $15 / 2.0 = 8 \mu\text{g/L}$

Beryllium

Water Quality Based Effluent Limits

$$\text{Chronic WLA: } C_e = ((0.233 + 0.0)5 - (0.0 * 0.0))/0.233$$

$$C_e = 5 \mu\text{g/L}$$

$$\text{LTA}_c = 5 (0.527) = \mathbf{2.635 \mu\text{g/L}}$$

[CV = 0.6, 99th Percentile]

$$\text{MDL} = 2.635(3.11) = 8.2 \mu\text{g/L}$$

[CV = 0.6, 99th Percentile]

$$\text{AML} = 2.635(1.55) = 4.1 \mu\text{g/L}$$

[CV = 0.6, 95th Percentile, n = 4]

Minimally degrading Effluent Limits

Maximum Concentration from DMRs = 1 $\mu\text{g/L}$

Criteria: 5 $\mu\text{g/L}$ (criteria-10 CSR 20-7)

9.9% of Criteria: 0.495 $\mu\text{g/L}$

Average Daily Flow = 0.135 MGD

$$\text{Current loading} = (0.001 \text{mg/L} * 0.135 \text{MGD} * 8.314) = 0.0011 \text{ lbs/day}$$

$$\text{Minimal increase in loading} = (0.495 * 0.135 * 8.314) = 0.55556 \text{ lbs/day}$$

$$\text{Expansion load} = 0.0011 + 0.55556 = 0.5567 \text{ lbs/day}$$

$$\text{Concentration} = (0.5567 / 8.314 / 0.150) = 0.446 \text{ mg/L}$$

$$\text{MDL} = 4.5 \mu\text{g/L}$$

$$\text{AML} = 4.5 / 2.0 = 2.2 \mu\text{g/L}$$

Cadmium

Water Quality Based Effluent Limits

$$\text{Acute: } 7.6 / 0.924 = 8.23 \mu\text{g/L}$$

$$\text{Chronic: } 0.34 / 0.889 = 0.38 \mu\text{g/L}$$

$$\text{Acute WLA: } C_e = ((0.233 + 0.0)8.23 - (0.0 * 0.0)) / 0.233$$

$$C_e = 8.23 \mu\text{g/L}$$

$$\text{Chronic WLA: } C_e = ((0.233 + 0.0)0.38 - (0.0 * 0.0)) / 0.233$$

$$C_e = 0.38 \mu\text{g/L}$$

$$\text{LTA}_c = 8.23 (0.321) = \mathbf{2.64 \mu\text{g/L}}$$

[CV = 0.6, 99th Percentile]

$$\text{LTA}_c = 0.38 (0.527) = \mathbf{0.20 \mu\text{g/L}}$$

[CV = 0.6, 99th Percentile]

$$\text{MDL} = 0.20(3.11) = 0.62 \mu\text{g/L}$$

[CV = 0.6, 99th Percentile]

$$\text{AML} = 0.20(1.55) = 0.31 \mu\text{g/L}$$

[CV = 0.6, 95th Percentile, n = 4]

Minimally degrading Effluent Limits

Maximum Concentration from DMRs = 4.0 $\mu\text{g/L}$ (above chronic criteria, thus used criteria for current loading)

Criteria: 0.38 $\mu\text{g/L}$ (criteria-10 CSR 20-7)

9.9% of Criteria: 0.0376 $\mu\text{g/L}$

Average Daily Flow = 0.135 MGD

$$\text{Current loading} = (0.00038 \text{mg/L} * 0.135 \text{MGD} * 8.314) = 0.0004265 \text{ lbs/day}$$

$$\text{Minimal increase in loading} = (0.0000376 * 0.135 * 8.314) = 0.0000422 \text{ lbs/day}$$

$$\text{Expansion load} = 0.0004265 + 0.0000422 = 0.000469 \text{ lbs/day}$$

$$\text{Concentration} = (0.000469 / 8.314 / 0.150) = 0.000375 \text{ mg/L}$$

$$\text{MDL} = 0.38 \mu\text{g/L}$$

$$\text{AML} = 0.38 / 2.0 = 0.19 \mu\text{g/L}$$

Chromium III

Water Quality Based Effluent Limits

Acute: $845.89/0.316=2676.9 \mu\text{g/L}$

Chronic: $110.04/0.860=128.0 \mu\text{g/L}$

Acute WLA: $C_e = ((0.233 + 0.0)2676.9 - (0.0* 0.0))/0.233$

$C_e = 2676.9 \mu\text{g/L}$

Chronic WLA: $C_e = ((0.233 + 0.0)128 - (0.0* 0.0))/0.233$

$C_e = 128 \mu\text{g/L}$

$LTA_a = 2676.9 (0.321) = 859.3 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$LTA_c = 128 (0.527) = 67.46 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$MDL = 67.46(3.11) = 210 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$AML = 67.46(1.55) = 105 \mu\text{g/L}$

[CV = 0.6, 95th Percentile, n = 4]

Minimally degrading Effluent Limits

Criteria: $128 \mu\text{g/L}$ (criteria-10 CSR 20-7)

9.9% of Criteria: $12.67 \mu\text{g/L}$

Average Daily Flow= 0.135 MGD

Current loading= $(0.128 \text{ mg/L} * 0.135 \text{ MGD} * 8.314) = 0.14366 \text{ lbs/day}$

Minimal increase in loading= $(0.01267 * 0.135 * 8.314) = 0.01422 \text{ lbs/day}$

Expansion load= $0.14366 + 0.01422 = 0.15789 \text{ lbs/day}$

Concentration= $(0.15789 / 8.314 / 0.150) = 0.1266 \text{ mg/L}$

$MDL = 127 \mu\text{g/L}$

$AML = 127 / 2.0 = 64 \mu\text{g/L}$

Chromium VI

Water Quality Based Effluent Limits

Acute: $15 \mu\text{g/L}$

Chronic: $10 \mu\text{g/L}$

Acute WLA: $C_e = ((0.233 + 0.0)8.23 - (0.0* 0.0))/0.233$

$C_e = 15 \mu\text{g/L}$

Chronic WLA: $C_e = ((0.233 + 0.0)0.38 - (0.0* 0.0))/0.233$

$C_e = 10 \mu\text{g/L}$

$LTA_a = 15 (0.321) = 4.815 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$LTA_c = 10 (0.527) = 5.27 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$MDL = 4.815(3.11) = 15 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$AML = 4.815(1.55) = 7 \mu\text{g/L}$

[CV = 0.6, 95th Percentile, n = 4]

Minimally degrading Effluent Limits

Maximum Concentration from DMRs = $70.0 \mu\text{g/L}$ (above chronic criteria, thus used criteria for current loading)

Criteria: $10 \mu\text{g/L}$ (criteria-10 CSR 20-7)

9.9% of Criteria: $0.99 \mu\text{g/L}$

Average Daily Flow= 0.135 MGD

Current loading= $(0.010 \text{ mg/L} * 0.135 \text{ MGD} * 8.314) = 0.1122 \text{ lbs/day}$

Minimal increase in loading= $(0.0099 * 0.135 * 8.314) = 0.0111 \text{ lbs/day}$

Expansion load= $0.1122 + 0.0111 = 0.1233 \text{ lbs/day}$

Concentration= $(0.1233 / 8.314 / 0.150) = 0.0988 \text{ mg/L}$

$MDL = 10 \mu\text{g/L}$

$AML = 10 / 2.0 = 5.0 \mu\text{g/L}$

Copper

Water Quality Based Effluent Limits

Acute: $21.17/0.96=22.0 \mu\text{g/L}$

Chronic: $13.52/0.96=14.1 \mu\text{g/L}$

Acute WLA: $C_e = ((0.233 + 0.0)22.0 - (0.0* 0.0))/0.233$

$C_e = 22 \mu\text{g/L}$

Chronic WLA: $C_e = ((0.233 + 0.0)14.1 - (0.0* 0.0))/0.233$

$C_e = 14.1 \mu\text{g/L}$

$LTA_a = 22 (0.321) = 7.06 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$LTA_c = 14.1 (0.527) = 7.43 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

MDL = $7.06(3.11) = 22 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

AML = $7.06(1.55) = 11 \mu\text{g/L}$

[CV = 0.6, 95th Percentile, n = 4]

Minimally degrading Effluent Limits

Criteria: $14.1 \mu\text{g/L}$ (criteria-10 CSR 20-7)

9.9% of Criteria: $1.396 \mu\text{g/L}$

Average Daily Flow= 0.135 MGD

Current loading= $(0.014\text{mg/L} * 0.135\text{MGD} * 8.314) = 0.0158 \text{ lbs/day}$

Minimal increase in loading= $(0.001396 * 0.135 * 8.314) = 0.00156 \text{ lbs/day}$

Expansion load= $0.0158 + 0.00156 = 0.0174 \text{ lbs/day}$

Concentration= $(0.0174 / 8.314 / 0.150) = 0.0139 \text{ mg/L}$

MDL= $14 \mu\text{g/L}$

AML= $14 / 2.0 = 7.0 \mu\text{g/L}$

Iron

Water Quality Based Effluent Limits

Chronic WLA: $C_e = ((0.233 + 0.0)1,000 - (0.0* 0.0))/0.233$

$C_e = 1,000 \mu\text{g/L}$

$LTA_c = 1,000 (0.527) = 527 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

MDL = $527(3.11) = 1639 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

AML = $527 (1.55) = 817 \mu\text{g/L}$

[CV = 0.6, 95th Percentile, n = 4]

Minimally degrading Effluent Limits

Maximum Concentration from DMRs = $590 \mu\text{g/L}$

Criteria: $1,000 \mu\text{g/L}$ (criteria-10 CSR 20-7)

9.9% of Criteria: $99 \mu\text{g/L}$

Average Daily Flow= 0.135 MGD

Current loading= $(0.590\text{mg/L} * 0.135\text{MGD} * 8.314) = 0.6622 \text{ lbs/day}$

Minimal increase in loading= $(0.099 * 0.135 * 8.314) = 0.111 \text{ lbs/day}$

Expansion load= $0.6622 + 0.111 = 0.7733 \text{ lbs/day}$

Concentration= $(0.7733 / 8.314 / 0.150) = 0.620 \text{ mg/L}$

MDL= $620 \mu\text{g/L}$

AML= $620 / 2.0 = 310 \mu\text{g/L}$

Lead

Water Quality Based Effluent Limits

Acute: $108.69/0.721 = 150.75 \mu\text{g/L}$

Chronic: $4.24/0.721 = 5.88 \mu\text{g/L}$

Acute WLA: $C_e = ((0.233 + 0.0)150.75 - (0.0 * 0.0))/0.233$

$C_e = 150.75 \mu\text{g/L}$

Chronic WLA: $C_e = ((0.233 + 0.0)5.88 - (0.0 * 0.0))/0.233$

$C_e = 5.88 \mu\text{g/L}$

$LTA_a = 150.75(0.321) = \mathbf{48.39 \mu\text{g/L}}$

[CV = 0.6, 99th Percentile]

$LTA_c = 5.88(0.527) = 3.099 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

MDL = $3.099(3.11) = 9.6 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

AML = $3.099(1.55) = 4.8 \mu\text{g/L}$

[CV = 0.6, 95th Percentile, n = 4]

Minimally degrading Effluent Limits

Maximum Concentration from DMRs = $100.0 \mu\text{g/L}$ (above chronic criteria, thus used criteria for current loading)

Criteria: $5.88 \mu\text{g/L}$ (criteria-10 CSR 20-7)

9.9% of Criteria: $0.582 \mu\text{g/L}$

Average Daily Flow = 0.135 MGD

Current loading = $(0.00588 \text{ mg/L} * 0.135 \text{ MGD} * 8.314) = 0.006599 \text{ lbs/day}$

Minimal increase in loading = $(0.0000582 * 0.135 * 8.314) = 0.0000653 \text{ lbs/day}$

Expansion load = $0.006599 + 0.0000653 = 0.00666 \text{ lbs/day}$

Concentration = $(0.00666 / 8.314 / 0.150) = 0.0053 \text{ mg/L}$

MDL = $5.3 \mu\text{g/L}$

AML = $5.3 / 2.0 = 2.7 \mu\text{g/L}$

Mercury

Water Quality Based Effluent Limits

Acute: 2.4

Chronic: 0.5

Acute WLA: $C_e = ((0.233 + 0.0)2.4 - (0.0 * 0.0))/0.233$

$C_e = 2.4 \mu\text{g/L}$

Chronic WLA: $C_e = ((0.233 + 0.0)0.5 - (0.0 * 0.0))/0.233$

$C_e = 0.5 \mu\text{g/L}$

$LTA_a = 2.4(0.321) = \mathbf{0.77 \mu\text{g/L}}$

[CV = 0.6, 99th Percentile]

$LTA_c = 0.5(0.527) = \mathbf{0.2635 \mu\text{g/L}}$

[CV = 0.6, 99th Percentile]

MDL = $0.2635(3.11) = 0.82 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

AML = $0.2635(1.55) = 0.41 \mu\text{g/L}$

[CV = 0.6, 95th Percentile, n = 4]

Minimally degrading Effluent Limits

Maximum Concentration from DMRs = $2.0 \mu\text{g/L}$ (above chronic criteria, thus used criteria for current loading)

Criteria: $0.5 \mu\text{g/L}$ (criteria-10 CSR 20-7)

9.9% of Criteria: $0.0495 \mu\text{g/L}$

Average Daily Flow = 0.135 MGD

Current loading = $(0.0005 \text{ mg/L} * 0.135 \text{ MGD} * 8.314) = 0.00056 \text{ lbs/day}$

Minimal increase in loading = $(0.0000495 * 0.135 * 8.314) = 0.0000556 \text{ lbs/day}$

Expansion load = $0.00056 + 0.0000556 = 0.000616 \text{ lbs/day}$

Concentration = $(0.000616 / 8.314 / 0.150) = 0.00049 \text{ mg/L}$

MDL = $0.5 \mu\text{g/L}$

AML = $0.5 / 2.0 = 0.25 \mu\text{g/L}$

Nickel

Water Quality Based Effluent Limits

Acute: $704.69/0.998 = 706.10 \mu\text{g/L}$

Chronic: $78.26/0.997 = 78.50 \mu\text{g/L}$

Acute WLA: $C_e = ((0.233 + 0.0)706.1 - (0.0 * 0.0))/0.233$

$C_e = 706.1 \mu\text{g/L}$

Chronic WLA: $C_e = ((0.233 + 0.0)78.5 - (0.0 * 0.0))/0.233$

$C_e = 78.5 \mu\text{g/L}$

$LTA_a = 706.1(0.321) = 4.815 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$LTA_c = 78.5(0.527) = 41.37 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$MDL = 41.37(3.11) = 129 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$AML = 41.37(1.55) = 64 \mu\text{g/L}$

[CV = 0.6, 95th Percentile, n = 4]

Minimally degrading Effluent Limits

Maximum Concentration from DMRs = $85.0 \mu\text{g/L}$ (above chronic criteria, thus used criteria for current loading)

Criteria: $78.50 \mu\text{g/L}$ (criteria-10 CSR 20-7)

9.9% of Criteria: $7.77 \mu\text{g/L}$

Average Daily Flow = 0.135 MGD

Current loading = $(0.0785 \text{ mg/L} * 0.135 \text{ MGD} * 8.314) = 0.088 \text{ lbs/day}$

Minimal increase in loading = $(0.0077 * 0.135 * 8.314) = 0.0086 \text{ lbs/day}$

Expansion load = $0.088 + 0.0086 = 0.0966 \text{ lbs/day}$

Concentration = $(0.0966 / 8.314 / 0.150) = 0.077 \text{ mg/L}$

$MDL = 77 \mu\text{g/L}$

$AML = 77 / 2.0 = 39 \mu\text{g/L}$

Silver

Water Quality Based Effluent Limits

Acute: $7.4/0.85 = 8.7$

Acute WLA: $C_e = ((0.233 + 0.0)8.7 - (0.0 * 0.0))/0.233$

$C_e = 8.7 \mu\text{g/L}$

$LTA_a = 8.7(0.321) = 2.79 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$MDL = 2.79(3.11) = 8.70 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$AML = 2.79(1.55) = 4.3 \mu\text{g/L}$

[CV = 0.6, 95th Percentile, n = 4]

Minimally degrading Effluent Limits

Maximum Concentration from DMRs = $50.0 \mu\text{g/L}$ (above criteria, thus used acute criteria for current loading)

Criteria: $8.7 \mu\text{g/L}$ (criteria-10 CSR 20-7)

9.9% of Criteria: $0.86 \mu\text{g/L}$

Average Daily Flow = 0.135 MGD

Current loading = $(0.0087 \text{ mg/L} * 0.135 \text{ MGD} * 8.314) = 0.00976 \text{ lbs/day}$

Minimal increase in loading = $(0.00086 * 0.135 * 8.314) = 0.000966 \text{ lbs/day}$

Expansion load = $0.1122 + 0.0111 = 0.0107 \text{ lbs/day}$

Concentration = $(0.0107 / 8.314 / 0.150) = 0.0086 \text{ mg/L}$

$MDL = 8.6 \mu\text{g/L}$

$AML = 8.6 / 2.0 = 4.3 \mu\text{g/L}$

Zinc

Water Quality Based Effluent Limits

Acute: $176.7/0.98 = 180 \mu\text{g/L}$

Chronic: $176.7/0.98 = 180 \mu\text{g/L}$

Acute WLA: $C_e = ((0.233 + 0.0)180 - (0.0 * 0.0))/0.233$

$C_e = 180 \mu\text{g/L}$

Chronic WLA: $C_e = ((0.233 + 0.0)180 - (0.0 * 0.0))/0.233$

$C_e = 180 \mu\text{g/L}$

$LTA_a = 180 (0.321) = 57.78 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$LTA_c = 180 (0.527) = 94.86 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$MDL = 57.78(3.11) = 180 \mu\text{g/L}$

[CV = 0.6, 99th Percentile]

$AML = 57.78(1.55) = 90 \mu\text{g/L}$

[CV = 0.6, 95th Percentile, n = 4]

Minimally degrading Effluent Limits

Maximum Concentration from DMRs = $400 \mu\text{g/L}$ (above criteria, thus used chronic criteria for current loading)

Criteria: $180 \mu\text{g/L}$ (criteria-10 CSR 20-7)

9.9% of Criteria: $17.8 \mu\text{g/L}$

Average Daily Flow = 0.135 MGD

Current loading = $(0.180 \text{ mg/L} * 0.135 \text{ MGD} * 8.314) = 0.202 \text{ lbs/day}$

Minimal increase in loading = $(0.0178 * 0.135 * 8.314) = 0.01997 \text{ lbs/day}$

Expansion load = $0.202 + 0.01997 = 0.222 \text{ lbs/day}$

Concentration = $(0.222 / 8.314 / 0.150) = 0.178 \text{ mg/L}$

$MDL = 178 \mu\text{g/L}$

$AML = 178 / 2.0 = 89 \mu\text{g/L}$

Table C-1: Comparison of WQBELs and MDELs for Metals

Pollutant of Concern	WQBELs ($\mu\text{g/L}$)		Minimally degrading Effluent Limits ($\mu\text{g/L}$)*	
	MDL	AML	MDL	AML
Aluminum, Total Recoverable	749	373	229	114
Arsenic, Total Recoverable	33	16	15	8
Beryllium, Total Recoverable	8.2	4.1	4.5	2.2
Cadmium, Total Recoverable	0.6	0.3	0.4	0.2
Chromium III, Total Recoverable	210	105	127	64
Chromium VI, Total Dissolved	15	7	10	5.0
Copper, Total Recoverable	22	11	14	7
Iron, Total Recoverable	1639	817	620	310
Lead, Total Recoverable	9.6	4.8	5.3	2.7
Mercury, Total Recoverable	0.8	0.4	0.5	0.3
Nickel, Total Recoverable	129	64	77	39
Silver, Total Recoverable	8.7	4.3	8.6	4.3
Zinc, Total Recoverable	180	90	178	89

*MDEL based on chronic criteria, unless only acute criteria exists. For hardness dependant metals, default hardness of 162 mg/L was used to calculate criteria.



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These Standard Conditions incorporate permit conditions as required by 40 CFR 122.41 or other applicable state statutes or regulations. These minimum conditions apply unless superseded by requirements specified in the permit.

Part I – General Conditions

Section A – Sampling, Monitoring, and Recording

1. **Sampling Requirements.**
 - a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
 - b. All samples shall be taken at the outfall(s) or Missouri Department of Natural Resources (Department) approved sampling location(s), and unless specified, before the effluent joins or is diluted by any other body of water or substance.
2. **Monitoring Requirements.**
 - a. Records of monitoring information shall include:
 - i. The date, exact place, and time of sampling or measurements;
 - ii. The individual(s) who performed the sampling or measurements;
 - iii. The date(s) analyses were performed;
 - iv. The individual(s) who performed the analyses;
 - v. The analytical techniques or methods used; and
 - vi. The results of such analyses.
 - b. If the permittee monitors any pollutant more frequently than required by the permit at the location specified in the permit using test procedures approved under 40 CFR Part 136, or another method required for an industry-specific waste stream under 40 CFR subchapters N or O, the results of such monitoring shall be included in the calculation and reported to the Department with the discharge monitoring report data (DMR) submitted to the Department pursuant to Section B, paragraph 7.
3. **Sample and Monitoring Calculations.** Calculations for all sample and monitoring results which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the permit.
4. **Test Procedures.** The analytical and sampling methods used shall conform to the reference methods listed in 10 CSR 20-7.015 unless alternates are approved by the Department. The facility shall use sufficiently sensitive analytical methods for detecting, identifying, and measuring the concentrations of pollutants. The facility shall ensure that the selected methods are able to quantify the presence of pollutants in a given discharge at concentrations that are low enough to determine compliance with Water Quality Standards in 10 CSR 20-7.031 or effluent limitations unless provisions in the permit allow for other alternatives. A method is “sufficiently sensitive” when; 1) the method minimum level is at or below the level of the applicable water quality criterion for the pollutant or, 2) the method minimum level is above the applicable water quality criterion, but the amount of pollutant in a facility’s discharge is high enough that the method detects and quantifies the level of pollutant in the discharge, or 3) the method has the lowest minimum level of the analytical methods approved under 10 CSR 20-7.015. These methods are also required for parameters that are listed as monitoring only, as the data collected may be used to determine if limitations need to be established. A permittee is responsible for working with their contractors to ensure that the analysis performed is sufficiently sensitive.
5. **Record Retention.** Except for records of monitoring information required by the permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five (5) years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Department at any time.

6. **Illegal Activities.**
 - a. The Federal Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under the permit shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than two (2) years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than four (4) years, or both.
 - b. The Missouri Clean Water Law provides that any person or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than six (6) months, or by both. Second and successive convictions for violation under this paragraph by any person shall be punished by a fine of not more than \$50,000 per day of violation, or by imprisonment for not more than two (2) years, or both.

Section B – Reporting Requirements

1. **Planned Changes.**
 - a. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility when:
 - i. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or
 - ii. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42;
 - iii. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;
 - iv. Any facility expansions, production increases, or process modifications which will result in a new or substantially different discharge or sludge characteristics must be reported to the Department 60 days before the facility or process modification begins. Notification may be accomplished by application for a new permit. If the discharge does not violate effluent limitations specified in the permit, the facility is to submit a notice to the Department of the changed discharge at least 30 days before such changes. The Department may require a construction permit and/or permit modification as a result of the proposed changes at the facility.
2. **Non-compliance Reporting.**
 - a. The permittee shall report any noncompliance which may endanger health or the environment. Relevant information shall be provided orally or via the current electronic method approved by the Department, within 24 hours from the time the permittee becomes aware of the circumstances, and shall be reported to the appropriate Regional Office during normal business hours or the Environmental Emergency Response hotline at 573-634-2436 outside of normal business hours. A written submission shall also be provided within five (5) business days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.



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- b. The following shall be included as information which must be reported within 24 hours under this paragraph.
 - i. Any unanticipated bypass which exceeds any effluent limitation in the permit.
 - ii. Any upset which exceeds any effluent limitation in the permit.
 - iii. Violation of a maximum daily discharge limitation for any of the pollutants listed by the Department in the permit required to be reported within 24 hours.
 - c. The Department may waive the written report on a case-by-case basis for reports under paragraph 2. b. of this section if the oral report has been received within 24 hours.
3. **Anticipated Noncompliance.** The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. The notice shall be submitted to the Department 60 days prior to such changes or activity.
 4. **Compliance Schedules.** Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of the permit shall be submitted no later than 14 days following each schedule date. The report shall provide an explanation for the instance of noncompliance and a proposed schedule or anticipated date, for achieving compliance with the compliance schedule requirement.
 5. **Other Noncompliance.** The permittee shall report all instances of noncompliance not reported under paragraphs 2, 3, and 6 of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph 2. a. of this section.
 6. **Other Information.** Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.
 7. **Discharge Monitoring Reports.**
 - a. Monitoring results shall be reported at the intervals specified in the permit.
 - b. Monitoring results must be reported to the Department via the current method approved by the Department, unless the permittee has been granted a waiver from using the method. If the permittee has been granted a waiver, the permittee must use forms provided by the Department.
 - c. Monitoring results shall be reported to the Department no later than the 28th day of the month following the end of the reporting period.
- b. Notice.
 - i. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass.
 - ii. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section B – Reporting Requirements, paragraph 5 (24-hour notice).
 - c. Prohibition of bypass.
 - i. Bypass is prohibited, and the Department may take enforcement action against a permittee for bypass, unless:
 1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
 2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
 3. The permittee submitted notices as required under paragraph 2. b. of this section.
 - ii. The Department may approve an anticipated bypass, after considering its adverse effects, if the Department determines that it will meet the three (3) conditions listed above in paragraph 2. c. i. of this section.
3. **Upset Requirements.**
 - a. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph 3. b. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
 - b. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
 - i. An upset occurred and that the permittee can identify the cause(s) of the upset;
 - ii. The permitted facility was at the time being properly operated; and
 - iii. The permittee submitted notice of the upset as required in Section B – Reporting Requirements, paragraph 2. b. ii. (24-hour notice).
 - iv. The permittee complied with any remedial measures required under Section D – Administrative Requirements, paragraph 4.
 - c. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

Section C – Bypass/Upset Requirements

1. **Definitions.**
 - a. *Bypass*: the intentional diversion of waste streams from any portion of a treatment facility, except in the case of blending.
 - b. *Severe Property Damage*: substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
 - c. *Upset*: an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
2. **Bypass Requirements.**
 - a. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2. b. and 2. c. of this section.

Section D – Administrative Requirements

1. **Duty to Comply.** The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Missouri Clean Water Law and Federal Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.
 - a. The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Federal Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
 - b. The Federal Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed \$25,000 per day for each violation. The Federal Clean Water Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement



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- imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of \$2,500 to \$25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than \$50,000 per day of violation, or by imprisonment of not more than two (2) years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of \$5,000 to \$50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than \$100,000 per day of violation, or imprisonment of not more than six (6) years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than \$250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than \$500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than \$1,000,000 and can be fined up to \$2,000,000 for second or subsequent convictions.
- c. Any person may be assessed an administrative penalty by the EPA Director for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed \$10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed \$25,000. Penalties for Class II violations are not to exceed \$10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed \$125,000.
- d. It is unlawful for any person to cause or permit any discharge of water contaminants from any water contaminant or point source located in Missouri in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law, or any standard, rule or regulation promulgated by the commission. In the event the commission or the director determines that any provision of sections 644.006 to 644.141 of the Missouri Clean Water Law or standard, rules, limitations or regulations promulgated pursuant thereto, or permits issued by, or any final abatement order, other order, or determination made by the commission or the director, or any filing requirement pursuant to sections 644.006 to 644.141 of the Missouri Clean Water Law or any other provision which this state is required to enforce pursuant to any federal water pollution control act, is being, was, or is in imminent danger of being violated, the commission or director may cause to have instituted a civil action in any court of competent jurisdiction for the injunctive relief to prevent any such violation or further violation or for the assessment of a penalty not to exceed \$10,000 per day for each day, or part thereof, the violation occurred and continues to occur, or both, as the court deems proper. Any person who willfully or negligently commits any violation in this paragraph shall, upon conviction, be punished by a fine of not less than \$2,500 nor more than \$25,000 per day of violation, or by imprisonment for not more than one year, or both. Second and successive convictions for violation of the same provision of this paragraph by any person shall be punished by a fine of not more than \$50,000 per day of violation, or by imprisonment for not more than two (2) years, or both.
2. **Duty to Reapply.**
- a. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.
- b. A permittee with a currently effective site-specific permit shall submit an application for renewal at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Department. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)
- c. A permittees with currently effective general permit shall submit an application for renewal at least 30 days before the existing permit expires, unless the permittee has been notified by the Department that an earlier application must be made. The Department may grant permission for a later submission date. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)
3. **Need to Halt or Reduce Activity Not a Defense.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.
4. **Duty to Mitigate.** The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.
5. **Proper Operation and Maintenance.** The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.
6. **Permit Actions.**
- a. Subject to compliance with statutory requirements of the Law and Regulations and applicable Court Order, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:
- i. Violations of any terms or conditions of this permit or the law;
- ii. Having obtained this permit by misrepresentation or failure to disclose fully any relevant facts;
- iii. A change in any circumstances or conditions that requires either a temporary or permanent reduction or elimination of the authorized discharge; or
- iv. Any reason set forth in the Law or Regulations.
- b. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.
7. **Permit Transfer.**
- a. Subject to 10 CSR 20-6.010, an operating permit may be transferred upon submission to the Department of an application to transfer signed by the existing owner and the new owner, unless prohibited by the terms of the permit. Until such time the permit is officially transferred, the original permittee remains responsible for complying with the terms and conditions of the existing permit.
- b. The Department may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Missouri Clean Water Law or the Federal Clean Water Act.
- c. The Department, within 30 days of receipt of the application, shall notify the new permittee of its intent to revoke or reissue or transfer the permit.
8. **Toxic Pollutants.** The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Federal Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the Federal Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
9. **Property Rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.



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10. **Duty to Provide Information.** The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.
11. **Inspection and Entry.** The permittee shall allow the Department, or an authorized representative (including an authorized contractor acting as a representative of the Department), upon presentation of credentials and other documents as may be required by law, to:
 - a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;
 - b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
 - c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
 - d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Federal Clean Water Act or Missouri Clean Water Law, any substances or parameters at any location.
12. **Closure of Treatment Facilities.**
 - a. Persons who cease operation or plan to cease operation of waste, wastewater, and sludge handling and treatment facilities shall close the facilities in accordance with a closure plan approved by the Department.
 - b. Operating Permits under 10 CSR 20-6.010 or under 10 CSR 20-6.015 are required until all waste, wastewater, and sludges have been disposed of in accordance with the closure plan approved by the Department and any disturbed areas have been properly stabilized. Disturbed areas will be considered stabilized when perennial vegetation, pavement, or structures using permanent materials cover all areas that have been disturbed. Vegetative cover, if used, shall be at least 70% plant density over 100% of the disturbed area.
13. **Signatory Requirement.**
 - a. All permit applications, reports required by the permit, or information requested by the Department shall be signed and certified. (See 40 CFR 122.22 and 10 CSR 20-6.010)
 - b. The Federal Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than six (6) months per violation, or by both.
 - c. The Missouri Clean Water Law provides that any person who knowingly makes any false statement, representation or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than ten thousand dollars, or by imprisonment for not more than six months, or by both.
14. **Severability.** The provisions of the permit are severable, and if any provision of the permit, or the application of any provision of the permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of the permit, shall not be affected thereby.



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REVISED
MAY 1, 2013

PART II - SPECIAL CONDITIONS – PUBLICLY OWNED
TREATMENT WORKS
SECTION A – INDUSTRIAL USERS

1. Definitions

Definitions as set forth in the Missouri Clean Water Laws and approved by the Missouri Clean Water Commission shall apply to terms used herein.

Significant Industrial User (SIU). Except as provided in the *General Pretreatment Regulation* 10 CSR 20-6.100, the term Significant Industrial User means:

1. All Industrial Users subject to Categorical Pretreatment Standards; and
2. Any other Industrial User that: discharges an average of 25,000 gallons per day or more of process wastewater to the Publicly-Owned Treatment Works (POTW) (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastestream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority on the basis that the Industrial User has a reasonable potential for adversely affecting the POTW's or for violating any Pretreatment Standard or requirement.

Clean Water Act (CWA) is the the federal Clean Water Act of 1972, 33 U.S.C. § 1251 et seq. (2002).

2. Identification of Industrial Discharges

Pursuant to 40 CFR 122.44(j)(1), all POTWs shall identify, in terms of character and volume of pollutants, any Significant Industrial Users discharging to the POTW subject to Pretreatment Standards under section 307(b) of the CWA and 40 CFR 403.

3. Application Information

Applications for renewal or modification of this permit must contain the information about industrial discharges to the POTW pursuant to 40 CFR 122.21(j)(6)

4. Notice to the Department

Pursuant to 40 CFR 122.42(b), all POTWs must provide adequate notice of the following:

1. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of CWA if it were directly discharging these pollutants; and
2. Any substantial change into the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
3. For purposes of this paragraph, adequate notice shall include information on:
 - i. the quality and quantity of effluent introduced into the POTW, and
 - ii. any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

For POTWs without an approved pretreatment program, the notice of industrial discharges which was not included in the permit application shall be made as soon as practicable. For POTWs with an approved pretreatment program, notice is to be included in the annual pretreatment report required in the special conditions of this permit. Notice may be sent to:

Missouri Department of Natural Resources
Water Protection Program
Attn: Pretreatment Coordinator
P.O. Box 176
Jefferson City, MO 65102

STANDARD CONDITIONS FOR NPDES PERMITS
ISSUED BY
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION
March 1, 2015

**PART III – SLUDGE AND BIOSOLIDS FROM DOMESTIC AND INDUSTRIAL WASTEWATER
TREATMENT FACILITIES**

SECTION A – GENERAL REQUIREMENTS

1. This permit pertains to sludge requirements under the Missouri Clean Water Law and regulation for domestic wastewater and industrial process wastewater. This permit also incorporates applicable federal sludge disposal requirements under 40 CFR 503 for domestic wastewater. The Environmental Protection Agency (EPA) has principal authority for permitting and enforcement of the federal sludge regulations under 40 CFR 503 for domestic wastewater. EPA has reviewed and accepted these standard sludge conditions. EPA may choose to issue a separate sludge addendum to this permit or a separate federal sludge permit at their discretion to further address the federal requirements.
2. These PART III Standard Conditions apply only to sludge and biosolids generated at domestic wastewater treatment facilities, including public owned treatment works (POTW), privately owned facilities and sludge or biosolids generated at industrial facilities.
3. Sludge and Biosolids Use and Disposal Practices:
 - a. The permittee is authorized to operate the sludge and biosolids treatment, storage, use, and disposal facilities listed in the facility description of this permit.
 - b. The permittee shall not exceed the design sludge volume listed in the facility description and shall not use sludge disposal methods that are not listed in the facility description, without prior approval of the permitting authority.
 - c. The permittee is authorized to operate the storage, treatment or generating sites listed in the Facility Description section of this permit.
4. Sludge Received from other Facilities:
 - a. Permittees may accept domestic wastewater sludge from other facilities including septic tank pumpings from residential sources as long as the design sludge volume is not exceeded and the treatment facility performance is not impaired.
 - b. The permittee shall obtain a signed statement from the sludge generator or hauler that certifies the type and source of the sludge
5. These permit requirements do not supersede nor remove liability for compliance with county and other local ordinances.
6. These permit requirements do not supersede nor remove liability for compliance with other environmental regulations such as odor emissions under the Missouri Air Pollution Control Law and regulations.
7. This permit may (after due process) be modified, or alternatively revoked and reissued, to comply with any applicable sludge disposal standard or limitation issued or approved under Section 405(d) of the Clean Water Act under Chapter 644 RSMo.
8. In addition to STANDARD CONDITIONS, the Department may include sludge limitations in the special conditions portion or other sections of a site specific permit.
9. Alternate Limits in the Site Specific Permit.

Where deemed appropriate, the Department may require an individual site specific permit in order to authorize alternate limitations:

 - a. A site specific permit must be obtained for each operating location, including application sites.
 - b. To request a site specific permit, an individual permit application, permit fee, and supporting documents shall be submitted for each operating location. This shall include a detailed sludge/biosolids management plan or engineering report.
10. Exceptions to these Standard Conditions may be authorized on a case-by-case basis by the Department, as follows:
 - a. The Department will prepare a permit modification and follow permit notice provisions as applicable under 10 CSR 20-6.020, 40 CFR 124.10, and 40 CFR 501.15(a)(2)(ix)(E). This includes notification of the owner of the property located adjacent to each land application site, where appropriate.
 - b. Exceptions cannot be granted where prohibited by the federal sludge regulations under 40 CFR 503.

SECTION B – DEFINITIONS

1. Best Management Practices include agronomic loading rates, soil conservation practices and other site restrictions.
2. Biosolids means organic fertilizer or soil amendment produced by the treatment of domestic wastewater sludge.
3. Biosolids land application facility is a facility where biosolids are spread onto the land at agronomic rates for production of food or fiber. The facility includes any structures necessary to store the biosolids until soil, weather, and crop conditions are favorable for land application.
4. Class A biosolids means a material that has met the Class A pathogen reduction requirements or equivalent treatment by a Process to Further Reduce Pathogens (PFRP) in accordance with 40 CFR 503.
5. Class B biosolids means a material that has met the Class B pathogen reduction requirements or equivalent treatment by a Process to Significantly Reduce Pathogens (PFRP) in accordance with 40 CFR 503.
6. Domestic wastewater means wastewater originating from the sanitary conveniences of residences, commercial buildings, factories and institutions; or co-mingled sanitary and industrial wastewater processed by a (POTW) or a privately owned facility.
7. Industrial wastewater means any wastewater, also known as process water, not defined as domestic wastewater. Per 40 CFR Part 122, process water means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.
8. Mechanical treatment plants are wastewater treatment facilities that use mechanical devices to treat wastewater, including septic tanks, sand filters, extended aeration, activated sludge, contact stabilization, trickling filters, rotating biological discs, and other similar facilities. It does not include wastewater treatment lagoons and constructed wetlands for wastewater treatment.
9. Operating location as defined in 10 CSR 20-2.010 is all contiguous lands owned, operated or controlled by one (1) person or by two (2) or more persons jointly or as tenants in common.
10. Plant Available Nitrogen (PAN) is the nitrogen that will be available to plants during the growing seasons after biosolids application.
11. Public contact site is land with a high potential for contact by the public. This includes, but is not limited to, public parks, ball fields, cemeteries, plant nurseries, turf farms, and golf courses.
12. Sludge is the solid, semisolid, or liquid residue removed during the treatment of wastewater. Sludge includes septage removed from septic tanks or equivalent facilities. Sludge does not include carbon coal byproducts (CCBs)
13. Sludge lagoon is part of a mechanical wastewater treatment facility. A sludge lagoon is an earthen basin that receives sludge that has been removed from a wastewater treatment facility. It does not include a wastewater treatment lagoon or sludge treatment units that are not a part of a mechanical wastewater treatment facility.
14. Septage is the material pumped from residential septic tanks and similar treatment works (with a design population of less than 150 people). The standard for biosolids from septage is different from other sludges.

SECTION C – MECHANICAL WASTEWATER TREATMENT FACILITIES

1. Sludge shall be routinely removed from wastewater treatment facilities and handled according to the permit facility description and sludge conditions of this permit.
2. The permittee shall operate the facility so that there is no sludge discharged to waters of the state.
3. Mechanical treatment plants shall have separate sludge storage compartments in accordance with 10 CSR 20, Chapter 8. Failure to remove sludge from these storage compartments on the required design schedule is a violation of this permit.

SECTION D – SLUDGE DISPOSED AT OTHER TREATMENT FACILITY OR CONTRACT HAULER

1. This section applies to permittees that haul sludge to another treatment facility for disposal or use contract haulers to remove and dispose of sludge.
2. Permittees that use contract haulers are responsible for compliance with all the terms of this permit including final disposal, unless the hauler has a separate permit for sludge or biosolids disposal issued by the Department; or the hauler transports the sludge to another permitted treatment facility.
3. Haulers who land apply septage must obtain a state permit.
4. Testing of sludge, other than total solids content, is not required if sludge is hauled to a municipal wastewater treatment facility or other permitted wastewater treatment facility, unless it is required by the accepting facility.

SECTION E – INCINERATION OF SLUDGE

1. Sludge incineration facilities shall comply with the requirements of 40 CFR 503 Subpart E; air pollution control regulations under 10 CSR 10; and solid waste management regulations under 10 CSR 80.
2. Permittee may be authorized under the facility description of this permit to store incineration ash in lagoons or ash ponds. This permit does not authorize the disposal of incineration ash. Incineration ash shall be disposed in accordance with 10 CSR 80; or if the ash is determined to be hazardous with 10 CSR 25.
3. In addition to normal sludge monitoring, incineration facilities shall report the following as part of the annual report, quantity of sludge incinerated, quantity of ash generated, quantity of ash stored, and ash used or disposal method, quantity, and location. Permittee shall also provide the name of the disposal facility and the applicable permit number.

SECTION F – SURFACE DISPOSAL SITES AND SLUDGE LAGOONS

1. Surface disposal sites of domestic facilities shall comply with the requirements in 40 CFR 503 Subpart C; air pollution control regulations under 10 CSR 10; and solid waste management regulations under 10 CSR 80.
2. Sludge storage lagoons are temporary facilities and are not required to obtain a permit as a solid waste management facility under 10 CSR 80. In order to maintain sludge storage lagoons as storage facilities, accumulated sludge must be removed routinely, but not less than once every two years unless an alternate schedule is approved in the permit. The amount of sludge removed will be dependent on sludge generation and accumulation in the facility. Enough sludge must be removed to maintain adequate storage capacity in the facility.
 - a. In order to avoid damage to the lagoon seal during cleaning, the permittee may leave a layer of sludge on the bottom of the lagoon, upon prior approval of the Department; or
 - b. Permittee shall close the lagoon in accordance with Section H.

SECTION G – LAND APPLICATION

1. The permittee shall not land apply sludge or biosolids unless land application is authorized in the facility description or the special conditions of the issued NPDES permit.
2. Land application sites within a 20 miles radius of the wastewater treatment facility are authorized under this permit when biosolids are applied for beneficial use in accordance with these standard conditions unless otherwise specified in a site specific permit. If the permittee's land application site is greater than a 20 mile radius of the wastewater treatment facility, approval must be granted from the Department.
3. Land application shall not adversely affect a threatened or endangered species or its designated critical habitat.
4. Biosolids shall not be applied unless authorized in this permit or exempted under 10 CSR 20, Chapter 6.
 - a. This permit does not authorize the land application of domestic sludge except for when sludge meets the definition of biosolids.
 - b. This permit authorizes "Class A or B" biosolids derived from domestic wastewater and/or process water sludge to be land applied onto grass land, crop land, timber or other similar agricultural or silviculture lands at rates suitable for beneficial use as organic fertilizer and soil conditioner.
5. Public Contact Sites:

Permittees who wish to apply Class A biosolids to public contact sites must obtain approval from the Department after two years of proper operation with acceptable testing documentation that shows the biosolids meet Class A criteria. A shorter length of testing will be allowed with prior approval from the Department. Authorization for land applications must be provided in the special conditions section of this permit or in a separate site specific permit.

 - a. After Class B biosolids have been land applied, public access must be restricted for 12 months.
 - b. Class B biosolids are only land applied to root crops, home gardens or vegetable crops whose edible parts will not be for human consumption.
6. Agricultural and Silvicultural Sites:

Septage – Based on Water Quality guide 422 (WQ422) published by the University of Missouri

 - a. Haulers that land apply septage must obtain a state permit
 - b. Do not apply more than 30,000 gallons of septage per acre per year.
 - c. Septage tanks are designed to retain sludge for one to three years which will allow for a larger reduction in pathogens and vectors, as compared to other mechanical type treatment facilities.
 - d. To meet Class B sludge requirements, maintain septage at 12 pH for at least thirty (30) minutes before land application. 50 pounds of hydrated lime shall be added to each 1,000 gallons of septage in order to meet pathogen and vector stabilization for septage biosolids applied to crops, pastures or timberland.
 - e. Lime is to be added to the pump truck and not directly to the septic tanks, as lime would harm the beneficial bacteria of the septic tank.

Biosolids - Based on Water Quality guide 423, 424, and 425 (WQ423, WQ424, WQ425) published by the University of Missouri;

- a. Biosolids shall be monitored to determine the quality for regulated pollutants
- b. The number of samples taken is directly related to the amount of sludge produced by the facility (See Section I of these Standard Conditions). Report as dry weight unless otherwise specified in the site specific permit. Samples should be taken only during land application periods. When necessary, it is permissible to mix biosolids with lower concentrations of biosolids as well as other suitable Department approved material to reach the maximum concentration of pollutants allowed.
- c. Table 1 gives the maximum concentration allowable to protect water quality standards

TABLE 1

Biosolids ceiling concentration ¹	
Pollutant	Milligrams per kilogram dry weight
Arsenic	75
Cadmium	85
Copper	4,300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
Selenium	100
Zinc	7,500

¹ Land application is not allowed if the sludge concentration exceeds the maximum limits for any of these pollutants

- d. The low metal concentration biosolids has reduced requirements because of its higher quality and can safely be applied for 100 years or longer at typical agronomic loading rates. (See Table 2)

TABLE 2

Biosolids Low Metal Concentration ¹	
Pollutant	Milligrams per kilogram dry weight
Arsenic	41
Cadmium	39
Copper	1,500
Lead	300
Mercury	17
Nickel	420
Selenium	36
Zinc	2,800

¹ You may apply low metal biosolids without tracking cumulative metal limits, provided the cumulative application of biosolids does not exceed 500 dry tons per acre.

- e. Each pollutant in Table 3 has an annual and a total cumulative loading limit, based on the allowable pounds per acre for various soil categories.

TABLE 3

Pollutant	CEC 15+		CEC 5 to 15		CEC 0 to 5	
	Annual	Total ¹	Annual	Total ¹	Annual	Total ¹
Arsenic	1.8	36.0	1.8	36.0	1.8	36.0
Cadmium	1.7	35.0	0.9	9.0	0.4	4.5
Copper	66.0	1,335.0	25.0	250.0	12.0	125.0
Lead	13.0	267.0	13.0	267.0	13.0	133.0
Mercury	0.7	15.0	0.7	15.0	0.7	15.0
Nickel	19.0	347.0	19.0	250.0	12.0	125.0
Selenium	4.5	89.0	4.5	44.0	1.6	16.0
Zinc	124.0	2,492.0	50.0	500.0	25.0	250.0

¹ Total cumulative loading limits for soils with equal or greater than 6.0 pH (salt based test) or 6.5 pH (water based test)

TABLE 4 - Guidelines for land application of other trace substances ¹

Cumulative Loading	
Pollutant	Pounds per acre
Aluminum	4,000 ²
Beryllium	100
Cobalt	50
Fluoride	800
Manganese	500
Silver	200
Tin	1,000
Dioxin	(10 ppt in soil) ³
Other	⁴

¹ Design of land treatment systems for Industrial Waste, 1979. Michael Ray Overcash, North Carolina State University and Land Treatment of Municipal Wastewater, EPA 1981.)

² This applies for a soil with a pH between 6.0 and 7.0 (salt based test) or a pH between 6.5 to 7.5 (water based test). Case-by-case review is required for higher pH soils.

³ Total Dioxin Toxicity Equivalents (TEQ) in soils, based on a risk assessment under 40 CFR 744, May 1998.

⁴ Case by case review. Concentrations in sludge should not exceed the 95th percentile of the National Sewage Sludge Survey, EPA, January 2009.

Best Management Practices – Based on Water Quality guide 426 (WQ426) published by the University of Missouri

- a. Use best management practices when applying biosolids.
- b. Biosolids cannot discharge from the land application site
- c. Biosolid application is subject to the Missouri Department of Agriculture State Milk Board concerning grazing restrictions of lactating dairy cattle.
- d. Biosolid application must be in accordance with section 4 of the Endangered Species Act.
- e. Do not apply more than the agronomic rate of nitrogen needed.
- f. The applicator must document the Plant Available Nitrogen (PAN) loadings, available nitrogen in the soil, and crop removal when either of the following occurs: 1) When biosolids are greater than 50,000 mg/kg TN; or 2) When biosolids are land applied at an application rate greater than two dry tons per acre per year.
 - i. PAN can be determined as follows and is in accordance with WQ426
(Nitrate + nitrite nitrogen) + (organic nitrogen x 0.2) + (ammonia nitrogen x volatilization factor¹).
¹Volatilization factor is 0.7 for surface application and 1 for subsurface application.
- g. Buffer zones are as follows:
 - i. 300 feet of a water supply well, sinkhole, lake, pond, water supply reservoir or water supply intake in a stream;
 - ii. 300 feet of a losing stream, no discharge stream, stream stretches designated for whole body contact recreation, wild and scenic rivers, Ozark National Scenic Riverways or outstanding state resource waters as listed in the Water Quality Standards, 10 CSR 20-7.031;
 - iii. 150 feet if dwellings;
 - iv. 100 feet of wetlands or permanent flowing streams;
 - v. 50 feet of a property line or other waters of the state, including intermittent flowing streams.
- h. Slope limitation for application sites are as follows;
 - i. A slope 0 to 6 percent has no rate limitation
 - ii. Applied to a slope 7 to 12 percent, the applicator may apply biosolids when soil conservation practices are used to meet the minimum erosion levels
 - iii. Slopes > 12 percent, apply biosolids only when grass is vegetated and maintained with at least 80 percent ground cover at a rate of two dry tons per acre per year or less.
- i. No biosolids may be land applied in an area that it is reasonably certain that pollutants will be transported into waters of the state.
- j. Do not apply biosolids to sites with soil that is snow covered, frozen or saturated with liquid without prior approval by the Department.
- k. Biosolids / sludge applicators must keep detailed records up to five years.

SECTION H – CLOSURE REQUIREMENTS

1. This section applies to all wastewater facilities (mechanical, industrial, and lagoons) and sludge or biosolids storage and treatment facilities and incineration ash ponds. It does not apply to land application sites.
2. Permittees of a domestic wastewater facility who plan to cease operation must obtain Department approval of a closure plan which addresses proper removal and disposal of all residues, including sludge, biosolids. Mechanical plants, sludge lagoons, ash ponds and other storage structures must obtain approval of a closure plan from the Department. Permittee must maintain this permit until the facility is closed in accordance with the approved closure plan per 10 CSR 20 – 6. 010 and 10 CSR 20 – 6.015.
3. Residuals that are left in place during closure of a lagoon or earthen structure or ash pond shall not exceed the agricultural loading rates as follows:
 - a. Residuals shall meet the monitoring and land application limits for agricultural rates as referenced in Section H of these standard conditions.
 - b. If a wastewater treatment lagoon has been in operation for 15 years or more without sludge removal, the sludge in the lagoon qualifies as a Class B biosolids with respect to pathogens due to anaerobic digestion, and testing for fecal coliform is not required. For other lagoons, testing for fecal coliform is required to show compliance with Class B biosolids limitations. In order to reach Class B biosolids requirements, fecal coliform must be less than 2,000,000 colony forming units or 2,000,000 most probable number. All fecal samples must be presented as geometric mean per gram.
 - c. The allowable nitrogen loading that may be left in the lagoon shall be based on the plant available nitrogen (PAN) loading. For a grass cover crop, the allowable PAN is 300 pounds/acre.
 - i. PAN can be determined as follows:
$$(\text{Nitrate} + \text{nitrite nitrogen}) + (\text{organic nitrogen} \times 0.2) + (\text{ammonia nitrogen} \times \text{volatilization factor}^1).$$

¹ Volatilization factor is 0.7 for surface application and 1 for subsurface application.
4. When closing a domestic wastewater treatment lagoon with a design treatment capacity equal or less than 150 persons, the residuals are considered “septage” under the similar treatment works definition. See Section B of these standard conditions. Under the septage category, residuals may be left in place as follows:
 - a. Testing for metals or fecal coliform is not required
 - b. If the wastewater treatment lagoon has been in use for less than 15 years, mix lime with the sludge at a rate of 50 pounds of hydrated lime per 1000 gallons (134 cubic feet) of sludge.
 - c. The amount of sludge that may be left in the lagoon shall be based on the plant available nitrogen (PAN) loading. 100 dry tons/acre of sludge may be left in the basin without testing for nitrogen. If 100 dry tons/acre or more will be left in the lagoon, test for nitrogen and determine the PAN using the calculation above. Allowable PAN loading is 300 pounds/acre.
5. Residuals left within the domestic lagoon shall be mixed with soil on at least a 1 to 1 ratio, the lagoon berm shall be demolished, and the site shall be graded and contain $\geq 70\%$ vegetative density over 100% of the site so as to avoid ponding of storm water and provide adequate surface water drainage without creating erosion.
6. Lagoons and/or earthen structure and/or ash pond closure activities shall obtain a storm water permit for land disturbance activities that equal or exceed one acre in accordance with 10 CSR 20-6.200
7. When closing a mechanical wastewater and/or industrial process wastewater plant; all sludge must be cleaned out and disposed of in accordance with the Department approved closure plan before the permit for the facility can be terminated.
 - a. Land must be stabilized which includes any grading, alternate use or fate upon approval by the Department, remediation, or other work that exposes sediment to stormwater per 10 CSR 20-6.200. The site shall be graded and contain $\geq 70\%$ vegetative density over 100% of the site, so as to avoid ponding of storm water and provide adequate surface water drainage without creating erosion.
 - b. Per 10 CSR 20-6.015(4)(B)6, Hazardous Waste shall not be land applied or disposed during industrial and mechanical plant closures unless in accordance with Missouri Hazardous Waste Management Law and Regulations under 10 CSR 25.
 - c. After demolition of the mechanical plant / industrial plant, the site must only contain clean fill defined in RSMo 260.200 (5) as uncontaminated soil, rock, sand, gravel, concrete, asphaltic concrete, cinderblocks, brick, minimal amounts of wood and metal, and inert solids as approved by rule or policy of the Department for fill or other beneficial use. Other solid wastes must be removed.
8. If sludge from the domestic lagoon or mechanical treatment plant exceeds agricultural rates under Section G and/or H, a landfill permit or solid waste disposal permit must be obtained if the permittee chooses to seek authorization for on-site sludge disposal under the Missouri Solid Waste Management Law and regulations per 10 CSR 80, and the permittee must comply with the surface disposal requirements under 40 CFR 503, Subpart C.

SECTION I – MONITORING FREQUENCY

- At a minimum, sludge or biosolids shall be tested for volume and percent total solids on a frequency that will accurately represent sludge quantities produced and disposed. Please see the table below.

TABLE 5

Design Sludge Production (dry tons per year)	Monitoring Frequency (See Notes 1, 2, and 3)			
	Metals, Pathogens and Vectors	Nitrogen TKN ¹	Nitrogen PAN ²	Priority Pollutants and TCLP ³
0 to 100	1 per year	1 per year	1 per month	1 per year
101 to 200	biannual	biannual	1 per month	1 per year
201 to 1,000	quarterly	quarterly	1 per month	1 per year
1,001 to 10,000	1 per month	1 per month	1 per week	-- ⁴
10,001 +	1 per week	1 per week	1 per day	-- ⁴

¹ Test total Kjeldahl nitrogen, if biosolids application is 2 dry tons per acre per year or less.

² Calculate plant available nitrogen (PAN) when either of the following occurs: 1) when biosolids are greater than 50,000 mg/kg TN; or 2) when biosolids are land applied at an application rate greater than two dry tons per acre per year.

³ Priority pollutants (40 CFR 122.21, Appendix D, Tables II and III) and toxicity characteristic leaching procedure (40 CFR 261.24) is required only for permit holders that must have a pre-treatment program.

⁴ One sample for each 1,000 dry tons of sludge.

Note 1: Total solids: A grab sample of sludge shall be tested one per day during land application periods for percent total solids.

This data shall be used to calculate the dry tons of sludge applied per acre.

Note 2: Total Phosphorus: Total phosphorus and total potassium shall be tested at the same monitoring frequency as metals.

Note 3: Table 5 is not applicable for incineration and permit holders that landfill their sludge.

- If you own a wastewater treatment lagoon or sludge lagoon that is cleaned out once a year or less, you may choose to sample only when the sludge is removed or the lagoon is closed. Test one composite sample for each 100 dry tons of sludge or biosolids removed from the lagoon during the year within the lagoon at closing. Composite sample must represent various areas at one-foot depth.
- Additional testing may be required in the special conditions or other sections of the permit. Permittees receiving industrial wastewater may be required to conduct additional testing upon request from the Department.
- At this time, the Department recommends monitoring requirements shall be performed in accordance with, "POTW Sludge Sampling and Analysis Guidance Document," United States Environmental Protection Agency, August 1989, and the subsequent revisions.

SECTION J – RECORD KEEPING AND REPORTING REQUIREMENTS

- The permittee shall maintain records on file at the facility for at least five years for the items listed in these standard conditions and any additional items in the Special Conditions section of this permit. This shall include dates when the sludge facility is checked for proper operation, records of maintenance and repairs and other relevant information.
- Reporting period
 - By January 28th of each year, an annual report shall be submitted for the previous calendar year period for all mechanical wastewater treatment facilities, sludge lagoons, and sludge or biosolids disposal facilities.
 - Permittees with wastewater treatment lagoons shall submit the above annual report only when sludge or biosolids are removed from the lagoon during the report period or when the lagoon is closed.
- Report Forms. The annual report shall be submitted on report forms provided by the Department or equivalent forms approved by the Department.
- Reports shall be submitted as follows:

Major facilities (those serving 10,000 persons or 1 million gallons per day) shall report to both the Department and EPA. Other facilities need to report only to the Department. Reports shall be submitted to the addresses listed as follows:

DNR regional office listed in your permit
(see cover letter of permit)
ATTN: Sludge Coordinator

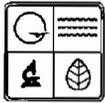
EPA Region VII
Water Compliance Branch (WACM)
Sludge Coordinator
11201 Renner Blvd.
Lenexa, KS 66219

5. Annual report contents. The annual report shall include the following:
- a. Sludge and biosolids testing performed. Include a copy or summary of all test results, even if not required by the permit.
 - b. Sludge or biosolids quantity shall be reported as dry tons for quantity generated by the wastewater treatment facility, the quantity stored on site at the end of the year, and the quantity used or disposed.
 - c. Gallons and % solids data used to calculate the dry ton amounts.
 - d. Description of any unusual operating conditions.
 - e. Final disposal method, dates, and location, and person responsible for hauling and disposal.
 - i. This must include the name, address for the hauler and sludge facility. If hauled to a municipal wastewater treatment facility, sanitary landfill, or other approved treatment facility, give the name of that facility.
 - ii. Include a description of the type of hauling equipment used and the capacity in tons, gallons, or cubic feet.
 - f. Contract Hauler Activities:

If contract hauler, provide a copy of a signed contract from the contractor. Permittee shall require the contractor to supply information required under this permit for which the contractor is responsible. The permittee shall submit a signed statement from the contractor that he has complied with the standards contained in this permit, unless the contract hauler has a separate sludge or biosolids use permit.
 - g. Land Application Sites:
 - i. Report the location of each application site, the annual and cumulative dry tons/acre for each site, and the landowners name and address. The location for each spreading site shall be given as a legal description for nearest ¼, ¼, Section, Township, Range, and county, or UTM coordinates. The facility shall report PAN when either of the following occurs: 1) When biosolids are greater than 50,000 mg/kg TN; or 2) when biosolids are land applied at an application rate greater than two dry tons per acre per year.
 - ii. If the "Low Metals" criteria are exceeded, report the annual and cumulative pollutant loading rates in pounds per acre for each applicable pollutant, and report the percent of cumulative pollutant loading which has been reached at each site.
 - iii. Report the method used for compliance with pathogen and vector attraction requirements.
 - iv. Report soil test results for pH, CEC, and phosphorus. If none was tested during the year, report the last date when tested and results.

JUL 30 2015

Water Protection Program



MISSOURI DEPARTMENT OF NATURAL RESOURCES
 WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH
**FORM B2 – APPLICATION FOR OPERATING PERMIT FOR FACILITIES THAT RECEIVE
 PRIMARILY DOMESTIC WASTE AND HAVE A DESIGN FLOW MORE THAN 100,000 GALLONS
 PER DAY**

FACILITY NAME Gerald North lagoon	
PERMIT NO. MO-0045420	COUNTY Franklin
APPLICATION OVERVIEW	
Form B2 has been developed in a modular format and consists of Parts A, B and C and a Supplemental Application Information (Parts D, E, F and G) packet. All applicants must complete Parts A, B and C. Some applicants must also complete parts of the Supplemental Application Information packet. The following items explain which parts of Form B2 you must complete. Submittal of an incomplete application may result in the application being returned.	
BASIC APPLICATION INFORMATION	
<p>A. Basic Application Information for all Applicants. All applicants must complete Part A.</p> <p>B. Additional Application Information for all Applicants. All applicants must complete Part B.</p> <p>C. Certification. All applicants must complete Part C.</p>	
SUPPLEMENTAL APPLICATION INFORMATION	
<p>D. Expanded Effluent Testing Data. A treatment works that discharges effluent to surface water of the United States and meets one or more of the following criteria must complete <i>Part D - Expanded Effluent Testing Data</i>:</p> <ol style="list-style-type: none"> 1. Has a design flow rate greater than or equal to 1 million gallons per day. 2. Is required to have or currently has a pretreatment program. 3. Is otherwise required by the permitting authority to provide the information. <p>E. Toxicity Testing Data. A treatment works that meets one or more of the following criteria must complete <i>Part E - Toxicity Testing Data</i>:</p> <ol style="list-style-type: none"> 1. Has a design flow rate greater than or equal to 1 million gallons per day. 2. Is required to have or currently has a pretreatment program. 3. Is otherwise required by the permitting authority to provide the information. <p>F. Industrial User Discharges and Resource Conservation and Recovery Act / Comprehensive Environmental Response, Compensation and Liability Act Wastes. A treatment works that accepts process wastewater from any significant industrial users, also known as SIUs, or receives a Resource Conservation and Recovery Act or CERCLA wastes must complete <i>Part F - Industrial User Discharges and Resource Conservation and Recovery Act /CERCLA Wastes</i>.</p> <p>SIUs are defined as:</p> <ol style="list-style-type: none"> 1. All Categorical Industrial Users, or CIUs, subject to Categorical Pretreatment Standards under 40 Code of Federal Regulations 403.6 and 40 Code of Federal Regulations 403.6 and 40 CFR Chapter 1, Subchapter N. 2. Any other industrial user that meets one or more of the following: <ol style="list-style-type: none"> i. Discharges an average of 25,000 gallons per day or more of process wastewater to the treatment works (with certain exclusions). ii. Contributes a process waste stream that makes up five percent or more of the average dry weather hydraulic or organic capacity of the treatment plant. iii. Is designated as an SIU by the control authority. iv. Is otherwise required by the permitting authority to provide the information. <p>G. Combined Sewer Systems. A treatment works that has a combined sewer system must complete <i>Part G - Combined Sewer Systems</i>.</p>	
ALL APPLICANTS MUST COMPLETE PARTS A, B and C	

RECEIVED

JUL 30 2015

AR21712



MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH
FORM B2 – APPLICATION FOR AN OPERATING PERMIT FOR FACILITIES THAT RECEIVE PRIMARILY DOMESTIC WASTE AND HAVE A DESIGN FLOW MORE THAN 100,000 GALLONS PER DAY

FOR AGENCY USE ONLY

CHECK NUMBER	
DATE RECEIVED: 7/30/15	FEE SUBMITTED: [Signature]

PART A – BASIC APPLICATION INFORMATION

1. THIS APPLICATION IS FOR:

An operating permit for a new or unpermitted facility. Construction Permit # _____
(Please include completed Antidegradation Review or request to conduct an Antidegradation Review, see instructions)

An operating permit renewal: Permit #MO-0045420 Expiration Date _____

An operating permit modification: Permit #MO-_____ Reason: _____

1.1 Is the appropriate fee included with the application (see instructions for appropriate fee)? YES NO

2. FACILITY

NAME Gerald North Lagoon	TELEPHONE NUMBER WITH AREA CODE		
ADDRESS (PHYSICAL) Wheeler Rd	CITY Gerald	STATE MO	ZIP 63037
2.1 LEGAL DESCRIPTION (Facility Site): ¼, NE ¼, NW ¼, Sec. 1, T 42N, R 4W	COUNTY FRANKLIN		
2.2 UTM Coordinates Easting (X): <u>646298</u> Northing (Y): <u>4253592</u> For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)			
2.3 Name of receiving stream: UNNAMED TRIBUTARY TO CEDAR FORK			
2.4 Number of Outfalls: 1 wastewater outfalls, stormwater outfalls, instream monitoring sites			

3. OWNER

NAME CITY OF GERALD	E-MAIL ADDRESS geraldch@fidnet.com	TELEPHONE NUMBER WITH AREA CODE 66 -764-3340	
ADDRESS 106 E Fitzgerald	CITY Gerald	STATE MO	ZIP 63037
3.1 Request review of draft permit prior to Public Notice? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			
3.2 Are you a Publically Owned Treatment Works (POTW)? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			
3.3 Are you a Privately Owned Treatment Facility? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			
3.4 Are you a Privately Owned Treatment Facility regulated by the Public Service Commission (PSC)? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			

4. CONTINUING AUTHORITY: Permanent organization which will serve as the continuing authority for the operation, maintenance and modernization of the facility.

NAME SAME	E-MAIL ADDRESS	TELEPHONE WITH AREA CODE	
ADDRESS	CITY	STATE	ZIP

If the Continuing Authority is different than the Owner, please include a copy of the contract agreement between the two parties and a description of the responsibilities of both parties within the agreement.

5. OPERATOR

NAME Nick Grube	TITLE Public Works Director	CERTIFICATE NUMBER (IF APPLICABLE) 9311
E-MAIL ADDRESS cityofgerladpw@gmail.com	TELEPHONE NUMBER WITH AREA CODE 573-626-764-3340	

6. FACILITY CONTACT

NAME SAME	TITLE		
E-MAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE		
ADDRESS	CITY	STATE	ZIP CODE

SL Franklin

FACILITY NAME Gerald North Lagoon	PERMIT NO. MO- 0045420	OUTFALL NO. 001
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PART A – BASIC APPLICATION INFORMATION

7. FACILITY INFORMATION

7.1 Process Flow Diagram or Schematic. Provide a diagram showing the processes of the treatment plant. Show all of the treatment units, including disinfection (e.g. – Chlorination and Dechlorination), influents, and outfalls. Indicate any treatment process changes in the routing of wastewater during dry weather and peak wet weather. Include a brief narrative description of the diagram. Attach sheets as necessary.

See Attached

FACILITY NAME Gerald North Lagoon	PERMIT NO. MO- 0045420	OUTFALL NO. 001
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PART A – BASIC APPLICATION INFORMATION

7. FACILITY INFORMATION (continued)

7.2 Topographic Map. Attach to this application a topographic map of the area extending at least one mile beyond facility property boundaries. This map must show the outline of the facility and the following information.

- The area surrounding the treatment plant, including all unit processes.
- The location of the downstream landowner(s). (See Item 10.)
- The major pipes or other structures through which wastewater enters the treatment works and the pipes or other structures through which treated wastewater is discharged from the treatment plant. Include outfalls from bypass piping, if applicable.
- The actual point of discharge.
- Wells, springs, other surface water bodies and drinking water wells that are: 1) within ¼ mile of the property boundaries of the treatment works, and 2) listed in public record or otherwise known to the applicant.
- Any areas where the sewage sludge produced by the treatment works is stored, treated, or disposed.
- If the treatment works receives waste that is classified as hazardous under the Resource Conservation and Recovery Act (RCRA) by truck, rail, or special pipe, show on the map where that hazardous waste enters the treatment works and where it is treated, stored, or disposed.

7.3 Facility SIC Code: 4952	Discharge SIC Code: 4952
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7.4 Number of people presently connected or population equivalent (P.E.): 592 Design P.E. 1200

7.5 Connections to the facility:
 Number of units presently connected:
 Homes 393 Trailers 92 Apartments 55 Other (including industrial) 8
 Number of Commercial Establishments: 44

7.6 Design Flow <u>150,000 gpd</u>	Actual Flow <u>80,000 gpd</u>
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7.7 Will discharge be continuous through the year? Yes No
 Discharge will occur during the following months: _____ How many days of the week will discharge occur? _____

7.8 Is industrial waste discharged to the facility? Yes No
 If yes, please describe the number and types of industries that discharge to your facility.
approx 10 industries, metals manufacturing and electroplating, food
 Refer to the APPLICATION OVERVIEW to determine whether additional information is needed for Part F.

7.9 Does the facility accept or process leachate from landfills? Yes No

7.10 Is wastewater land applied? Yes No
 If yes, is Form I attached? Yes No

7.11 Does the facility discharge to a losing stream or sinkhole? Yes No

7.12 Has a wasteload allocation study been completed for this facility? Yes No

8. LABORATORY CONTROL INFORMATION

LABORATORY WORK CONDUCTED BY PLANT PERSONNEL		
Lab work conducted outside of plant.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Push-button or visual methods for simple test such as pH, settleable solids.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Additional procedures such as Dissolved Oxygen, Chemical Oxygen Demand, Biological Oxygen Demand, titrations, solids, volatile content.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
More advanced determinations such as BOD seeding procedures, fecal coliform, nutrients, total oils, phenols, etc.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Highly sophisticated instrumentation, such as atomic absorption and gas chromatograph.	Yes <input type="checkbox"/>	No <input type="checkbox"/>

FACILITY NAME Gerald North Lagoon		PERMIT NO. MO- 0045420	OUTFALL NO. 001		
PART A - BASIC APPLICATION INFORMATION					
9. SLUDGE HANDLING, USE AND DISPOSAL					
9.1	Is the sludge a hazardous waste as defined by 10 CSR 25?		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
9.2	Sludge production (Including sludge received from others): Design Dry Tons/Year 8.3		Actual Dry Tons/Year		
9.3	Sludge storage provided: _____ Cubic feet; _____ Days of storage; _____ Average percent solids of sludge;				
	<input type="checkbox"/> No sludge storage is provided. <input checked="" type="checkbox"/> Sludge is stored in lagoon.				
9.4	Type of storage:	<input type="checkbox"/> Holding Tank <input type="checkbox"/> Basin <input type="checkbox"/> Concrete Pad	<input type="checkbox"/> Building <input checked="" type="checkbox"/> Lagoon <input type="checkbox"/> Other (Please describe) _____		
9.5	Sludge Treatment:				
	<input type="checkbox"/> Anaerobic Digester <input type="checkbox"/> Aerobic Digester	<input type="checkbox"/> Storage Tank <input type="checkbox"/> Air or Heat Drying	<input type="checkbox"/> Lime Stabilization <input type="checkbox"/> Composting	<input checked="" type="checkbox"/> Lagoon <input type="checkbox"/> Other (Attach Description)	
9.6	Sludge use or disposal:				
	<input type="checkbox"/> Land Application <input checked="" type="checkbox"/> Surface Disposal (Sludge Disposal Lagoon, Sludge Held For More Than Two Years) <input type="checkbox"/> Other (Attach Explanation Sheet) _____	<input type="checkbox"/> Contract Hauler <input type="checkbox"/> Hauled to Another Treatment Facility	<input type="checkbox"/> Solid Waste Landfill <input type="checkbox"/> Incineration		
9.7	Person responsible for hauling sludge to disposal facility: <input checked="" type="checkbox"/> By Applicant <input type="checkbox"/> By Others (complete below)				
NAME		E-MAIL ADDRESS			
ADDRESS		CITY	STATE	ZIP CODE	
CONTACT PERSON		TELEPHONE WITH AREA CODE		PERMIT NO. MO-	
9.8	Sludge use or disposal facility: <input checked="" type="checkbox"/> By Applicant <input type="checkbox"/> By Others (Please complete below)				
NAME		E-MAIL ADDRESS			
ADDRESS		CITY	STATE	ZIP CODE	
CONTACT PERSON		TELEPHONE WITH AREA CODE		PERMIT NO. MO-	
9.9	Does the sludge or biosolids disposal comply with Federal Sludge Regulation 40 CFR 503? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Please explain) <i>sludge is tested & land applied</i>				
END OF PART A					

FACILITY NAME Gerald North Lagoon	PERMIT NO. MO- MO-0045420	OUTFALL NO. 001
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PART B – ADDITIONAL APPLICATION INFORMATION

10. COLLECTION SYSTEM

10.1 Length of sanitary sewer collection system in miles
13

10.2 Does significant infiltration occur in the collection system? Yes No
If yes, briefly explain any steps underway or planned to minimize inflow and infiltration:
City has line several thousand feet of collection pipe in past 5 years

11. BYPASSING

Does any bypassing occur anywhere in the collection system or at the treatment facility? Yes No
If yes, explain:

12. OPERATION AND MAINTENANCE PERFORMED BY CONTRACTOR(S)

Are any operational or maintenance aspects (related to wastewater treatment and effluent quality) of the treatment works the responsibility of the contractor?
Yes No
If Yes, list the name, address, telephone number and status of each contractor and describe the contractor's responsibilities.
(Attach additional pages if necessary.)

NAME

MAILING ADDRESS

TELEPHONE NUMBER WITH AREA CODE

EMAIL ADDRESS

RESPONSIBILITIES OF CONTRACTOR

13. SCHEDULED IMPROVEMENTS AND SCHEDULES OF IMPLEMENTATION

Provide information about any uncompleted implementation schedule or uncompleted plans for improvements that will affect the wastewater treatment, effluent quality, or design capacity of the treatment works. If the treatment works has several different implementation schedules or is planning several improvements, submit separate responses for each.

FACILITY NAME Gerald North Lagoon	PERMIT NO. MO- MO-0045420	OUTFALL NO. 001
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PART B – ADDITIONAL APPLICATION INFORMATION

14. EFFLUENT TESTING DATA

Applicants must provide effluent testing data for the following parameters. Provide the indicated effluent data for each outfall through which effluent is discharged. Do not include information of combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. At a minimum, effluent testing data must be based on at least **three samples** and must be no more than four and one-half years apart.

Outfall Number

PARAMETER	MAXIMUM DAILY VALUE		AVERAGE DAILY VALUE		
	Value	Units	Value	Units	Number of Samples
pH (Minimum)	6.7	S.U.		S.U.	12
pH (Maximum)	7.73	S.U.		S.U.	12
Flow Rate	300,000	MGD	80,000	MGD	12

*For pH report a minimum and a maximum daily value

POLLUTANT	MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	ML/MDL
	Conc.	Units	Conc.	Units	Number of Samples		

Conventional and Nonconventional Compounds

BIOCHEMICAL OXYGEN DEMAND (Report One)	BOD ₅	30	mg/L	11	mg/L	12		
	CBOD ₅		mg/L		mg/L			
E. COLI			#/100 mL		#/100 mL			
TOTAL SUSPENDED SOLIDS (TSS)	53		mg/L	15	mg/L	12		
AMMONIA (as N)	2.54		mg/L	.7	mg/L			
CHLORINE* (TOTAL RESIDUAL, TRC)			mg/L		mg/L			
DISSOLVED OXYGEN	9.7		mg/L	8	mg/L			
OIL and GREASE	5		mg/L	5	mg/L			
OTHER			mg/L		mg/L			

*Report only if facility chlorinates

END OF PART B

FACILITY NAME Gerald North Lagoon	PERMIT NO. MO- MO-0045420	OUTFALL NO. 001
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PART C – CERTIFICATION

15. CERTIFICATION

All applicants must complete the Certification Section. This certification must be signed by an officer of the company or city official. All applicants must complete all applicable sections as explained in the Application Overview. By signing this certification statement, applicants confirm that they have reviewed the entire form and have completed all sections that apply to the facility for which this application is submitted.

ALL APPLICANTS MUST COMPLETE THE FOLLOWING CERTIFICATION.

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

PRINTED NAME Nick Grube	OFFICIAL TITLE (MUST BE AN OFFICER OF THE COMPANY OR CITY OFFICIAL) Public Works Director
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SIGNATURE 
--

TELEPHONE NUMBER WITH AREA CODE (573) 764-3340

DATE SIGNED 7/24/15

Upon request of the permitting authority, you must submit any other information necessary to assess wastewater treatment practices at the treatment works or identify appropriate permitting requirements.

Send Completed Form to:

Department of Natural Resources
Water Protection Program
ATTN: NPDES Permits and Engineering Section
P.O. Box 176
Jefferson City, MO 65102

END OF PART C
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH PARTS OF FORM B2 YOU MUST COMPLETE.

Do not complete the remainder of this application, unless at least one of the following statements applies to your facility:

1. Your facility design flow is equal to or greater than 1,000,000 gallons per day.
2. Your facility is a pretreatment treatment works.
3. Your facility is a combined sewer system.

Submittal of an incomplete application may result in the application being returned. Permit fees for returned applications shall be forfeited. Permit fees for applications being processed by the department that are withdrawn by the applicant shall be forfeited.

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL		
FACILITY NAME Gerald North lagoon	PERMIT NO. MO- MO-0045420	OUTFALL NO. 001

PART D – EXPANDED EFFLUENT TESTING DATA

16. EXPANDED EFFLUENT TESTING DATA

Refer to the APPLICATION OVERVIEW to determine whether Part D applies to the treatment works.

If the treatment works has a design flow greater than or equal to 1 million gallons per day or it has (or is required to have) a pretreatment program, or is otherwise required by the permitting authority to provide the data, then provide effluent testing data for the following pollutants. Provide the indicated effluent testing information for each outfall through which effluent is discharged. Do not include information of combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. The facility shall use sufficiently sensitive analytical methods for detecting, identifying, and measuring the concentrations of pollutants. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. Indicate in the blank rows provided below any data you may have on pollutants not specifically listed in this form. At a minimum, effluent testing data must be based on at least **three pollutant scans** and must be no more than four and one-half years apart.

Outfall Number (Complete Once for Each Outfall Discharging Effluent to Waters of the State.)

POLLUTANT	MAXIMUM DAILY DISCHARGE			AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units		

METALS (TOTAL RECOVERABLE), CYANIDE, PHENOLS AND HARDNESS

ANTIMONY		mg				mg			3		
ARSENIC	<15								3		
BERYLLIUM	1				1				3		
CADMIUM	<2								3		
CHROMIUM III	<2								3		
CHROMIUM VI	3.2				2.5				3		
COPPER	16				14				3		
LEAD	10				6				3		
MERCURY	<.2								3		
NICKEL	16				6				3		
SELENIUM									3		
SILVER	<2								3		
THALLIUM									3		
ZINC	50	∇			36	∇			3		
CYANIDE		mg				mg			3		
TOTAL PHENOLIC COMPOUNDS											
HARDNESS (as CaCO ₃)	274	mg			230	mg			3		

VOLATILE ORGANIC COMPOUNDS

ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMOFORM											
CARBON TETRACHLORIDE											
CHLOROBENZENE											

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PART D – EXPANDED EFFLUENT TESTING DATA

16. EXPANDED EFFLUENT TESTING DATA

Complete Once for Each Outfall Discharging Effluent to Waters of the State

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL	
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	No. of Samples			
CHLORODIBROMO-METHANE												
CHLOROETHANE												
2-CHLORO-ETHYL VINYL ETHER												
CHLOROFORM												
DICHLOROBROMO-METHANE												
1,1-DICHLORO-ETHANE												
1,2-DICHLORO-ETHANE												
TRANS-1,2-DICHLOROETHYLENE												
1,1-DICHLORO-ETHYLENE												
1,2-DICHLORO-PROPANE												
1,3-DICHLORO-PROPYLENE												
ETHYLBENZENE												
METHYL BROMIDE												
METHYL CHLORIDE												
METHYLENE CHLORIDE												
1,1,2,2-TETRA-CHLOROETHANE												
TETRACHLORO-ETHANE												
TOLUENE												
1,1,1-TRICHLORO-ETHANE												
1,1,2-TRICHLORO-ETHANE												
TRICHLORETHYLENE												
VINYL CHLORIDE												

ACID-EXTRACTABLE COMPOUNDS

P-CHLORO-M-CRESOL												
2-CHLOROPHENOL												
2,4-DICHLOROPHENOL												
2,4-DIMETHYLPHENOL												
4,6-DINITRO-O-CRESOL												
2,4-DINITROPHENOL												
2-NITROPHENOL												
4-NITROPHENOL												

FACILITY NAME Gerald North lagoon	PERMIT NO. MO- MO-0045420	OUTFALL NO. 001
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PART D – EXPANDED EFFLUENT TESTING DATA

16. EXPANDED EFFLUENT TESTING DATA

Complete Once for Each Outfall Discharging Effluent to Waters of the State.

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/MDL	
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	No. of Samples			
PENTACHLOROPHENOL												
PHENOL												
2,4,6-TRICHLOROPHENOL												
BASE-NEUTRAL COMPOUNDS												
ACENAPHTHENE												
ACENAPHTHYLENE												
ANTHRACENE												
BENZIDINE												
BENZO(A)ANTHRACENE												
BENZO(A)PYRENE												
3,4-BENZO-FLUORANTHENE												
BENZO(GH) PHERYLENE												
BENZO(K) FLUORANTHENE												
BIS (2-CHLOROTHOXY) METHANE												
BIS (2-CHLOROETHYL) – ETHER												
BIS (2-CHLOROISO-PROPYL) ETHER												
BIS (2-ETHYLHEXYL) PHTHALATE												
4-BROMOPHENYL PHENYL ETHER												
BUTYL BENZYL PHTHALATE												
2-CHLORONAPH-THALENE												
4-CHLORPHENYL PHENYL ETHER												
CHRYSENE												
DI-N-BUTYL PHTHALATE												
DI-N-OCTYL PHTHALATE												
DIBENZO (A,H) ANTHRACENE												
1,2-DICHLORO-BENZENE												
1,3-DICHLORO-BENZENE												
1,4-DICHLORO-BENZENE												
3,3-DICHLORO-BENZIDINE												
DIETHYL PHTHALATE												
DIMETHYL PHTHALATE												

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME Gerald North lagoon	PERMIT NO. MO- MO-0045420	OUTFALL NO. 001
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PART E – TOXICITY TESTING DATA

17. TOXICITY TESTING DATA

Refer to the APPLICATION OVERVIEW to determine whether Part E applies to the treatment works.

Publicly owned treatment works, or POTWs, meeting one or more of the following criteria must provide the results of whole effluent toxicity tests for acute or chronic toxicity for each of the facility's discharge points.

- A. POTWs with a design flow rate greater than or equal to 1 million gallons per day
- B. POTWs with a pretreatment program (or those that are required to have one under 40 CFR Part 403)
- C. POTWs required by the permitting authority to submit data for these parameters
 - At a minimum, these results must include quarterly testing for a 12-month period within the past one year using multiple species (minimum of two species), or the results from four tests performed at least annually in the four and one-half years prior to the application, provided the results show no appreciable toxicity, and testing for acute or chronic toxicity, depending on the range of receiving water dilution. Do not include information about combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136.
 - If EPA methods were not used, report the reason for using alternative methods. If test summaries are available that contain all of the information requested below, they may be submitted in place of Part E. If no biomonitoring data is required, do not complete Part E. Refer to the application overview for directions on which other sections of the form to complete.

Indicate the number of whole effluent toxicity tests conducted in the past four and one-half years: ____ chronic ____ acute

Complete the following chart for the last three whole effluent toxicity tests. Allow one column per test. Copy this page if more than three tests are being reported.

	Most Recent	2 ND Most Recent	3 RD Most Recent
A. Test Information			
Test Method Number			
Final Report Number			
Outfall Number			
Dates Sample Collected			
Date Test Started			
Duration			
B. Toxicity Test Methods Followed			
Manual Title			
Edition Number and Year of Publication			
Page Number(s)			
C. Sample collection method(s) used. For multiple grab samples, indicate the number of grab samples used			
24-Hour Composite			
Grab			
D. Indicate where the sample was taken in relation to disinfection. (Check all that apply for each)			
Before Disinfection			
After Disinfection			
After Dechlorination			
E. Describe the point in the treatment process at which the sample was collected			
Sample Was Collected:			
F. Indicate whether the test was intended to assess chronic toxicity, acute toxicity, or both			
Chronic Toxicity			
Acute Toxicity			
G. Provide the type of test performed			
Static			
Static-renewal			
Flow-through			
H. Source of dilution water. If laboratory water, specify type; if receiving water, specify source			
Laboratory Water			
Receiving Water			

SEE ATTACHED

FACILITY NAME Gerald North lagoon	PERMIT NO. MO- MO-0045420	OUTFALL NO. 001
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PART E – TOXICITY TESTING DATA

17. TOXICITY TESTING DATA (continued)

	Most Recent	2 ND Most Recent	3 RD Most Recent
I. Type of dilution water. If salt water, specify "natural" or type of artificial sea salts or brine used.			
Fresh Water			
Salt Water			
J. Percentage of effluent used for all concentrations in the test series			
K. Parameters measured during the test (State whether parameter meets test method specifications)			
pH			
Salinity			
Temperature			
Ammonia			
Dissolved Oxygen			
L. Test Results			
Acute:			
Percent Survival in 100% Effluent			
LC ₅₀			
95% C.I.			
Control Percent Survival			
Other (Describe)			
Chronic:			
NOEC			
IC ₂₅			
Control Percent Survival			
Other (Describe)			
M. Quality Control/ Quality Assurance			
Is reference toxicant data available?			
Was reference toxicant test within acceptable bounds?			
What date was reference toxicant test run (MM/DD/YYYY)?			
Other (Describe)			
Is the treatment works involved in a toxicity reduction evaluation? <input type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, describe:			
If you have submitted biomonitoring test information, or information regarding the cause of toxicity, within the past four and one-half years, provide the dates the information was submitted to the permitting authority and a summary of the results.			
Date Submitted (MM/DD/YYYY)			
Summary of Results (See Instructions)			

SEE ATTACHED

END OF PART E

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME Gerald North lagoon	PERMIT NO. MO- MO-0045420	OUTFALL NO. 001
--------------------------------------	------------------------------	--------------------

PART F – INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES

Refer to the APPLICATION OVERVIEW to determine whether Part F applies to the treatment works.

18. GENERAL INFORMATION

18.1 Does the treatment works have, or is it subject to, an approved pretreatment program?
 Yes No

18.2 Number of Significant Industrial Users (SIUs) and Categorical Industrial Users (CIUs). Provide the number of each of the following types of industrial users that discharge to the treatment works:
Number of non-categorical SIUs _____
Number of CIUs _____

19. INDUSTRIES CONTRIBUTING MORE THAN 5 PERCENT OF THE ACTUAL FLOW TO THE FACILITY OR OTHER SIGNIFICANT INDUSTRIAL USERS INFORMATION

Supply the following information for each SIU. If more than one SIU discharges to the treatment works, provide the information requested for each. Submit additional pages as necessary.

NAME			
MAILING ADDRESS		STATE	ZIP

19.1 Describe all of the industrial processes that affect or contribute to the SIU's discharge

19.2 Describe all of the principle processes and raw materials that affect or contribute to the SIU's discharge.
Principal Product(s):

Raw Material(s):

19.3 Flow Rate

a. PROCESS WASTEWATER FLOW RATE. Indicate the average daily volume of process wastewater discharged into the collection system in gallons per day, or gpd, and whether the discharge is continuous or intermittent.
gpd Continuous Intermittent

b. NON-PROCESS WASTEWATER FLOW RATE. Indicate the average daily volume of non-process wastewater discharged into the collection system in gallons per day, or gpd, and whether the discharge is continuous or intermittent.
gpd Continuous Intermittent

19.4 Pretreatment Standards. Indicate whether the SIU is subject to the following:

a. Local Limits Yes No

b. Categorical Pretreatment Standards Yes No

If subject to categorical pretreatment standards, which category and subcategory?

19.5 Problems at the Treatment Works attributed to waste discharged by the SIU. Has the SIU caused or contributed to any problems (e.g., upsets, interference) at the treatment works in the past three years?
 Yes No

If Yes, describe each episode

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME Gerald North lagoon	PERMIT NO. MO- MO-0045420	OUTFALL NO. 001
--------------------------------------	------------------------------	--------------------

PART F – INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES

20. RCRA HAZARDOUS WASTE RECEIVED BY TRUCK, RAIL, OR DEDICATED PIPELINE

20.1 Does the treatment works receive or has it in the past three years received RCRA hazardous waste by truck, rail or dedicated pipe? Yes No

20.2 Method by which RCRA waste is received. (Check all that apply)
 Truck Rail Dedicated Pipe

20.3 Waste Description

EPA Hazardous Waste Number	Amount (volume or mass)	Units

21. CERCLA (SUPERFUND) WASTEWATER, RCRA REMEDIATION/CORRECTIVE ACTION WASTEWATER, AND OTHER REMEDIAL ACTIVITY WASTEWATER

21.1 Does the treatment works currently (or has it been notified that it will) receive waste from remedial activities? Yes No

Provide a list of sites and the requested information for each current and future site.

21.2 Waste Origin. Describe the site and type of facility at which the CERCLA/RCRA/or other remedial waste originates (or is expected to originate in the next five years).

21.3 List the hazardous constituents that are received (or are expected to be received). Included data on volume and concentration, if known. (Attach additional sheets if necessary)

21.4 Waste Treatment

a. Is this waste treated (or will it be treated) prior to entering the treatment works? Yes No

If Yes, describe the treatment (provide information about the removal efficiency):

b. Is the discharge (or will the discharge be) continuous or intermittent? Continuous Intermittent

If intermittent, describe the discharge schedule:

END OF PART F

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

MAKE ADDITIONAL COPIES OF THIS FORM FOR EACH OUTFALL

FACILITY NAME Gerald North lagoon	PERMIT NO. MO-0045420	OUTFALL NO. 001
--------------------------------------	--------------------------	--------------------

PART G – COMBINED SEWER SYSTEMS

Refer to the APPLICATION OVERVIEW to determine whether Part G applies to the treatment works.

22. GENERAL INFORMATION

22.1 System Map. Provide a map indicating the following: (May be included with basic application information.)

- A. All CSO Discharges.
- B. Sensitive Use Areas Potentially Affected by CSOs. (e.g., beaches, drinking water supplies, shellfish beds, sensitive aquatic ecosystems and Outstanding Natural Resource Waters.)
- C. Waters that Support Threatened and Endangered Species Potentially Affected by CSOs.

22.2 System Diagram. Provide a diagram, either in the map provided above or on a separate drawing, of the Combined Sewer Collection System that includes the following information:

- A. Locations of Major Sewer Trunk Lines, Both Combined and Separate Sanitary.
- B. Locations of Points where Separate Sanitary Sewers Feed into the Combined Sewer System.
- C. Locations of In-Line or Off-Line Storage Structures.
- D. Locations of Flow-Regulating Devices.
- E. Locations of Pump Stations.

22.3 Percent of collection system that is combined sewer

22.4 Population served by combined sewer collection system

22.5 Name of any satellite community with combined sewer collection system

23. CSO OUTFALLS. COMPLETE THE FOLLOWING ONCE FOR EACH CSO DISCHARGE POINT

23.1 Description of Outfall

- a. Outfall Number
- b. Location
- c. Distance from Shore (if applicable) _____ ft
- d. Depth Below Surface (if applicable) _____ ft
- e. Which of the following were monitored during the last year for this CSO?
 Rainfall CSO Pollutant Concentrations CSO
 CSO Flow Volume Receiving Water Quality
- f. How many storm events were monitored last year?

23.2 CSO Events

- a. Give the Number of CSO Events in the Last Year Events Actual Approximate
- b. Hours Give the Average Duration Per CSO Event
 Actual Approximate
- c. Million Gallons Give the Average Volume Per CSO Event
 Actual Approximate
- d. Give the minimum rainfall that caused a CSO event in the last year _____ inches of rainfall

23.3 Description of Receiving Waters

- a. Name of Receiving Water
- b. Name of Watershed/River/Stream System
- c. U.S. Soil Conservation Service 14-Digit Watershed Code (If Known)
- d. Name of State Management/River Basin
- e. U.S. Geological Survey 8- Digit Hydrologic Cataloging Unit Code (If Known)

23.4 CSO Operations
Describe any known water quality impacts on the receiving water caused by this CSO (e.g., permanent or intermittent beach closings, permanent or intermittent shellfish bed closings, fish kills, fish advisories, other recreational loss, or violation of any applicable state water quality standard.)

END OF PART G

REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM B2 YOU MUST COMPLETE.

**INSTRUCTIONS FOR COMPLETING FORM B2
APPLICATION FOR OPERATING PERMIT FOR FACILITIES THAT RECEIVE PRIMARILY DOMESTIC WASTE AND
HAVE A DESIGN FLOW MORE THAN 100,000 GALLONS PER DAY. Form 780-1805**

(Facilities less than or equal to 100,000 gallons per day of domestic waste must use Form B - 780-1512.)

PART A – BASIC APPLICATION INFORMATION

1. Check the appropriate box. **Do not check more than one item.** Operating permits refer to permits issued by the Department of Natural Resources, Water Protection Program. If an Antidegradation Review has not been conducted, please submit the application located at the following link to the Missouri Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, MO 65102: dnr.mo.gov/forms/780-1893-f.pdf.

1.1 **Fees Information:**

DOMESTIC OPERATING PERMIT FEES – PRIVATE

Annual operating permit fees are based on flow.

Annual fee/Design flow	Annual fee/Design flow	Annual fee/Design flow
\$100.....<5,000 gpd	\$375.....10,000-10,999 gpd	\$650.....16,000-16,999 gpd
\$150.....5,000-5,999 gpd	\$400.....11,000-11,999 gpd	\$800.....17,000-19,999 gpd
\$175.....6,000-6,999 gpd	\$450.....12,000-12,999 gpd	\$1,000.....20,000-22,999 gpd
\$200.....7,000-7,999 gpd	\$500.....13,000-13,999 gpd	\$2,000.....23,000-24,999 gpd
\$225.....8,000-8,999 gpd	\$550.....14,000-14,999 gpd	\$2,500.....25,000-29,999 gpd
\$250.....9,000-9,999 gpd	\$600.....15,000-15,999 gpd	\$3,000.....30,000 gpd -1 mgd

New domestic wastewater treatment facilities must submit the annual fee with the original application.

If the application is for a site-specific permit re-issuance, send no fees. You will be invoiced separately by the department on the anniversary date of the original permit. Permit fees must be current for the department to reissue the operating permit. Late fees of two percent per month are charged and added to outstanding annual fees.

PUBLIC SEWER SYSTEM OPERATING PERMIT FEES (City, Public Sewer District, Public Water District, or other publicly owned treatment works). Annual fee is based on number of service connections. The table of fees is in 10 CSR 20-6.011 and is available at www.sos.mo.gov/adrules/csr/current/10csr/10c20-6a.pdf. New Public Sewer System facilities should not submit any fee as the department will invoice the permittee.

OPERATING PERMIT MODIFICATIONS, including transfers, are subject to the following fees:

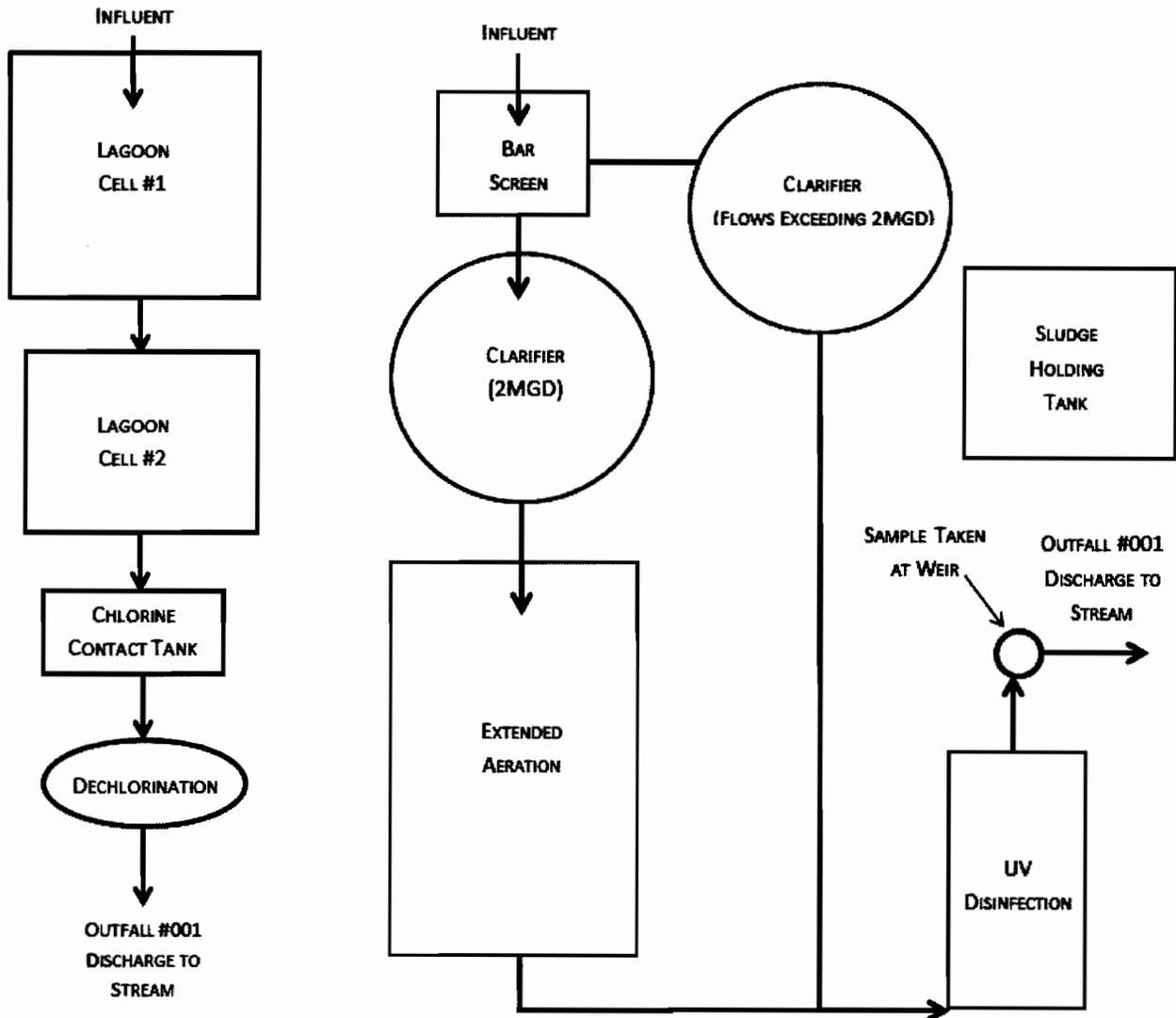
- a. Municipals - \$200 each.
- b. All others – \$100 each.

Note: Facility name or address changes where owner, operator and continuing authority remain the same are not considered transfers.

2. Name of Facility – Include the name by which this facility is locally known. Example: Southwest Sewage Treatment Plant, Country Club Mobile Home Park, etc. Provide the street address or location of the facility. If the facility lacks a street name or route number, provide the names of the closest intersection, highway, country road, etc.
- 2.1 Self-explanatory.
- 2.2 Global Positioning System, or GPS, is a satellite-based navigation system. The department prefers that a GPS receiver is used and the displayed coordinates submitted. If access to a GPS receiver is not available, use a mapping system to approximate the coordinates; the department’s mapping system is available at www.dnr.mo.gov/internetmapviewer/.
- 2.3-2.4 Self-explanatory.
3. Owner – Provide the legal name, mailing address, phone number, and e-mail address of the owner.
- 3.1 Prior to submitting a permit to public notice, the Department of Natural Resources shall provide the permit applicant 15 days to review the draft permit for nonsubstantive drafting errors. In the interest of expediting permit issuance, permit applicants may waive the opportunity to review draft permits prior to public notice.
- 3.2-3.4 Self-explanatory.
4. Continuing Authority – Provide information for the permanent organization which will serve as the continuing authority for the operation, maintenance, and modernization of the facility. The regulatory requirement regarding continuing authority is available at www.sos.mo.gov/adrules/csr/current/10csr/10c20-6a.pdf or contact the Department of Natural Resources Water Protection Program (see contact information below).
5. Operator – Provide the name, certificate number, title, mailing address, phone number, and e-mail address of the operator of the facility.
6. Provide the name, title, mailing address, work phone number, and e-mail address of a person who is thoroughly familiar with the operation of the facility and with the facts reported in this application and who can be contacted by the department.

7.1 Process Flow Diagram Examples

WASTEWATER TREATMENT LAGOON WASTEWATER TREATMENT FACILITY



- 7.2 A topographic map is available on the web at www.dnr.mo.gov/internetmapviewer/ or from the Department of Natural Resources' Geological Survey in Rolla at 573-368-2125.
- 7.3 For Standard Industrial Codes visit www.osha.gov/pls/imis/sicsearch.html and for the North American Industry Classification System, visit www.census.gov/naics or contact the Department of Natural Resources Water Protection Program.
- 7.4-7.8 Self – explanatory.
- 7.9 If wastewater is land applied please submit form I: www.dnr.mo.gov/forms/780-1686-f.pdf.
- 7.10-8. Self-explanatory
- 9.1 A copy of 10 CSR 25 is available at www.sos.mo.gov/adrules/csr/current/10csr/10csr.asp#10-25.
- 9.2-9.9 Self – explanatory.

**INSTRUCTIONS FOR COMPLETING FORM B2
APPLICATION FOR OPERATING PERMIT FOR FACILITIES THAT RECEIVE PRIMARILY DOMESTIC WASTE AND
HAVE A DESIGN FLOW MORE THAN 100,000 GALLONS PER DAY
(continued)**

PART B – ADDITIONAL APPLICATION INFORMATION

10.-14. Self-explanatory

PART C – CERTIFICATION

15. Signature – All applications must be signed as follows and the signatures must be original:
- a. For a corporation, by an officer having responsibility for the overall operation of the regulated facility or activity or for environmental matters.
 - b. For a partnership or sole proprietorship, by a general partner or the proprietor.
 - c. For a municipal, state, federal or other public facility, by either a principal executive officer or by an individual having overall responsibility for environmental matters at the facility.

PART D – EXPANDED EFFLUENT TESTING DATA

16. Self-explanatory. ML/MDL means minimum limit or minimum detection limit.

PART E – TOXICITY TESTING DATA

17. Self-explanatory.

PART F – INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES

18. Federal regulations are available through the U.S. Government Printing Office at www.gpoaccess.gov/cfr/index.html.

18.1 Self-explanatory

18.2 A non-categorical significant industrial user is an industrial user that is not a CIU and meets one or more of the following:

- i. Discharges an average of 25,000 gallons per day or more of process wastewater to the treatment works (with certain exclusions).
- ii. Contributes a process waste stream that makes up five percent or more of the average dry weather hydraulic or organic capacity of the treatment plant.
- iii. Is designated as an SIU by the control authority.

19.-21.4 Self-explanatory.

PART G – COMBINED SEWER SYSTEMS

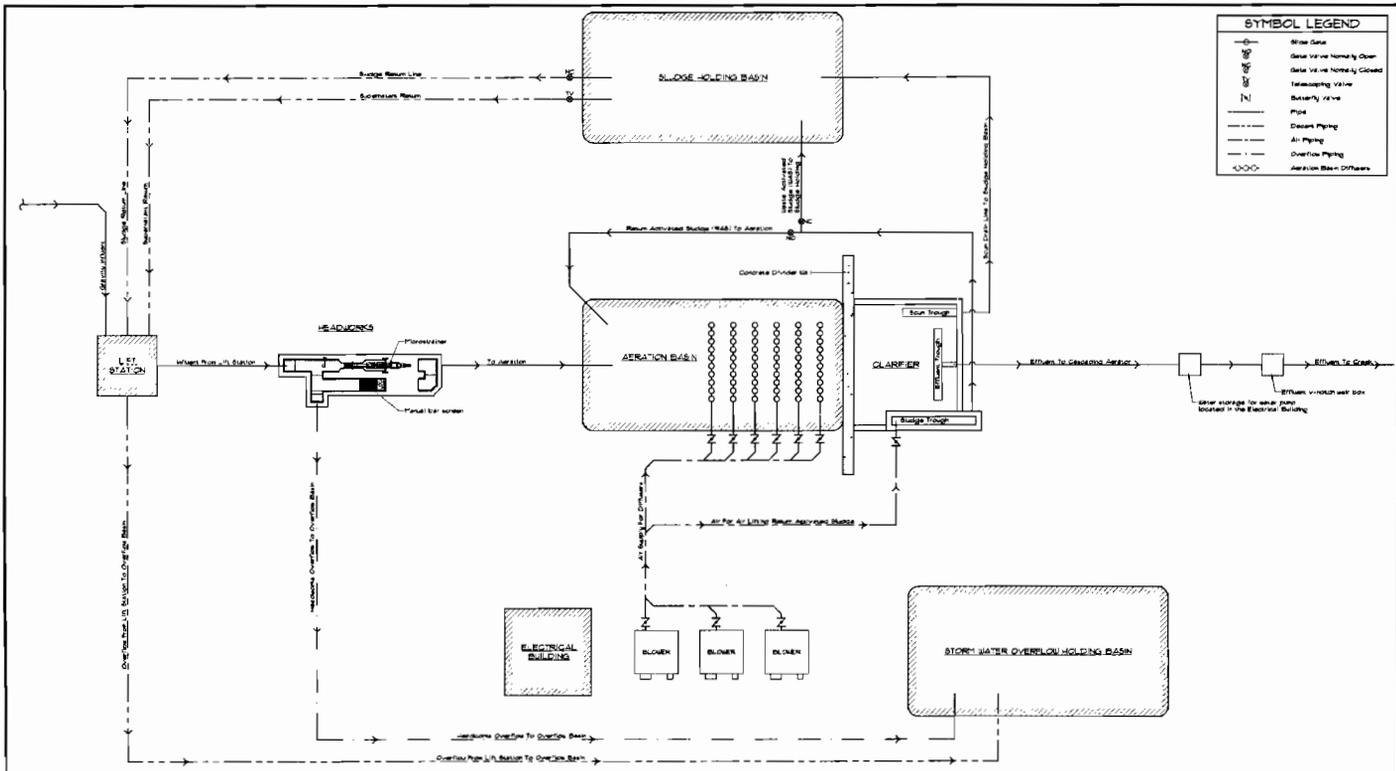
22.-23.4 Self-explanatory.

Submittal of an incomplete application may result in the application being returned.

This completed form and any attachments along with the applicable permit fees, should be submitted to:

Department of Natural Resources
Water Protection Program
ATTN: NPDES Permits and Engineering Section
P.O. Box 176
Jefferson City, MO 65102

If there are any questions concerning this form, contact the appropriate Department of Natural Resources regional office or the Water Protection Program at 573-751-6825. A map of the department's regional offices with addresses and phone numbers is available at www.dnr.mo.gov/regions/ro-map.pdf.



SYMBOL LEGEND

	Air Valve
	Gate Valve Normally Closed
	Gate Valve
	Telescoping Valve
	Butterfly Valve
	Pipe
	Ductwork Piping
	Air Piping
	Overhead Piping
	Aeration Basin Diffusers



PRELIMINARY

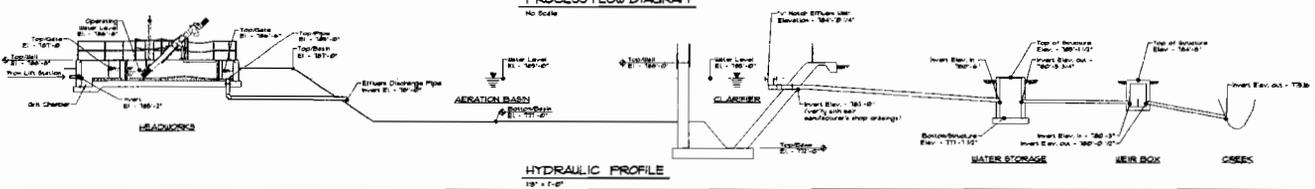
NEW WASTEWATER TREATMENT FACILITY
FOR THE CITY OF GERALD
FRANKLIN COUNTY, MISSOURI

PROCESS FLOW DIAGRAM / HYDRAULIC PROFILE

NO.	DATE	BY	CHKD.	APP.
1	4/12/2011	BSG	JL	
AS NOTED				
07-3505				

P1.1

PROCESS FLOW DIAGRAM
No Scale



HYDRAULIC PROFILE
1" = 1'-0"

Gerald Industrial - Sewer Use Questionnaire Results

Business Name/Notes	Business Type	SIC*	Facility Address	Avg. City Water Use gpd	Process gpd	Pretreatment	Non-Sewered Waste?	Classify	Follow Up Needed
Gerald Industries - Plant #1 Manufacturer of refrigerant valves & driers - 56 employees	Manufacturing facility	3499	625 West Industrial Drive	840	7,200		Yes	Significant	Permit needed
Gerald Industries - Plant #2 Assembly of dispensing products for liquid materials - 90 employees	Manufacturing facility	3089	701 West Industrial Drive	1,390	40		Yes	Significant	Permit needed
Gerald Industries - Plant #3 SURVEY NOT RETURNED								Significant	Permit needed
Bull Moose Tube Company Steel Tubing - 75 employees	Steel Tubing		406 E. Industrial Drive	9,513				Significant	Permit needed
Foxboro Plastics SURVEY NOT RETURNED			603 W. Flottmann Road	165				Significant	Permit needed
Newly Weds Foods Milling & blending of spice and seasoning - 57 employees	Food processing	2099	412 West Flottmann Rd.	5,316				Significant	Permit needed
MFA Feed Mill SURVEY NOT RETURNED				1,598				Significant	Permit needed
Ace Industries, LLC SURVEY NOT RETURNED			600 W. Industrial Drive	7,576				Significant	Permit needed

**ACUTE TOXICITY TESTING
USING
CERIODAPHNIA DUBIA
AND
*PIMEPHALES PROMELAS***

FOR

**ID#: 242-2014
RE-TEST #3
CITY OF GERALD**

NPDES PERMIT NUMBER: MO-0045420

BY

OZARK TESTING

**DIVISION OF ANDERSON & ASSOCIATES CONSULTING ENGINEERS, L.L.C.
1511 WATTS DRIVE
P.O. BOX 806
ROLLA, MO 65401**

**OCTOBER 20, 2014
OTWL 242**

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WHOLE EFFLUENT TOXICITY TEST

ABSTRACT

No acute toxicity was observed for effluent sample, collected on October 1, 2014 @ 7:45 AM. Forty-eight hour, static acute toxicity tests using the invertebrate, *Ceriodaphnia dubia* and Forty-eight hour static acute toxicity tests using the fathead minnow, *Pimephales promelas* were performed at the Ozark Testing Laboratory in Rolla, Missouri. No mortality was observed for either organism at the 24 or 48 hour mark. No mortality was observed the Control (Reconstituted Hard Water) for both species.

SUBJECT

Whole Effluent Toxicity testing for Gerald North Lagoon. Acute 48 hour static non-renewal test of plant effluent on *Ceriodaphnia dubia* and 48 hour static renewal test of plant effluent on *Pimephales promelas*.

CLIENT

City of Gerald
Attn: Brad Landwher
106 E. Fitzgerald
Gerald, MO 63037

Client #242

Permit # MO-0045420

TESTING LABORATORY

Ozark Testing
Division of Anderson & Associates Consulting Engineers, L.L.C.
1511 Watts Drive • P.O. Box 806
Rolla, MO 65401
(573) 364-3301

TEST MATERIAL

The Effluent from the Wastewater Treatment Plant and Upstream, which was provided by the client.

REPLICATE TEST CONCENTRATIONS

Sample concentrations:

100% effluent, 50% effluent, 25% effluent, 12.5% effluent, 6.25% effluent, 0% effluent (100% upstream diluent), and Control (100% Reconstituted Water)

I. INTRODUCTION

The following is a report on the Whole Effluent Toxicity Test performed by Ozark Testing in Rolla, MO, for the City of Gerald North Lagoon. Duration of the test was October 1-3, 2014.

The objective of this test was to determine the acute toxicity of Gerald North on *Ceriodaphnia dubia* and *Pimephales promelas*.

This test was conducted utilizing test procedures for acute static non-renewal toxicity test as described in methods for measuring the 1) Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, and 2) Standard Methods for the Examination of Water and Wastewater, 19th Edition, and modified according to the clients NPDES permit requirements.

Sample Collected:	10/01/14 @ 7:45 AM
Collected By:	Brad Landwehr
Arrival in Laboratory:	10/01/14 @ 9:05AM
Sample Temperature on Arrival:	16.7°C
Test Start:	10/01/14 @ 1:00 PM
Test Duration:	48 Hours for <i>Ceriodaphnia dubia</i> 48 Hours for <i>Pimephales promelas</i>
Test Species:	<i>Ceriodaphnia dubia</i> and <i>Pimephales promelas</i>
Age of Organisms:	<i>Ceriodaphnia dubia</i> 24 Hours <i>Pimephales promelas</i> 24 Hours
Source of Organisms:	Aquatic Bio-Systems

II. METHODS AND MATERIALS

A. TEST ORGANISMS

A test lot of the *Ceriodaphnia dubia* and *Pimephales promelas* was obtained and held in a temperature controlled environmental chamber at 25 (± 1.0) °C. A photoperiod was maintained at 16 hours light and 8 hours darkness, using ambient laboratory light, during holding period and the test duration.

B. TEST MATERIAL

Ozark Testing received Effluent Water samples on October 1, 2014 @ 9:05 AM in one 4L cub-containers supplied to the client by Ozark Testing. Upon receipt, the effluent had observed color and particulate matter with no turbidity. Initial water quality parameters were started immediately.

C. TEST VESSELS

The procedure was conducted using disposable 30 ml polypropylene beakers for the *Ceriodaphnia dubia* and disposable 500 ml beakers for the *Pimephales promelas*.

III. TEST PROCEDURES

Organisms were randomly selected and placed in each sample container of each corresponding concentration. Initial Water quality parameters were run on all samples prior to test initialization. These results are listed in Table I. Six concentrations were utilized for acute toxicity testing, the concentrations were: 100% effluent, 50% effluent, 25% effluent, 12.5% effluent, 6.25% effluent, and 0% effluent (100% Upstream), and the Control (100% Reconstituted Hard Water) with dilutions being made using upstream dilution water provided by the client. All organisms appeared healthy at time of introduction. All concentrations were at 25(± 1.0) °C before introduction of organisms. A reference toxicity test was also conducted during sample testing. The reference toxicity test data for the *Ceriodaphnia dubia* was determined not to fall within the acceptable laboratory range to deem the test organisms as healthy and able to provide reliable data for sample analysis. The reference toxicity test data for the *Pimephales promelas* was determined to fall within the acceptable laboratory range to deem the test organisms as healthy and able to provide reliable data for sample analysis. These results are listed in Table V.

IV. TEST RESULTS

Observations were made of *Ceriodaphnia dubia* and *Pimephales promelas* at 24 hours and at 48 hours. There was no abnormal behavior observed in the *Ceriodaphnia dubia* or the *Pimephales promelas* at the any of the concentrations. Please see Tables II and III for these results.

V. SIGNATURE PAGE

Submitted by: Ozark Testing
Division of Anderson & Associates Consulting Engineers, L.L.C.
1511 Watts Drive
P.O. Box 806
Rolla, MO 65401



Rachel Carter
Water Laboratory Manager

10/24/14

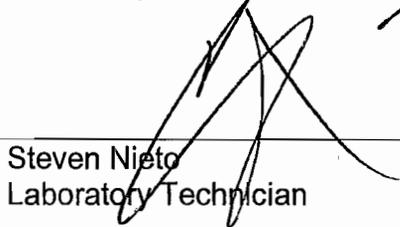
Date



Mondae Atughonu
Laboratory Technician

10/20/14

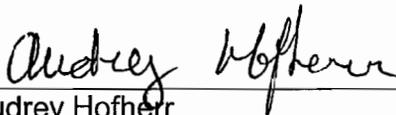
Date



Steven Nieto
Laboratory Technician

10-15-14

Date



Audrey Hofherr
Laboratory Technician

10-15-14

Date

TABLE I**CITY OF GERALD****INITIAL WATER QUALITY PARAMETERS**

ANALYSIS	RECON WATER	EFFLUENT	TECHNICIAN
TEMPERATURE °C	20.9	16.7	RLC
PH S.U.	8.11	7.82	RLC
CONDUCTIVITY µS	677	912	MA
DISSOLVED OXYGEN MG/L	8.69	8.19	RLC
TOTAL RESIDUAL CHLORINE MG/L	<0.02	<0.02	MA
AMMONIA MG/L	<0.01	0.12	RLC/MA
ALKALINITY MG/L	146	218	MA
HARDNESS MG/L	216	286	MA

^a Temperature (°C) - Glass Mercury Thermometer

^b pH – perHect pH meter Standard Methods #19-4500-H⁺ B

^c Alkalinity & Hardness (mg/l as CaCO₃) - Titrimetric method adapted from Standard Methods #19 –2320-B, #19-2340-C

^d Conductivity (µMhos/cm)-Oakton conductivity meter Standard Methods #19-2510 B

^e Total Ammonia As N (mg/l) - Nessler Method Standard Methods #17-4500-NH₃ C

^f Residual Chlorine (mg/l) - Colorimetric Method Standard Methods #19-4500-Cl G

^g Dissolved Oxygen (mg/l) - YSI D.O. Meter

TABLE II

ACUTE TOXICITY OF THE CITY OF GERALD TO
CERIODAPHNIA DUBIA

CERIODAPHNIA DUBIA
Record # of alive specimens

CONCENTRATION %	START	24HR A	24HR B	24HR C	24HR D	48HR A	48HR B	48HR C	48HR D
CONTROL	1:00	5	5	5	5	5	5	5	5
0	1:55	5	5	5	5	5	5	5	5
6.25	1:55	5	5	5	5	5	5	5	5
12.5	1:55	5	5	5	5	5	5	5	5
25	1:55	5	5	5	5	5	5	5	5
50	1:55	5	5	5	5	5	5	5	5
100	1:55	5	5	5	5	5	5	5	5
TECHNICIAN	RLC/SAN	AJH/SAN	AJH/SAN	AJH/SAN	AJH/SAN	RLC	RLC	RLC	RLC

ACUTE TOXICITY OF THE CITY OF GERALD TO
FATHEAD MINNOW (*Pimephales promelas*)

FATHEAD MINNOW
RECORD # OF ALIVE SPECIMENS

CONCENTRATION %	START	24HR A	24HR B	48HR A	48HR B
CONTROL	1:25	10	10	10	10
0	2:45	10	10	10	10
6.25	2:45	10	10	10	10
12.5	2:45	10	10	10	10
25	2:45	10	10	10	10
50	2:45	10	10	10	10
100	2:45	10	10	10	10
TECHNICIAN	RLC/SAN	AJH	AJH	RLC	RLC

Ceriodaphnia Survival and Reproduction Test-48 Hr Survival

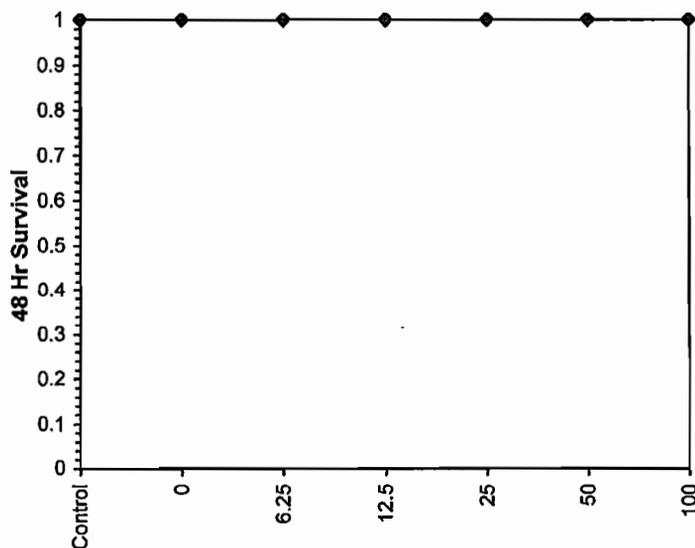
Start Date: 10/1/2014 Test ID: Grld100114 Sample ID: MO0045420
 End Date: 10/3/2014 Lab ID: MO 00987 Sample Type: AMB1-Ambient water
 Sample Date: 10/1/2014 Protocol: EPAF 94-EPA/600/4-91/002 Test Species: CD-Ceriodaphnia dubia
 Comments:

Conc-%	1	2	3	4
Control	1.0000	1.0000	1.0000	1.0000
0	1.0000	1.0000	1.0000	1.0000
6.25	1.0000	1.0000	1.0000	1.0000
12.5	1.0000	1.0000	1.0000	1.0000
25	1.0000	1.0000	1.0000	1.0000
50	1.0000	1.0000	1.0000	1.0000
100	1.0000	1.0000	1.0000	1.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%		
Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	
0	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00
6.25	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00
12.5	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00
25	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00
50	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00
100	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	1	0.896		
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	100	>100		1
Treatments vs Control				

Dose-Response Plot



Acute Fish Test-48 Hr Survival

Start Date: 10/1/2014	Test ID: graIdPP	Sample ID: MO0045420
End Date: 10/3/2014	Lab ID: MO 00987	Sample Type: AMB1-Ambient water
Sample Date: 10/1/2014	Protocol: EPAA 91-EPA/600/4-90/027F	Test Species: PP-Pimephales promelas

Comments:

Conc-%	1	2
Control	1.0000	1.0000
0	1.0000	1.0000
6.25	1.0000	1.0000
12.5	1.0000	1.0000
25	1.0000	1.0000
50	1.0000	1.0000
100	1.0000	1.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				N
			Mean	Min	Max	CV%	
Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2
0	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2
6.25	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2
12.5	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2
25	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2
50	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2
100	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Dose-Response Plot

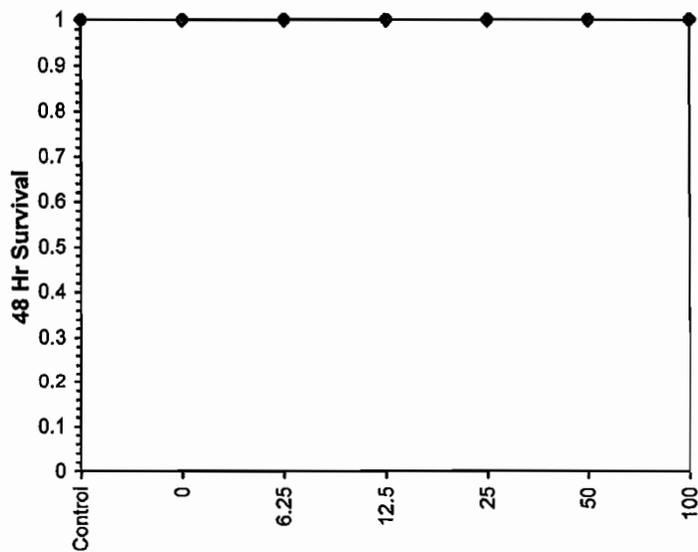


TABLE III**ACUTE TOXICITY OF THE CITY OF GERALD TO
*CERIODAPHNIA DUBIA***

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
AJH/SAN	24HR	CONTROL	24.0	8.03	8.51
AJH/SAN	24HR	100 UPSTREAM	24.6	7.85	8.21
AJH/SAN	24HR	6.25 EFFLUENT	24.5	7.95	8.19
AJH/SAN	24HR	12.5 EFFLUENT	24.9	7.64	8.21
AJH/SAN	24HR	25 EFFLUENT	24.7	7.75	8.31
AJH/SAN	24HR	50 EFFLUENT	24.1	7.82	8.39
AJH/SAN	24HR	100 EFFLUENT	24.8	7.51	8.45
RLC	48HR	CONTROL	25.3	7.67	8.35
RLC	48HR	100 UPSTREAM	25.4	7.63	8.45
RLC	48HR	6.25 EFFLUENT	25.5	7.61	8.51
RLC	48HR	12.5 EFFLUENT	25.5	7.56	8.40
RLC	48HR	25 EFFLUENT	25.5	7.60	8.53
RLC	48HR	50 EFFLUENT	25.3	7.58	8.58
RLC	48HR	100 EFFLUENT	25.0	7.53	8.67

TABLE III

ACUTE TOXICITY OF THE CITY OF GERALD TO
FATHEAD MINNOW (*Pimephales promelas*)

FATHEAD MINNOW

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
SAN/AJH	24HR	CONTROL	25.7	7.45	8.58
AJH	24HR	0	24.2	7.77	8.19
AJH	24HR	6.25	24.7	5.58	8.06
AJH	24HR	12.5	24.2	5.53	8.11
AJH	24HR	25	24.5	4.98	8.08
AJH	24HR	50	24.1	5.13	8.16
AJH	24HR	100	24.3	5.37	8.26
AJH	48HR	CONTROL	25.8	7.17	8.49
AJH	48HR	0	25.3	7.43	8.38
AJH	48HR	6.25	25.8	7.61	8.25
AJH	48HR	12.5	25.9	6.50	8.30
AJH	48HR	25	25.8	6.34	8.39
AJH	48HR	50	25.8	6.42	8.36
AJH	48HR	100	25.5	6.25	8.49

TABLE IV

REFERENCE TOXICITY TEST
CERIODAPHNIA DUBIA

Ceriodaphnia Dubia
RECORD # OF ALIVE SPECIMENS

Concentration %	Start	24hr A	24hr B	24hr C	24hr D	48hr A	48hr B	48hr C	48hr D
0.0 g/l	1:00	5	5	5	5	5	5	5	5
1.0 g/l	1:00	0	0	0	0	0	0	0	0
1.5 g/l	1:00	0	0	0	0	0	0	0	0
2.0g/l	1:00	0	0	0	0	0	0	0	0
2.5 g/l	1:00	0	0	0	0	0	0	0	0
3.0 g/l	1:00	0	0	0	0	0	0	0	0
TECHNICIAN	RLC	AJH/SAN	AJH/SAN	AJH/SAN	AJH/SAN	RLC	RLC	RLC	RLC

REFERENCE TOXICITY TEST
CERIODAPHNIA DUBIA

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
AJH/SAN	24HR	0.0 g/l	24.3	7.95	7.51
AJH/SAN	24HR	1.0 g/l	24.8	8.06	8.36
AJH/SAN	24HR	1.5 g/l	24.5	7.91	8.36
AJH/SAN	24HR	2.0g/l	24.0	8.02	8.37
AJH/SAN	24HR	2.5 g/l	24.2	7.95	8.30
AJH/SAN	24HR	3.0 g/l	24.5	7.94	8.33
RLC	48HR	0.0 g/l	25.4	7.64	8.36
RLC	48HR	1.0 g/l	25.3	7.63	8.42
RLC	48HR	1.5 g/l	25.4	7.70	8.42
RLC	48HR	2.0g/l	25.0	7.81	8.42
RLC	48HR	2.5 g/l	24.9	7.74	8.41
RLC	48HR	3.0 g/l	25.0	7.70	8.41

Ceriodaphnia Survival and Reproduction Test-48 Hr Survival

Start Date: 10/1/2014	Test ID: RT100114CD	Sample ID: MORT100114
End Date: 10/3/2014	Lab ID: MO 00987	Sample Type: AMB1-Ambient water
Sample Date: 10/1/2014	Protocol: EPAF 94-EPA/600/4-91/002	Test Species: CD-Ceriodaphnia dubia

Conc-%	1	2	3	4
Control	1.0000	1.0000	1.0000	1.0000
0	1.0000	1.0000	1.0000	1.0000
6.25	0.0000	0.0000	0.0000	0.0000
12.5	0.0000	0.0000	0.0000	0.0000
25	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				N
			Mean	Min	Max	CV%	
Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4
0	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4
6.25	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4
12.5	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4
25	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4
50	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4
100	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)	1	0.749		
Equality of variance cannot be confirmed				

Dose-Response Plot

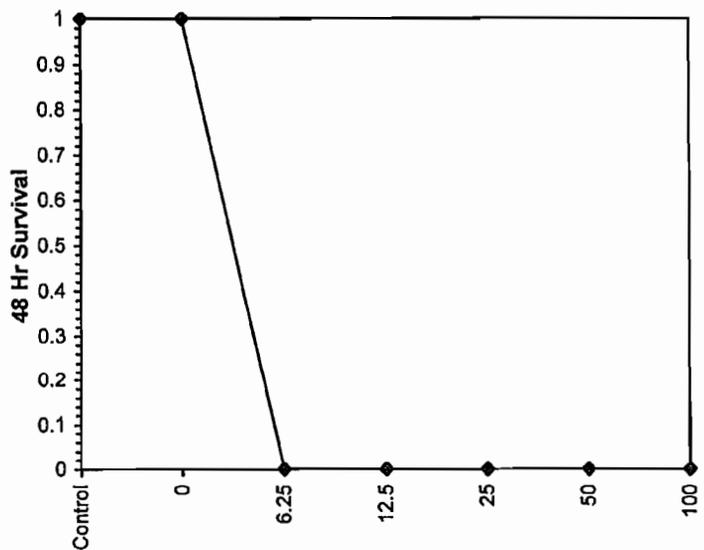


TABLE V

REFERENCE TOXICITY TEST
FATHEAD MINNOW (*PIMEPHALES PROMELAS*)

FATHEAD MINNOW
RECORD # OF ALIVE SPECIMENS

CONCENTRATION %	START	24HR A	24HR B	48HR A	48HR B
0	1:25	10	10	10	10
4.0	1:25	10	10	10	10
6.0	1:25	10	10	10	10
8.0	1:25	9	8	6	4
10.0	1:25	5	5	5	0
12.0	1:25	0	0	0	0
TECHNICIAN	RLC	AJH/SAN	AJH/SAN	RLC	RLC

REFERENCE TOXICITY TEST
FATHEAD MINNOW (*PIMEPHALES PROMELAS*)

FATHEAD MINNOW
WATER CHEMISTRIES

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
AJH/SAN	24HR	0	25.5	7.45	8.22
AJH/SAN	24HR	4	25.3	7.35	8.33
AJH/SAN	24HR	6	25.1	7.17	8.34
AJH/SAN	24HR	8	25.1	7.38	8.30
AJH/SAN	24HR	10	24.8	7.48	8.30
AJH/SAN	24HR	12	24.8	7.26	8.28
RLC	48HR	0	25.0	7.07	8.50
RLC	48HR	4	25.1	6.88	8.37
RLC	48HR	6	25.2	6.43	8.33
RLC	48HR	8	25.4	6.93	8.32
RLC	48HR	10	25.6	6.39	8.23
RLC	48HR	12	25.3	6.74	8.14

Acute Fish Test-48 Hr Survival

Start Date: 10/1/2014	Test ID: RT100114PP	Sample ID: MO
End Date: 10/3/2014	Lab ID: MO 00987	Sample Type: AMB1-Ambient water
Sample Date: 10/1/2014	Protocol: EPAA 91-EPA/600/4-90/027F	Test Species: PP-Pimephales promelas

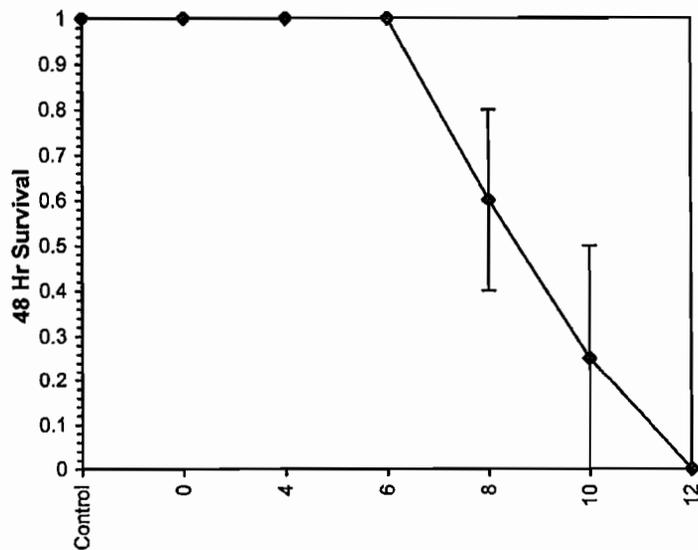
Comments:

Conc-%	1	2
Control	1.0000	1.0000
0	1.0000	1.0000
4	1.0000	1.0000
6	1.0000	1.0000
8	0.8000	0.4000
10	0.5000	0.0000
12	0.0000	0.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				N
			Mean	Min	Max	CV%	
Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2
0	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2
4	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2
6	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2
8	0.6000	0.6000	0.8959	0.6847	1.1071	33.340	2
10	0.2500	0.2500	0.4721	0.1588	0.7854	93.856	2
12	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	2

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Dose-Response Plot



OZARK TESTING
 Division of Anderson & Associates Consulting Engineers, L.L.C.
 1511 Watts Drive, P.O. Box 806
 Rolla, MO 65402-0806

CHAIN OF CUSTODY FORM

Email Address: <i>Gerald</i>				NPDES Permit #:					
Site:									
Client Address:									
Client Telephone #:		Temperature of Sample during Collection:							
Samples Collected by: <i>BRAD LANDWEHR</i>				<i>PWD</i>					
Print Name				Title		Signature			
Samples Relinquished by:									
Print Name				Title		Signature			
Mode of Transportation:						Date:			
Sample ID	Sample Collection				Sample Type		Volume	Preservation	Analysis Requested
	Beginning		Ending		Grab	Comp.			
	Date	Time	Date	Time					
<i>FFP</i> <i>NO UPSTREAM</i>	<i>10/1/14</i>	<i>7:45AM</i>						<i>WET</i>	
Received By: <i>Gerald Carter</i>				<i>PWD</i>		<i>10/1/14</i>			
Print Name				Title		Date			
Comments:				Time Sample Dropped off: <i>905</i>					

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524



Toll Free: 800/331-5916
Tel: 970/484-5091 Fax: 970/484-2514

ORGANISM HISTORY

DATE: 9/30/2014

SPECIES: *Pimephales promelas*

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 9/30/2014

BEGAN FEEDING: N/A

FOOD: N/A

Water Chemistry Record:

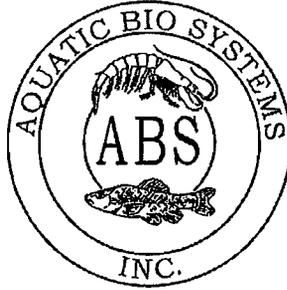
	Current	Range
TEMPERATURE:	<u>25°C</u>	<u>--</u>
SALINITY/CONDUCTIVITY:	<u>--</u>	<u>--</u>
TOTAL HARDNESS (as CaCO ₃):	<u>125 mg/l</u>	<u>--</u>
TOTAL ALKALINITY (as CaCO ₃):	<u>90 mg/l</u>	<u>--</u>
pH:	<u>8.08</u>	<u>--</u>

Comments:



Facility Supervisor

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524



Toll Free: 800/331-5916
Tel: 970/484-5091 Fax: 970/484-2514

ORGANISM HISTORY

DATE: 9/30/2014

SPECIES: Ceriodaphnia dubia

AGE: < 24 hour

LIFE STAGE: Neonate

HATCH DATE: 9/30/2014

BEGAN FEEDING: Immediately

FOOD: YTC, P. subcapitata

Water Chemistry Record:	Current	Range
TEMPERATURE:	<u>22°C</u>	<u>--</u>
SALINITY/CONDUCTIVITY:	<u>--</u>	<u>--</u>
TOTAL HARDNESS (as CaCO ₃):	<u>90 mg/l</u>	<u>--</u>
TOTAL ALKALINITY (as CaCO ₃):	<u>65 mg/l</u>	<u>--</u>
pH:	<u>7.87</u>	<u>--</u>

Comments:



Facility Supervisor

TABLE I

CITY OF GERALD

INITIAL WATER QUALITY PARAMETERS

ANALYSIS	UPSTREAM DILUTION WATER	EFFLUENT	TECHNICIAN
TEMPERATURE °C	20.9	16.7°C	RLC
PH S.U.	8.11	7.82	RLC
CONDUCTIVITY µS	699	912	MA
DISSOLVED OXYGEN MG/L	8.69	8.19	RLC
TOTAL RESIDUAL CHLORINE MG/L	<0.02	<0.02	MA
AMMONIA MG/L	<0.01	0.12	RLC/MA
ALKALINITY MG/L	146	10.9 x 20 = 218	MA
HARDNESS MG/L	216	14.3 x 20 = 286	MA

(0.01)

- ^a Temperature (°C) - Glass Mercury Thermometer
- ^b pH – perpHect pH meter Standard Methods #19-4500-H⁺ B
- ^c Alkalinity & Hardness (mg/l as CaCO₃) - Titrimetric method adapted from Standard Methods #19-2320-B, #19-2340-C
- ^d Conductivity (µMhos/cm)-Oakton conductivity meter Standard Methods #19-2510 B
- ^e Total Ammonia As N (mg/l) - Nessler Method Standard Methods #17-4500-NH₃ C
- ^f Residual Chlorine (mg/l) - Colorimetric Method Standard Methods #19-4500-Cl G
- ^g Dissolved Oxygen (mg/l) - YSI D.O. Meter

CL

TABLE II

ACUTE TOXICITY OF THE CITY OF GERALD TO
CERIODAPHNIA DUBIA

CERIODAPHNIA DUBIA
Record # of alive specimens

CONCENTRATION %	START	24HR A	24HR B	24HR C	24HR D	48HR A	48HR B	48HR C	48HR D
CONTROL	1:00	6	5	5	5	5	5	5	5
0	1:55	5	5	5	5	5	5	5	5
6.25		5	5	5	5	5	5	5	5
12.5		5	5	5	5	5	5	5	5
25		5	5	5	5	5	5	5	5
50		5	5	5	5	5	5	5	5
100		5	5	5	5	5	5	5	5
TECHNICIAN		RLC/SAN	AJH/SAN				RLC		

ACUTE TOXICITY OF THE CITY OF GERALD TO
FATHEAD MINNOW (*Pimephales promelas*)

FATHEAD MINNOW
RECORD # OF ALIVE SPECIMENS

CONCENTRATION %	START	24HR A	24HR B	48HR A	48HR B
CONTROL	1:25	10	10	10	10
0	2:45	10	10	10	10
6.25		10	10	10	10
12.5		10	10	10	10
25		10	10	10	10
50		10	10	10	10
100		10	10	10	10
TECHNICIAN		RLC/SAN	AJH	AJH	

TABLE III

ACUTE TOXICITY OF THE CITY OF GERALD TO
CERIODAPHNIA DUBIA

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
A.H./SAN	24HR	CONTROL	24.0	8.03	8.51
	24HR	100 UPSTREAM	24.6	7.85	8.21
	24HR	6.25 EFFLUENT	24.5	7.95	8.19
	24HR	12.5 EFFLUENT	24.9	7.64	8.21
	24HR	25 EFFLUENT	24.9	7.75	8.31
	24HR	50 EFFLUENT	24.1	7.82	8.39
	24HR	100 EFFLUENT	24.8	7.51	8.45
R.C.	48HR	CONTROL	25.3	7.67	8.35
	48HR	100 UPSTREAM	25.4	7.67	8.45
	48HR	6.25 EFFLUENT	25.5	7.67	8.51
	48HR	12.5 EFFLUENT	25.5	7.50	8.40
	48HR	25 EFFLUENT	25.5	7.60	8.53
	48HR	50 EFFLUENT	25.3	7.58	8.58
	48HR	100 EFFLUENT	25.0	7.53	8.67

~~22-11-14~~

TABLE III

ACUTE TOXICITY OF THE CITY OF GERALD TO
FATHEAD MINNOW (*Pimephales promelas*)

FATHEAD MINNOW

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
SAN/AJH	24HR	CONTROL	25.7	7.45	8.58
AJH	24HR	0	24.2	7.77	8.19
↓	24HR	6.25	24.7	5.58	8.06
	24HR	12.5	24.2	5.53	8.11
	24HR	25	24.5	4.98	8.08
	24HR	50	24.1	5.13	8.16
	24HR	100	24.3	5.37	8.26
RLC	48HR	CONTROL	25.8	7.17	8.49
AJH	48HR	0	25.3	7.43	8.38
↓	48HR	6.25	25.8	6.61	8.25
	48HR	12.5	25.9	6.50	8.30
	48HR	25	25.8	6.34	8.39
	48HR	50	25.6	6.42	8.36
	48HR	100	25.5	6.25	8.49

TABLE IV

REFERENCE TOXICITY TEST
CERIODAPHNIA DUBIA

Ceriodaphnia Dubia
RECORD # OF ALIVE SPECIMENS

Concentration %	Start	24hr A	24hr B	24hr C	24hr D	48hr A	48hr B	48hr C	48hr D
0.0 g/l	100	5	5	5	5	5	5	5	5
1.0 g/l	↓	6	0	0	0	0	0	0	0
1.5 g/l		6	0	0	0	0	0	0	0
2.0g/l		0	0	0	0	0	0	0	0
2.5 g/l		0	0	0	0	0	0	0	0
3.0 g/l		0	0	0	0	0	0	0	0
TECHNICIAN	RLC	ASH/SAN	→			RLC	→		

REFERENCE TOXICITY TEST
CERIODAPHNIA DUBIA

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
ASH/SAN	24HR	0.0 g/l	24.3	7.95	7.51
	24HR	1.0 g/l	24.8	8.06	8.36
	24HR	1.5 g/l	24.5	7.91	8.36
	24HR	2.0g/l	24.0	8.02	8.37
	24HR	2.5 g/l	24.2	7.95	8.30
	24HR	3.0 g/l	24.5	7.94	8.33
RLC	48HR	0.0 g/l	25.4	7.64	8.36
	48HR	1.0 g/l	25.3	7.63	8.42
	48HR	1.5 g/l	25.4	7.70	8.42
	48HR	2.0g/l	25.0	7.81	8.42
	48HR	2.5 g/l	24.9	7.74	8.41
	48HR	3.0 g/l	25.0	7.70	8.41

TABLE V

REFERENCE TOXICITY TEST
FATHEAD MINNOW (*PIMEPHALES PROMELAS*)

FATHEAD MINNOW
RECORD # OF ALIVE SPECIMENS

CONCENTRATION %	START	24HR A	24HR B	48HR A	48HR B
0	1:25	10	10	10	10
4.0	↓	10	10	10	10
6.0		10	10	10	10
8.0		9	8	6	4
10.0		5	5	0	0
12.0		0	0	0	0
TECHNICIAN	RLC	ASH/SAN →		RLC →	

REFERENCE TOXICITY TEST
FATHEAD MINNOW (*PIMEPHALES PROMELAS*)

FATHEAD MINNOW
WATER CHEMISTRIES

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
ASH/SAN	24HR	0	25.5	7.15	8.22
	24HR	4	25.3	7.35	8.33
	24HR	6	25.1	7.17	8.34
	24HR	8	25.1	7.39	8.30
	24HR	10	24.8	7.48	8.36
	24HR	12	24.8	7.26	8.28
RLC	48HR	0	25.0	7.07	8.50
	48HR	4	25.1	6.88	8.37
	48HR	6	25.2	6.43	8.33
	48HR	8	25.4	6.93	8.32
	48HR	10	25.6	6.39	8.23
	48HR	12	25.3	6.44	8.14

RECEIVED

JUL 30 2015



MISSOURI DEPARTMENT OF NATURAL RESOURCES
 WATER PROTECTION PROGRAM
WHOLE EFFLUENT TOXICITY (WET) TEST REPORT
 (TO BE ATTACHED TO WET TESTS FOR SUBMISSION TO THE REGULATORY AUTHORITY)

Water Protection Program

PART A - TO BE COMPLETED IN FULL BY PERMITTEE	
FACILITY NAME GERALD NORTH WWTF	DATE AND TIME COLLECTED EFFLUENT 10/01/14 @ 7:45 AM UPSTREAM RECON
PERMIT NUMBER MO-0045420	PERMIT OUTFALL NUMBER 1
COLLECTOR'S NAME BRAD LANDWEHR	
RECEIVING STREAM COLLECTION SITE AND DESCRIPTION	
PERMIT ALLOWABLE EFFLUENT CONCENTRATION (AEC) 100%	EFFLUENT SAMPLE TYPE (CHECK ONE) <input type="checkbox"/> 24 HR COMPOSITE <input checked="" type="checkbox"/> GRAB <input type="checkbox"/> OTHER _____
SAMPLE NUMBER EFFLUENT 242EFF#3 UPSTREAM RECON	UPSTREAM SAMPLE TYPE (CHECK ONE) <input type="checkbox"/> 24 HR COMPOSITE <input type="checkbox"/> GRAB <input checked="" type="checkbox"/> OTHER RECON
PERMITTED EFFLUENT DAILY MAXIMUM LIMITATION FOR CHLORINE NA mg/L	PERMITTED EFFLUENT DAILY MAXIMUM LIMITATION FOR AMMONIA _____ mg/L

PART B - TO BE COMPLETED IN FULL BY PERFORMING LABORATORY		
PERFORMING LABORATORY OZARK TESTING, A DIVISION OF ANDERSON & ASSOCIATES CONSULTING ENGINEERS, LLC	TEST TYPE MULTIPLE DILUTION TEST - 48 HR ACUTE TOXICITY FOR CD 96 HR ACUTE TOXICITY PP	
FINAL REPORT NUMBER 242-2014#3	TEST DURATION 10/01/14-10/03/14	
DATE OF LAST REFERENCE TOXICANT TESTING 10/01/14	TEST METHOD EPA METHOD 2000 AND 2002	
DATE AND TIME SAMPLES RECEIVED AT LABORATORY 10/01/14 @ 9:05 AM	TEST START DATE AND TIME 10/01/14 @ 1:00 PM	TEST END DATE AND TIME 10/03/14 @ 2:45 PM
SAMPLE DECHLORINATED PRIOR TO ANALYSIS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO EFFLUENT <0.02 UPSTREAM <0.02	TEST ORGANISM #1 AND AGE CERIODAPHNIA DUBIA 24 HOUR	TEST ORGANISM #2 AND AGE PIMEPHALES PROMELAS 24 HOUR
SAMPLE FILTERED1 PRIOR TO ANALYSIS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO EFFLUENT NA UPSTREAM NA	90 PERCENT OR GREATER SURVIVAL IN SYNTHETIC CONTROL? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	DILUTION WATER USED TO ACHIEVE AEC UPSTREAM
FILTER MESH SIEVE SIZE 2 NA	EFFLUENT ORGANISM #1 PERCENT MORTALITY AT AEC 100	EFFLUENT ORGANISM #2 PERCENT MORTALITY AT AEC 100
SAMPLE AERATED DURING TESTING? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	UPSTREAM ORGANISM #1 PERCENT MORTALITY 100	UPSTREAM ORGANISM #2 PERCENT MORTALITY 100
pH ADJUSTED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO EFFLUENT 7.82 UPSTREAM 7.82	TEST RESULT AT AEC FOR ORGANISM #1 <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL	TEST RESULT AT AEC FOR ORGANISM #2 <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

PART A - TO BE COMPLETED IN FULL BY PERMITTEE			
PARAMETER	RESULT	METHOD	WHEN ANALYZED
Temperature °C	16.7	THERMOMETER	10/01/14
pH Standard Units	7.82	ST. METHOD #19-4500-H+B	10/01/14
Conductance µMohs	912	ST. METHODS #19-2510B	10/01/14
Dissolved Oxygen mg/L	8.19	ST. METHODS #19-4500-O G	10/01/14
Total Residual Chlorine mg/L	<0.02	ST. METHODS #19-4500-CL G	10/01/14
Unionized Ammonia mg/L	0.12	ST. METHODS #18-4500-NH3 B & 4500-NH3 C	10/01/14
* Total Alkalinity mg/L	218	ST. METHODS #19-2320 B	10/01/14
* Total Hardness mg/L	286	ST. METHODS #19-2340 C	10/01/14

* Recommended by EPA guidance, not a required analysis.

¹ Samples shall only be filtered if indigenous organisms are present that may be confused with, or attack the test organisms.

² Filters shall have a sieve size of 60 microns or greater.

WHOLE EFFLUENT TOXICITY (WET) TEST REPORT (Continued)
 (TO BE ATTACHED TO WET TESTS FOR SUBMISSION TO THE REGULATORY AUTHORITY)

MINIMUM REQUIRED ANALYTICAL RESULTS FOR THE 100 PERCENT UPSTREAM SAMPLE³

PARAMETER	RESULT	METHOD	WHEN ANALYZED
Temperature °C	20.9	THERMOMETER	09/29/14
pH Standard Units	8.11	ST. METHOD #19-4500-H+B	09/29/14
Conductance µMohs	677	ST. METHODS #19-2510B	09/29/14
Dissolved Oxygen mg/L	8.69	ST. METHODS #19-4500-O G	09/29/14
Total Residual Chlorine mg/L	<0.02	ST. METHODS #19-4500-CL G	09/29/14
Unionized Ammonia mg/L	<0.01	ST. METHODS #18-4500-NH3 B & 4500-NH3 C	09/29/14
* Total Alkalinity mg/L	146	ST. METHODS #19-2320 B	09/29/14
* Total Hardness mg/L	216	ST. METHODS #19-2340 C	09/29/14

* Recommended by EPA guidance, not a required analysis.

PRELIMINARY TEST ACCEPTABILITY MATRIX (FOR USE BY PERMITTEE IN DETERMINING TEST VALIDITY)
MINIMUM REQUIRED ANALYTICAL RESULTS FOR THE 100 PERCENT UPSTREAM SAMPLE³

PERMIT ALLOWABLE EFFLUENT CONCENTRATION, or AEC: As indicated on permit. Test is invalid otherwise.

EFFLUENT SAMPLE TYPE: As indicated on permit. Test is invalid otherwise.

TEST TYPE: Acute Static Non-Renewal Test or other as indicated on permit. Test is invalid otherwise.

TEST DURATION: Forty-eight hours or as indicated on permit. Test is invalid otherwise.

TEST ORGANISMS: As indicated on permit. Test is invalid otherwise.

DILUTION WATER USED TO ACHIEVE AEC: Upstream receiving water required if available.

TEST METHOD: The only acceptable method is the **most current edition** of *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, or other as specifically assigned by EPA for determining National Pollutant Discharge Elimination System, or NPDES, compliance. Test is invalid otherwise.

TEST START DATE AND TIME: Unless otherwise specified in writing by EPA, if >36 hours lapse between collection and initiation, test is invalid.

FILTER MESH SIEVE SIZE: Unless otherwise specified in writing by EPA, if sieve size is smaller than 60 microns, test is invalid.

90 PERCENT OR GREATER SURVIVAL IN LABORATORY CONTROL(S) (Y/N): If no, test is invalid.

PARAMETER	RESULT	NOTES	WHEN ANALYZED
Temperature °C	0 – 6	Unless received by the laboratory on the same day as collected, values outside this range invalidate the test.	Upon receipt.

³ Where no upstream control is available, enter results from laboratory or synthetic control.

**ACUTE TOXICITY TESTING
USING
CERIODAPHNIA DUBIA
AND
*PIMEPHALES PROMELAS***

FOR

**ID#: 242-2014
RE-TEST #1
CITY OF GERALD**

NPDES PERMIT NUMBER: MO-0045420

BY

OZARK TESTING

**DIVISION OF ANDERSON & ASSOCIATES CONSULTING ENGINEERS, L.L.C.
1511 WATTS DRIVE
P.O. BOX 806
ROLLA, MO 65401**

**SEPTEMBER 24, 2014
OTWL 242**

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WHOLE EFFLUENT TOXICITY TEST

ABSTRACT

No acute toxicity was observed for effluent sample, collected on September 16, 2014 @ 8:20 AM. Forty-eight hour, static acute toxicity tests using the invertebrate, *Ceriodaphnia dubia* and Forty-eight hour static acute toxicity tests using the fathead minnow, *Pimephales promelas* were performed at the Ozark Testing Laboratory in Rolla, Missouri. No mortality was observed for either organism at the 24 or 48 hour mark. No mortality was observed the Control (Reconstituted Hard Water) for both species.

SUBJECT

Whole Effluent Toxicity testing for Gerald North Lagoon. Acute 48 hour static non-renewal test of plant effluent on *Ceriodaphnia dubia* and 48 hour static renewal test of plant effluent on *Pimephales promelas*.

CLIENT

City of Gerald
Attn: Brad Landwher
106 E. Fitzgerald
Gerald, MO 63037

Client #242

Permit # MO-0045420

TESTING LABORATORY

Ozark Testing
Division of Anderson & Associates Consulting Engineers, L.L.C.
1511 Watts Drive • P.O. Box 806
Rolla, MO 65401
(573) 364-3301

TEST MATERIAL

The Effluent from the Wastewater Treatment Plant and Upstream, which was provided by the client.

REPLICATE TEST CONCENTRATIONS

Sample concentrations:

100% effluent, 50% effluent, 25% effluent, 12.5% effluent, 6.25% effluent, 0% effluent (100% upstream diluent), and Control (100% Reconstituted Water)

I. INTRODUCTION

The following is a report on the Whole Effluent Toxicity Test performed by Ozark Testing in Rolla, MO, for the City of Gerald North Lagoon. Duration of the test was September 16 - 18, 2014.

The objective of this test was to determine the acute toxicity of Gerald North on *Ceriodaphnia dubia* and *Pimephales promelas*.

This test was conducted utilizing test procedures for acute static non-renewal toxicity test as described in methods for measuring the 1) Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, and 2) Standard Methods for the Examination of Water and Wastewater, 19th Edition, and modified according to the clients NPDES permit requirements.

Sample Collected:	09/16/14 @ 8:20 AM
Collected By:	Carl Wheeler
Arrival in Laboratory:	09/16/14 @ 9:50 AM
Sample Temperature on Arrival:	18.9 °C
Test Start:	09/16/14 @ 2:30 PM
Test Duration:	48 Hours for <i>Ceriodaphnia dubia</i> 48 Hours for <i>Pimephales promelas</i>
Test Species:	<i>Ceriodaphnia dubia</i> and <i>Pimephales promelas</i>
Age of Organisms:	<i>Ceriodaphnia dubia</i> 24 Hours <i>Pimephales promelas</i> 24 Hours
Source of Organisms:	Aquatic Bio-Systems

II. METHODS AND MATERIALS

A. TEST ORGANISMS

A test lot of the *Ceriodaphnia dubia* and *Pimephales promelas* was obtained and held in a temperature controlled environmental chamber at 25 (\pm 1.0) °C. A photoperiod was maintained at 16 hours light and 8 hours darkness, using ambient laboratory light, during holding period and the test duration.

B. TEST MATERIAL

Ozark Testing received Effluent and Upstream Water samples on September 16, 2014 @ AM in two 4L cub-containers supplied to the client by Ozark Testing. Upon receipt, the effluent had observed color and particulate matter with no turbidity. The receiving water had observed color and particulate matter with no turbidity. Initial water quality parameters were started immediately.

C. TEST VESSELS

The procedure was conducted using disposable 30 ml polypropylene beakers for the *Ceriodaphnia dubia* and disposable 500 ml beakers for the *Pimephales promelas*.

III. TEST PROCEDURES

Organisms were randomly selected and placed in each sample container of each corresponding concentration. Initial Water quality parameters were run on all samples prior to test initialization. These results are listed in Table I. Six concentrations were utilized for acute toxicity testing, the concentrations were: 100% effluent, 50% effluent, 25% effluent, 12.5% effluent, 6.25% effluent, and 0% effluent (100% Upstream), and the Control (100% Reconstituted Hard Water) with dilutions being made using upstream dilution water provided by the client. All organisms appeared healthy at time of introduction. All concentrations were at 25(\pm 1.0) °C before introduction of organisms. A reference toxicity test was also conducted during sample testing. The reference toxicity test data for the *Ceriodaphnia dubia* was determined not to fall within the acceptable laboratory range to deem the test organisms as healthy and able to provide reliable data for sample analysis. The reference toxicity test data for the *Pimephales promelas* was determined to fall within the acceptable laboratory range to deem the test organisms as healthy and able to provide reliable data for sample analysis. These results are listed in Table V.

IV. TEST RESULTS

Observations were made of *Ceriodaphnia dubia* and *Pimephales promelas* at 24 hours and at 48 hours. There was no abnormal behavior observed in the *Ceriodaphnia dubia* or the *Pimephales promelas* at the any of the concentrations. Please see Tables II and III for these results.

V. SIGNATURE PAGE

Submitted by: Ozark Testing
Division of Anderson & Associates Consulting Engineers, L.L.C.
1511 Watts Drive
P.O. Box 806
Rolla, MO 65401



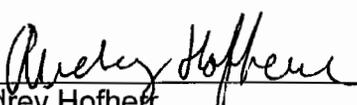
Rachel Carter
Water Laboratory Manager
Date 9/26/14



Mondae Atughonu
Laboratory Technician
Date 9/24/14



Steven Nieto
Laboratory Technician
Date 9/24/14



Audrey Hoffert
Laboratory Technician
Date 9/24/14

TABLE I

CITY OF GERALD

INITIAL WATER QUALITY PARAMETERS

ANALYSIS	UPSTREAM DILUTION WATER	EFFLUENT	TECHNICIAN
TEMPERATURE °C	16.6	18.9	MA
PH S.U.	6.91	7.55	MA
CONDUCTIVITY µS	306	947	MA
DISSOLVED OXYGEN MG/L	4.05	8.36	AJH
TOTAL RESIDUAL CHLORINE MG/L	<0.02	0.04	AJH
AMMONIA MG/L	0.17	<0.01	AJH
ALKALINITY MG/L	152	230	MA
HARDNESS MG/L	134	272	MA

^a Temperature (°C) - Glass Mercury Thermometer

^b pH – perpHect pH meter Standard Methods #19-4500-H⁺ B

^c Alkalinity & Hardness (mg/l as CaCO₃) - Titrimetric method adapted from Standard Methods #19 -2320-B, #19-2340-C

^d Conductivity (µMhos/cm)-Oakton conductivity meter Standard Methods #19-2510 B

^e Total Ammonia As N (mg/l) - Nessler Method Standard Methods #17-4500-NH₃ C

^f Residual Chlorine (mg/l) - Colorimetric Method Standard Methods #19-4500-Cl G

^g Dissolved Oxygen (mg/l) - YSI D.O. Meter

TABLE II

ACUTE TOXICITY OF THE CITY OF GERALD TO
CERIODAPHNIA DUBIA

CERIODAPHNIA DUBIA
Record # of alive specimens

CONCENTRATION %	START	24HR A	24HR B	24HR C	24HR D	48HR A	48HR B	48HR C	48HR D
CONTROL	3:20	5	5	5	5	5	5	5	5
0	3:20	5	5	5	5	5	5	5	5
6.25	3:20	5	5	5	5	5	5	5	5
12.5	3:20	5	5	5	5	5	5	5	5
25	3:20	5	5	5	5	5	5	5	5
50	3:20	5	5	5	5	5	5	5	5
100	3:20	5	5	5	5	5	5	5	5
TECHNICIAN	SAN/RLC	MA	MA	MA	MA	RLC/SAN	RLC/SAN	RLC/SAN	RLC/SAN

ACUTE TOXICITY OF THE CITY OF GERALD TO
FATHEAD MINNOW (*Pimephales promelas*)

FATHEAD MINNOW
RECORD # OF ALIVE SPECIMENS

CONCENTRATION %	START	24HR A	24HR B	48HR A	48HR B
CONTROL	3:35	10	10	10	10
0	3:35	10	10	10	10
6.25	3:35	10	10	10	10
12.5	3:35	10	10	10	10
25	3:35	10	10	10	10
50	3:35	10	10	10	10
100	3:35	10	10	10	10
TECHNICIAN	SAN/MA	MA/AJH	MA/AJH	RLC/SAN	RLC/SAN

TABLE III

ACUTE TOXICITY OF THE CITY OF GERALD TO
CERIODAPHNIA DUBIA

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
MA/AJH	24HR	CONTROL	24.0	8.03	8.52
MA/AJH	24HR	100 UPSTREAM	24.2	7.60	8.18
MA/AJH	24HR	6.25 EFFLUENT	24.6	7.70	8.25
MA/AJH	24HR	12.5 EFFLUENT	24.4	7.81	8.30
MA/AJH	24HR	25 EFFLUENT	24.4	7.52	8.34
MA/AJH	24HR	50 EFFLUENT	25.2	7.51	8.47
MA/AJH	24HR	100 EFFLUENT	24.6	7.98	8.55
RLC/SAN	48HR	CONTROL	24.7	8.29	8.37
RLC/SAN	48HR	100 UPSTREAM	24.8	7.63	8.27
RLC/SAN	48HR	6.25 EFFLUENT	25.1	7.40	8.25
RLC/SAN	48HR	12.5 EFFLUENT	25.2	7.12	8.27
RLC/SAN	48HR	25 EFFLUENT	25.2	7.19	8.34
RLC/SAN	48HR	50 EFFLUENT	25.2	7.22	8.41
RLC/SAN	48HR	100 EFFLUENT	25.0	7.35	8.54

TABLE III

ACUTE TOXICITY OF THE CITY OF GERALD TO
FATHEAD MINNOW (*Pimephales promelas*)

FATHEAD MINNOW

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	pH
MA/AJH	24HR	CONTROL	25.2	7.52	8.32
MA/AJH	24HR	0	25.6	6.60	7.99
MA/AJH	24HR	6.25	26.0	5.18	7.94
MA/AJH	24HR	12.5	25.9	5.22	7.92
MA/AJH	24HR	25	25.9	5.17	8.06
MA/AJH	24HR	50	26.0	5.44	8.11
MA/AJH	24HR	100	25.8	5.48	8.31
RLC/SAN	48HR	CONTROL	25.2	7.16	8.22
RLC/SAN	48HR	0	25.3	6.78	7.91
RLC/SAN	48HR	6.25	25.4	8.02	8.02
RLC/SAN	48HR	12.5	25.6	5.93	8.04
RLC/SAN	48HR	25	25.8	6.14	8.13
RLC/SAN	48HR	50	25.8	5.99	8.23
RLC/SAN	48HR	100	25.6	6.87	8.34

TABLE IV

REFERENCE TOXICITY TEST
CERIODAPHNIA DUBIA

Ceriodaphnia Dubia
RECORD # OF ALIVE SPECIMENS

Concentration %	Start	24hr A	24hr B	24hr C	24hr D	48hr A	48hr B	48hr C	48hr D
0.0 g/l	2:30	5	5	5	5	5	5	5	5
1.0 g/l	2:30	0	0	0	0	0	0	0	0
1.5 g/l	2:30	0	0	0	0	0	0	0	0
2.0g/l	2:30	0	0	0	0	0	0	0	0
2.5 g/l	2:30	0	0	0	0	0	0	0	0
3.0 g/l	2:30	0	0	0	0	0	0	0	0
TECHNICIAN	SAN/RLC	RLC/MA	RLC/MA	RLC/MA	RLC/MA	RLC/SAN	RLC/SAN	RLC/SAN	RLC/SAN

REFERENCE TOXICITY TEST
CERIODAPHNIA DUBIA

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
RLC/MA	24HR	0.0 g/l	24.2	7.73	8.29
RLC/MA	24HR	1.0 g/l	24.0	7.76	8.59
RLC/MA	24HR	1.5 g/l	24.2	8.06	8.61
RLC/MA	24HR	2.0g/l	24.2	7.76	8.63
RLC/MA	24HR	2.5 g/l	24.2	7.78	8.63
RLC/MA	24HR	3.0 g/l	24.1	7.81	8.63
RLC/SAN	48HR	0.0 g/l	24.0	8.58	8.01
RLC/SAN	48HR	1.0 g/l	24.6	7.79	8.360
RLC/SAN	48HR	1.5 g/l	24.2	7.92	8.62
RLC/SAN	48HR	2.0g/l	24.4	7.89	8.64
RLC/SAN	48HR	2.5 g/l	24.1	7.90	8.63
RLC/SAN	48HR	3.0 g/l	24.5	7.83	8.64

TABLE V

REFERENCE TOXICITY TEST
FATHEAD MINNOW (*PIMEPHALES PROMELAS*)

FATHEAD MINNOW
RECORD # OF ALIVE SPECIMENS

CONCENTRATION %	START	24HR A	24HR B	48HR A	48HR B
0	2:55	10	10	10	10
4.0	2:55	10	10	10	10
6.0	2:55	10	10	10	10
8.0	2:55	10	10	8	7
10.0	2:55	0	1	0	0
12.0	2:55	0	0	0	0
TECHNICIAN	RLC/SAN	RLC/MA	RLC/MA	RLC/SAN	RLC/SAN

REFERENCE TOXICITY TEST
FATHEAD MINNOW (*PIMEPHALES PROMELAS*)

FATHEAD MINNOW
WATER CHEMISTRIES

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
RLC/MA	24HR	0	25.2	7.55	8.30
RLC/MA	24HR	4	25.2	7.48	8.52
RLC/MA	24HR	6	25.4	7.38	8.53
RLC/MA	24HR	8	25.4	7.25	8.53
RLC/MA	24HR	10	25.3	7.42	8.54
RLC/MA	24HR	12	25.2	6.87	8.50
RLC/SAN	48HR	0	25.3	7.23	8.26
RLC/SAN	48HR	4	25.4	7.21	8.49
RLC/SAN	48HR	6	25.4	7.29	8.50
RLC/SAN	48HR	8	25.3	7.19	8.49
RLC/SAN	48HR	10	25.0	7.35	8.54
RLC/SAN	48HR	12	24.8	7.08	8.48

TABLE I

CITY OF GERALD

INITIAL WATER QUALITY PARAMETERS

ANALYSIS	UPSTREAM DILUTION WATER	EFFLUENT	TECHNICIAN
TEMPERATURE °C	16.6	18.9	MA
PH S.U.	6.91	7.55	MA
CONDUCTIVITY μS	306	947	MA
DISSOLVED OXYGEN MG/L	4.05	8.36	ASH
TOTAL RESIDUAL CHLORINE MG/L	0.01 < 0.02	0.04	AJH
AMMONIA MG/L	0.17	0.00 < 0.01	AJH
ALKALINITY MG/L	7.6 x 20 = 152	11.5 x 20 = 230	MA
HARDNESS MG/L	6.7 x 20 = 134	13.6 x 20 = 272	MA

^a Temperature (°C) - Glass Mercury Thermometer

^b pH – perHect pH meter Standard Methods #19-4500-H⁺ B

^c Alkalinity & Hardness (mg/l as CaCO₃) - Titrimetric method adapted from Standard Methods #19 -2320-B, #19-2340-C

^d Conductivity (μMhos/cm)-Oakton conductivity meter Standard Methods #19-2510 B

^e Total Ammonia As N (mg/l) - Nessler Method Standard Methods #17-4500-NH₃ C

^f Residual Chlorine (mg/l) - Colorimetric Method Standard Methods #19-4500-Cl G

^g Dissolved Oxygen (mg/l) - YSI D.O. Meter

TABLE II

ACUTE TOXICITY OF THE CITY OF GERALD TO
CERIODAPHNIA DUBIA

CERIODAPHNIA DUBIA
Record # of alive specimens

CONCENTRATION %	START	24HR A	24HR B	24HR C	24HR D	48HR A	48HR B	48HR C	48HR D
CONTROL	3:20	5	5	5	5	5	5	5	5
0	↓	5	5	5	5	5	5	5	5
6.25		5	5	5	5	5	5	5	5
12.5		5	5	5	5	5	5	5	5
25		5	5	5	5	5	5	5	5
50		5	5	5	5	5	5	5	5
100		5	5	5	5	5	5	5	5
TECHNICIAN	SAN/RLC	MA					RLC/SAN		

ACUTE TOXICITY OF THE CITY OF GERALD TO
FATHEAD MINNOW (*Pimephales promelas*)

FATHEAD MINNOW
RECORD # OF ALIVE SPECIMENS

CONCENTRATION %	START	24HR A	24HR B	48HR A	48HR B
CONTROL	3:35	10	10	10	10
0	↓	10	10	10	10
6.25		10	10	10	10
12.5		10	10	10	10
25		10	10	10	10
50		10	10	10	10
100		10	10	10	10
TECHNICIAN	SAN/MA	ASH/MA		RLC/SAN	

TABLE III

ACUTE TOXICITY OF THE CITY OF GERALD TO
CERIODAPHNIA DUBIA

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
MA/ASH	24HR	CONTROL	24.0	8.03	8.52
	24HR	100 UPSTREAM	24.7	7.60	8.18
	24HR	6.25 EFFLUENT	24.6	7.70	8.25
	24HR	12.5 EFFLUENT	24.4	7.81	8.30
	24HR	25 EFFLUENT	24.4	7.52	8.31
	24HR	50 EFFLUENT	25.2	7.51	8.47
	24HR	100 EFFLUENT	24.6	7.98	8.55
RL/SAN	48HR	CONTROL	24.7	8.29	8.31
	48HR	100 UPSTREAM	24.8	7.63	8.22
	48HR	6.25 EFFLUENT	25.1	7.40	8.25
	48HR	12.5 EFFLUENT	25.2	7.12	8.24
	48HR	25 EFFLUENT	25.2	7.19	8.34
	48HR	50 EFFLUENT	25.2	7.22	8.41
	48HR	100 EFFLUENT	25.0	7.35	8.54

TABLE III

ACUTE TOXICITY OF THE CITY OF GERALD TO
FATHEAD MINNOW (*Pimephales promelas*)

FATHEAD MINNOW

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
ASH/MA	24HR	CONTROL	25.2	7.52	8.32
	24HR	0	25.6	7.89	7.99
	24HR	6.25	26.0	5.18	7.94
	24HR	12.5	25.9	5.22	7.98
	24HR	25	25.9	5.17	8.06
	24HR	50	26.0	5.44	8.11
	24HR	100	25.8	5.48	8.31
RICKAN	48HR	CONTROL	25.2	7.16	8.22
	48HR	0	25.3	6.78	7.91
	48HR	6.25	25.4	6.02	8.02
	48HR	12.5	25.6	5.93	8.04
	48HR	25	25.8	6.14	8.13
	48HR	50	25.8	5.99	8.23
	48HR	100	25.6	6.84	8.34 8.34

→ E.60

TABLE IV

REFERENCE TOXICITY TEST
CERIODAPHNIA DUBIA

Ceriodaphnia Dubia
RECORD # OF ALIVE SPECIMENS

Concentration %	Start	24hr A	24hr B	24hr C	24hr D	48hr A	48hr B	48hr C	48hr D
0.0 g/l	2:30	5	5	5	5	5	5	5	5
1.0 g/l	↓	0	0	0	0	0	0	0	0
1.5 g/l		0	0	0	0	0	0	0	0
2.0g/l		0	0	0	0	0	0	0	0
2.5 g/l		0	0	0	0	0	0	0	0
3.0 g/l		0	0	0	0	0	0	0	0
TECHNICIAN	RLC/SAN	RLC/MA				SAN/RLC			

REFERENCE TOXICITY TEST
CERIODAPHNIA DUBIA

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
RLC/MA	24HR	0.0 g/l	24.2	7.73	8.29
	24HR	1.0 g/l	24.0	7.76	8.59
	24HR	1.5 g/l	24.2	8.06	8.61
	24HR	2.0g/l	24.2	7.75	8.63
	24HR	2.5 g/l	24.2	7.78	8.63
	24HR	3.0 g/l	24.1	7.81	8.63
RLC/SAN	48HR	0.0 g/l	24.0	8.53	8.01
	48HR	1.0 g/l	24.6	7.99	8.60
	48HR	1.5 g/l	24.2	7.92	8.62
	48HR	2.0g/l	24.4	7.89	8.64
	48HR	2.5 g/l	24.1	7.90	8.63
	48HR	3.0 g/l	24.5	7.83	8.64

TABLE V

REFERENCE TOXICITY TEST
FATHEAD MINNOW (*PIMEPHALES PROMELAS*)

FATHEAD MINNOW
RECORD # OF ALIVE SPECIMENS

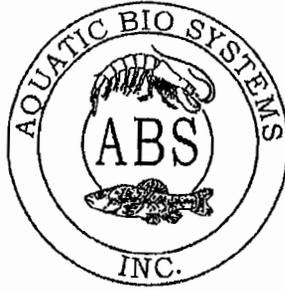
CONCENTRATION %	START	24HR A	24HR B	48HR A	48HR B
0	2:35	10	10	10	10
4.0	RCS	10	10	10	10
6.0		10	10	10	10
8.0		10	10	8	7
10.0		8	7	0	0
12.0		0	0	0	0
TECHNICIAN	RCSAN	RCC/MA		RCSAN	

REFERENCE TOXICITY TEST
FATHEAD MINNOW (*PIMEPHALES PROMELAS*)

FATHEAD MINNOW
WATER CHEMISTRIES

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
RCC/MA	24HR	0	25.2	7.55	8.30
	24HR	4	25.2	7.48	8.32
	24HR	6	25.4	7.52	8.33
	24HR	8	25.4	7.25	8.53
	24HR	10	25.3	7.42	8.54
	24HR	12	25.2	6.87	8.50
RCSAN	48HR	0	25.3	7.23	8.26
	48HR	4	25.4	7.21	8.49
	48HR	6	25.4	7.29	8.50
	48HR	8	25.3	7.19	8.49
	48HR	10	25.0	7.35	8.54
	48HR	12	24.8	7.08	8.48

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524



Toll Free: 800/331-5916
Tel: 970/484-5091 Fax: 970/484-2514

ORGANISM HISTORY

DATE: 9/15/2014

SPECIES: Ceriodaphnia dubia

AGE: < 24 hour

LIFE STAGE: Neonate

HATCH DATE: 9/15/2014

BEGAN FEEDING: Immediately

FOOD: YTC, P. subcapitata

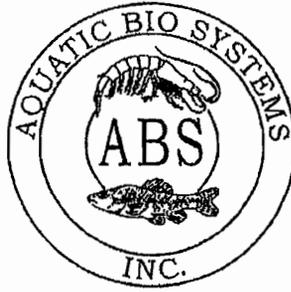
Water Chemistry Record:

	Current	Range
TEMPERATURE:	<u>23°C</u>	<u>--</u>
SALINITY/CONDUCTIVITY:	<u>--</u>	<u>--</u>
TOTAL HARDNESS (as CaCO ₃):	<u>98 mg/l</u>	<u>--</u>
TOTAL ALKALINITY (as CaCO ₃):	<u>70 mg/l</u>	<u>--</u>
pH:	<u>7.86</u>	<u>--</u>

Comments:

Facility Supervisor

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524



Toll Free: 800/331-5916
Tel: 970/484-5091 Fax: 970/484-2514

ORGANISM HISTORY

DATE: 9/15/2014

SPECIES: *Pinephales promelas*

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 9/15/2014

BEGAN FEEDING: N/A

FOOD: N/A

Water Chemistry Record:

	Current	Range
TEMPERATURE:	<u>23°C</u>	<u>--</u>
SALINITY/CONDUCTIVITY:	<u>--</u>	<u>--</u>
TOTAL HARDNESS (as CaCO ₃):	<u>120 mg/l</u>	<u>--</u>
TOTAL ALKALINITY (as CaCO ₃):	<u>90 mg/l</u>	<u>--</u>
pH:	<u>7.68</u>	<u>--</u>

Comments:

Facility Supervisor

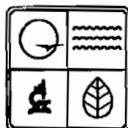
OZARK TESTING
 Division of Anderson & Associates Consulting Engineers, L.L.C.
 1511 Watts Drive, P.O. Box 806
 Rolla, MO 65402-0806

CHAIN OF CUSTODY FORM

Email Address: <u>Gerald</u>					NPDES Permit #:				
Site:									
Client Address:									
Client Telephone #: <u>573-764-2811</u>					Temperature of Sample during Collection:				
Samples Collected by: <u>BRAD HANDWEHR PWD</u>									
					Print Name		Title		Signature
Samples Relinquished by:									
					Print Name		Title		Signature
Mode of Transportation:							Date: <u>9/16/14</u>		
Sample ID	Sample Collection				Sample Type		Volume	Preservation	Analysis Requested
	Beginning		Ending		Grab	Comp.			
	Date	Time	Date	Time					
	<u>9/16/14</u>	<u>8:20</u>							<u>WE</u>
Received By: <u>Andrey Hopherr</u>					<u>Andrey Hopherr</u>		<u>9/16/14</u>		
					Print Name		Title		Signature
Comments:					Time Sample Dropped off: <u>9:50</u>				

RECEIVED

JUL 30 2015



MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM

WHOLE EFFLUENT TOXICITY (WET) TEST REPORT

(TO BE ATTACHED TO WET TESTS FOR SUBMISSION TO THE REGULATORY AUTHORITY) Water Protection Program

PART A - TO BE COMPLETED IN FULL BY PERMITTEE

FACILITY NAME GERALD NORTH WWTF		DATE AND TIME COLLECTED EFFLUENT 08/19/14 @ 9:45AM UPSTREAM 08/19/14 @ 9:45 AM	
PERMIT NUMBER MO-0045420		PERMIT OUTFALL NUMBER 1	
COLLECTOR'S NAME CARL WHEELER			
RECEIVING STREAM COLLECTION SITE AND DESCRIPTION			
PERMIT ALLOWABLE EFFLUENT CONCENTRATION (AEC) 100%		EFFLUENT SAMPLE TYPE (CHECK ONE) <input type="checkbox"/> 24 HR COMPOSITE <input checked="" type="checkbox"/> GRAB <input type="checkbox"/> OTHER _____	
SAMPLE NUMBER EFFLUENT 242EFF UPSTREAM 242UP		UPSTREAM SAMPLE TYPE (CHECK ONE) <input type="checkbox"/> 24 HR COMPOSITE <input checked="" type="checkbox"/> GRAB <input type="checkbox"/> OTHER _____	
PERMITTED EFFLUENT DAILY MAXIMUM LIMITATION FOR CHLORINE NA mg/L		PERMITTED EFFLUENT DAILY MAXIMUM LIMITATION FOR AMMONIA _____ mg/L	

PART B - TO BE COMPLETED IN FULL BY PERFORMING LABORATORY

PERFORMING LABORATORY OZARK TESTING, A DIVISION OF ANDERSON & ASSOCIATES CONSULTING ENGINEERS, LLC		TEST TYPE MULTIPLE DILUTION TEST - 48 HR ACUTE TOXICITY FOR CD 96 HR ACUTE TOXICITY PP	
FINAL REPORT NUMBER 242-2014		TEST DURATION 08/19/14-08/21/14	
DATE OF LAST REFERENCE TOXICANT TESTING 08/19/14		TEST METHOD EPA METHOD 2000 AND 2002	
DATE AND TIME SAMPLES RECEIVED AT LABORATORY 08/19/14 @ 10:40		TEST START DATE AND TIME 08/19/14 @ 1:45PM	TEST END DATE AND TIME 08/21/14 @ 3:00 PM
SAMPLE DECHLORINATED PRIOR TO ANALYSIS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO EFFLUENT 0.05 UPSTREAM 0.04		TEST ORGANISM #1 AND AGE CERIODAPHNIA DUBIA 24 HOUR	TEST ORGANISM #2 AND AGE PIMEPHALES PROMELAS 24 HOUR
SAMPLE FILTERED ¹ PRIOR TO ANALYSIS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO EFFLUENT NA UPSTREAM NA		90 PERCENT OR GREATER SURVIVAL IN SYNTHETIC CONTROL? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	DILUTION WATER USED TO ACHIEVE AEC UPSTREAM
FILTER MESH SIEVE SIZE 2 NA		EFFLUENT ORGANISM #1 PERCENT MORTALITY AT AEC 71.7	EFFLUENT ORGANISM #2 PERCENT MORTALITY AT AEC 63.7
SAMPLE AERATED DURING TESTING? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		UPSTREAM ORGANISM #1 PERCENT MORTALITY 100	UPSTREAM ORGANISM #2 PERCENT MORTALITY 100
pH ADJUSTED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO EFFLUENT 7.62 UPSTREAM 7.08		TEST RESULT AT AEC FOR ORGANISM #1 <input type="checkbox"/> PASS <input checked="" type="checkbox"/> FAIL	TEST RESULT AT AEC FOR ORGANISM #2 <input type="checkbox"/> PASS <input checked="" type="checkbox"/> FAIL

PART A - TO BE COMPLETED IN FULL BY PERMITTEE

PARAMETER	RESULT	METHOD	WHEN ANALYZED
Temperature °C	22.4	THERMOMETER	08/19/14
pH Standard Units	7.62	ST. METHOD #19-4500-H+B	08/19/14
Conductance µMols	969	ST. METHODS #19-2510B	08/19/14
Dissolved Oxygen mg/L	7.50	ST. METHODS #19-4500-O G	08/19/14
Total Residual Chlorine mg/L	0.05	ST. METHODS #19-4500-CL G	08/19/14
Unlonized Ammonia mg/L	16.6	ST. METHODS #18-4500-NH3 B & 4500-NH3 C	08/19/14
* Total Alkalinity mg/L	270	ST. METHODS #19-2320 B	08/19/14
* Total Hardness mg/L	250	ST. METHODS #19-2340 C	08/19/14

* Recommended by EPA guidance, not a required analysis.

- ¹ Samples shall only be filtered if indigenous organisms are present that may be confused with, or attack the test organisms.
- ² Filters shall have a sieve size of 60 microns or greater.

WHOLE EFFLUENT TOXICITY (WET) TEST REPORT (Continued)
 (TO BE ATTACHED TO WET TESTS FOR SUBMISSION TO THE REGULATORY AUTHORITY)

MINIMUM REQUIRED ANALYTICAL RESULTS FOR THE 100 PERCENT UPSTREAM SAMPLE³

PARAMETER	RESULT	METHOD	WHEN ANALYZED
Temperature °C	22.0	THERMOMETER	08/19/14
pH Standard Units	7.08	ST. METHOD #19-4500-H+B	08/19/14
Conductance µMohs	309	ST. METHODS #19-2510B	08/19/14
Dissolved Oxygen mg/L	4.67	ST. METHODS #19-4500-O G	08/19/14
Total Residual Chlorine mg/L	0.04	ST. METHODS #19-4500-CL G	08/19/14
Unionized Ammonia mg/L	0.03	ST. METHODS #18-4500-NH3 B & 4500-NH3 C	08/19/14
* Total Alkalinity mg/L	96	ST. METHODS #19-2320 B	08/19/14
* Total Hardness mg/L	130	ST. METHODS #19-2340 C	08/19/14

* Recommended by EPA guidance, not a required analysis.

PRELIMINARY TEST ACCEPTABILITY MATRIX (FOR USE BY PERMITTEE IN DETERMINING TEST VALIDITY)
MINIMUM REQUIRED ANALYTICAL RESULTS FOR THE 100 PERCENT UPSTREAM SAMPLE³

PERMIT ALLOWABLE EFFLUENT CONCENTRATION, or AEC: As indicated on permit. Test is invalid otherwise.

EFFLUENT SAMPLE TYPE: As indicated on permit. Test is invalid otherwise.

TEST TYPE: Acute Static Non-Renewal Test or other as Indicated on permit. Test is invalid otherwise.

TEST DURATION: Forty-eight hours or as indicated on permit. Test is invalid otherwise.

TEST ORGANISMS: As indicated on permit. Test is invalid otherwise.

DILUTION WATER USED TO ACHIEVE AEC: Upstream receiving water required if available.

TEST METHOD: The only acceptable method is the most current edition of *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, or other as specifically assigned by EPA for determining National Pollutant Discharge Elimination System, or NPDES, compliance. Test is invalid otherwise.

TEST START DATE AND TIME: Unless otherwise specified in writing by EPA, if >36 hours lapse between collection and initiation, test is invalid.

FILTER MESH SIEVE SIZE: Unless otherwise specified in writing by EPA, if sieve size is smaller than 60 microns, test is invalid.

90 PERCENT OR GREATER SURVIVAL IN LABORATORY CONTROL(S) (Y/N): If no, test is invalid.

PARAMETER	RESULT	NOTES	WHEN ANALYZED
Temperature °C	0 – 6	Unless received by the laboratory on the same day as collected, values outside this range invalidate the test.	Upon receipt.

³ Where no upstream control is available, enter results from laboratory or synthetic control.

**ACUTE TOXICITY TESTING
USING
CERIODAPHNIA DUBIA
AND
*PIMEPHALES PROMELAS***

FOR

ID#: 242-2014

CITY OF GERALD

NPDES PERMIT NUMBER: MO-0045420

BY

OZARK TESTING

**DIVISION OF ANDERSON & ASSOCIATES CONSULTING ENGINEERS, L.L.C.
1511 WATTS DRIVE
P.O. BOX 806
ROLLA, MO 65401**

**SEPTEMBER 10, 2014
OTWL 242**

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WHOLE EFFLUENT TOXICITY TEST

ABSTRACT

Acute toxicity was observed for effluent sample, collected on August 19, 2014 @ 9:45 AM. Forty-eight hour, static acute toxicity tests using the invertebrate, *Ceriodaphnia dubia* and Forty-eight hour static acute toxicity tests using the fathead minnow, *Pimephales promelas* were performed at the Ozark Testing Laboratory in Rolla, Missouri. Mortality was observed for the *Ceriodaphnia dubia* and the *Pimephales promelas* at the 24 hour mark for the 100% concentration. No mortality was observed at 48 hours for the *Ceriodaphnia dubia*. Mortality was observed at the 50% for the *Pimephales promelas* at the 48 hour mark. No mortality was observed the Control (Reconstituted Hard Water) for both species.

SUBJECT

Whole Effluent Toxicity testing for Gerald North Lagoon. Acute 48 hour static non-renewal test of plant effluent on *Ceriodaphnia dubia* and 48 hour static renewal test of plant effluent on *Pimephales promelas*.

CLIENT

City of Gerald
Attn: Brad Landwher
106 E. Fitzgerald
Gerald, MO 63037

Client #242

Permit # MO-0045420

TESTING LABORATORY

Ozark Testing
Division of Anderson & Associates Consulting Engineers, L.L.C.
1511 Watts Drive • P.O. Box 806
Rolla, MO 65401
(573) 364-3301

TEST MATERIAL

The Effluent from the Wastewater Treatment Plant and Upstream, which was provided by the client.

REPLICATE TEST CONCENTRATIONS

Sample concentrations:

100% effluent, 50% effluent, 25% effluent, 12.5% effluent, 6.25% effluent, 0% effluent (100% upstream diluent), and Control (100% Reconstituted Water)

I. INTRODUCTION

The following is a report on the Whole Effluent Toxicity Test performed by Ozark Testing in Rolla, MO, for the City of Gerald North Lagoon. Duration of the test was August 19 – 21, 2014.

The objective of this test was to determine the acute toxicity of Gerald North on *Ceriodaphnia dubia* and *Pimephales promelas*.

This test was conducted utilizing test procedures for acute static non-renewal toxicity test as described in methods for measuring the 1) Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, and 2) Standard Methods for the Examination of Water and Wastewater, 19th Edition, and modified according to the clients NPDES permit requirements.

Sample Collected:	08/19/14 @ 9:45 AM
Collected By:	Carl Wheeler
Arrival in Laboratory:	08/19/14 @ 10:40 AM
Sample Temperature on Arrival:	22.4 °C
Test Start:	08/19/14 @ 2:40 PM
Test Duration:	48 Hours for <i>Ceriodaphnia dubia</i> 48 Hours for <i>Pimephales promelas</i>
Test Species:	<i>Ceriodaphnia dubia</i> and <i>Pimephales promelas</i>
Age of Organisms:	<i>Ceriodaphnia dubia</i> 24 Hours <i>Pimephales promelas</i> 24 Hours
Source of Organisms:	Aquatic Bio-Systems

II. METHODS AND MATERIALS

A. TEST ORGANISMS

A test lot of the *Ceriodaphnia dubia* and *Pimephales promelas* was obtained and held in a temperature controlled environmental chamber at 25 (± 1.0) °C. A photoperiod was maintained at 16 hours light and 8 hours darkness, using ambient laboratory light, during holding period and the test duration.

B. TEST MATERIAL

Ozark Testing received Effluent and Upstream Water samples on August 19, 2014 @ 10:40 AM in two 4L cub-containers supplied to the client by Ozark Testing. Upon receipt, the effluent had observed color and particulate matter with no turbidity. The receiving water had observed color and particulate matter with no turbidity. Initial water quality parameters were started immediately.

C. TEST VESSELS

The procedure was conducted using disposable 30 ml polypropylene beakers for the *Ceriodaphnia dubia* and disposable 500 ml beakers for the *Pimephales promelas*.

III. TEST PROCEDURES

Organisms were randomly selected and placed in each sample container of each corresponding concentration. Initial Water quality parameters were run on all samples prior to test initialization. These results are listed in Table I. Six concentrations were utilized for acute toxicity testing, the concentrations were: 100% effluent, 50% effluent, 25% effluent, 12.5% effluent, 6.25% effluent, and 0% effluent (100% Upstream), and the Control (100% Reconstituted Hard Water) with dilutions being made using upstream dilution water provided by the client. All organisms appeared healthy at time of introduction. All concentrations were at 25(± 1.0) °C before introduction of organisms. A reference toxicity test was also conducted during sample testing. The reference toxicity test data for the *Ceriodaphnia dubia* was determined not to fall within the acceptable laboratory range to deem the test organisms as healthy and able to provide reliable data for sample analysis. The reference toxicity test data for the *Pimephales promelas* was determined to fall within the acceptable laboratory range to deem the test organisms as healthy and able to provide reliable data for sample analysis. These results are listed in Table V.

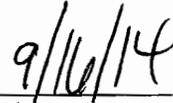
IV. TEST RESULTS

Observations were made of *Ceriodaphnia dubia* and *Pimephales promelas* at 24 hours and at 48 hours. There was abnormal behavior observed in the *Ceriodaphnia dubia* and the *Pimephales promelas* at the 100% concentration. Please see Tables II and III for these results.

V. SIGNATURE PAGE

Submitted by: Ozark Testing
Division of Anderson & Associates Consulting Engineers, L.L.C.
1511 Watts Drive
P.O. Box 806
Rolla, MO 65401

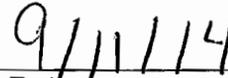




Rachel Carter
Water Laboratory Manager

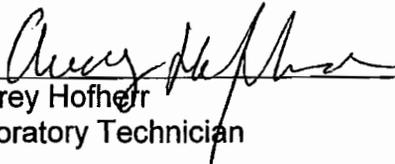
Date





Mondae Atughonu
Laboratory Technician

Date





Audrey Hofner
Laboratory Technician

Date

TABLE I
CITY OF GERALD
INITIAL WATER QUALITY PARAMETERS

ANALYSIS	UPSTREAM DILUTION WATER	EFFLUENT	TECHNICIAN
TEMPERATURE °C	22.0	22.4	AJH
PH S.U.	7.08	7.62	AJH
CONDUCTIVITY μ S	309	969	AJH
DISSOLVED OXYGEN MG/L	4.67	7.50	AJH
TOTAL RESIDUAL CHLORINE MG/L	0.04	0.05	AJH
AMMONIA MG/L	0.03	16.6	AJH/MA
ALKALINITY MG/L	96	270	AJH
HARDNESS MG/L	130	250	AJH

^a Temperature (°C) - Glass Mercury Thermometer

^b pH – perphect pH meter Standard Methods #19-4500-H⁺ B

^c Alkalinity & Hardness (mg/l as CaCO₃) - Titrimetric method adapted from Standard Methods #19 -2320-B, #19-2340-C

^d Conductivity (μ Mhos/cm)-Oakton conductivity meter Standard Methods #19-2510 B

^e Total Ammonia As N (mg/l) - Nessler Method Standard Methods #17-4500-NH₃ C

^f Residual Chlorine (mg/l) - Colorimetric Method Standard Methods #19-4500-Cl G

^g Dissolved Oxygen (mg/l) - YSI D.O. Meter

TABLE II

ACUTE TOXICITY OF THE CITY OF GERALD TO
CERIODAPHNIA DUBIA

CERIODAPHNIA DUBIA
Record # of alive specimens

CONCENTRATION %	START	24HR A	24HR B	24HR G	24HR D	48HR A	48HR B	48HR C	48HR D
CONTROL	1:45	5	5	5	5	5	5	5	5
0	2:40	5	5	5	5	5	5	5	5
6.25	2:40	5	5	5	5	5	5	5	5
12.5	2:40	5	5	5	5	5	5	5	5
25	2:40	5	5	5	5	5	5	5	5
50	2:40	5	5	5	5	5	5	5	5
100	2:40	5	5	5	5	0	0	0	1
TECHNICIAN	RLC/MA	AJH/MA							

ACUTE TOXICITY OF THE CITY OF GERALD TO
FATHEAD MINNOW (*Pimephales promelas*)

FATHEAD MINNOW
RECORD # OF ALIVE SPECIMENS

CONCENTRATION %	START	24HR A	24HR B	48HR A	48HR B
CONTROL	2:10	10	10	10	10
0	2:50	10	10	10	10
6.25	2:50	10	10	10	10
12.5	2:50	10	10	10	10
25	2:50	10	10	10	10
50	2:50	10	10	10	7
100	2:50	0	0	0	0
TECHNICIAN	RLC/MA	AJH/MA	AJH/MA	AJH/MA	AJH/MA

TABLE III

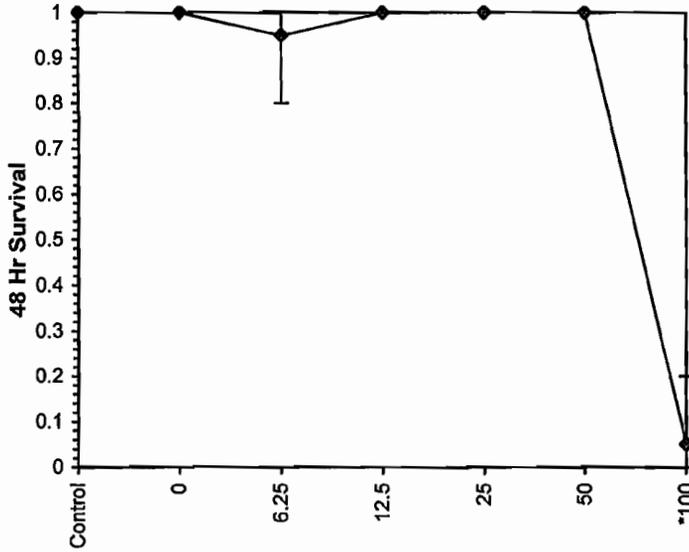
ACUTE TOXICITY OF THE CITY OF GERALD TO
CERIODAPHNIA DUBIA

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	pH
AJH/MA	24HR	CONTROL	24.2	8.15	8.13
AJH/MA	24HR	100 UPSTREAM	24.6	7.78	8.26
AJH/MA	24HR	6.25 EFFLUENT	24.8	7.86	8.38
AJH/MA	24HR	12.5 EFFLUENT	25.0	7.75	8.35
AJH/MA	24HR	25 EFFLUENT	25.0	7.86	8.54
AJH/MA	24HR	50 EFFLUENT	24.8	7.73	8.55
AJH/MA	24HR	100 EFFLUENT	25.2	7.64	8.71
AJH/MA	48HR	CONTROL	24.3	7.80	7.73
AJH/MA	48HR	100 UPSTREAM	24.6	7.62	7.69
AJH/MA	48HR	6.25 EFFLUENT	24.6	7.68	8.27
AJH/MA	48HR	12.5 EFFLUENT	24.8	7.63	8.35
AJH/MA	48HR	25 EFFLUENT	24.8	7.55	8.43
AJH/MA	48HR	50 EFFLUENT	25.0	7.42	8.44
AJH/MA	48HR	100 EFFLUENT	25.0	7.12	8.53

Ceriodaphnia Survival and Reproduction Test-48 Hr Survival

Start Date: 8/19/2014 Test ID: GrId081914 Sample ID: MO0045420
End Date: 8/21/2014 Lab ID: MO 00987 Sample Type: AMB1-Ambient water
Sample Date: 8/19/2014 Protocol: EPAF 94-EPA/600/4-91/002 Test Species: CD-Ceriodaphnia dubia
Comments:

Dose-Response Plot



Acute Fish Test-48 Hr Survival

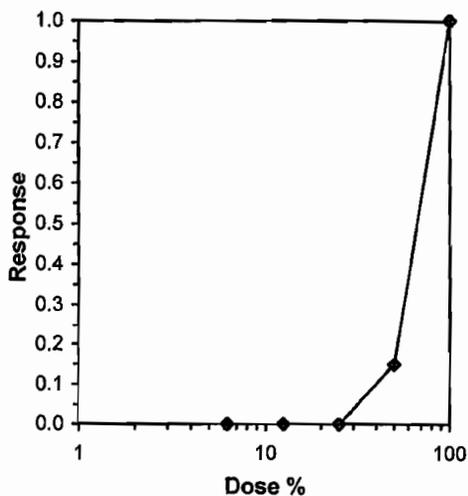
Start Date: 8/19/2014	Test ID: graldPP	Sample ID: MO0045420
End Date: 8/21/2014	Lab ID: MO 00987	Sample Type: AMB1-Ambient water
Sample Date: 8/19/2014	Protocol: EPAA 91-EPA/600/4-90/027F	Test Species: PP-Pimephales promelas

Conc-%	1	2
Control	1.0000	1.0000
0	1.0000	1.0000
6.25	1.0000	1.0000
12.5	1.0000	1.0000
25	1.0000	1.0000
50	1.0000	0.7000
100	0.0000	0.0000

Conc-%	Transform: Arcsin Square Root								Number Resp	Total Number
	Mean	N-Mean	Mean	Min	Max	CV%	N			
Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20	
0	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20	
6.25	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20	
12.5	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20	
25	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20	
50	0.8500	0.8500	1.2016	0.9912	1.4120	24.767	2	3	20	
100	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	2	20	20	

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Trim Level	Trimmed Spearman-Kärber		
	EC50	95% CL	
0.0%	63.728	57.051	71.187
5.0%	65.124	57.208	74.136
10.0%	66.121	55.888	78.229
20.0%	66.516	61.611	71.811
Auto-0.0%	63.728	57.051	71.187



Ceriodaphnia Survival and Reproduction Test-48 Hr Survival

Start Date: 8/19/2014	Test ID: Grid081914	Sample ID: MO0045420
End Date: 8/21/2014	Lab ID: MO 00987	Sample Type: AMB1-Ambient water
Sample Date: 8/19/2014	Protocol: EPAF 94-EPA/600/4-91/002	Test Species: CD-Ceriodaphnia dubia

Comments:

Conc-%	1	2	3	4
Control	1.0000	1.0000	1.0000	1.0000
0	1.0000	1.0000	1.0000	1.0000
6.25	1.0000	0.8000	1.0000	1.0000
12.5	1.0000	1.0000	1.0000	1.0000
25	1.0000	1.0000	1.0000	1.0000
50	1.0000	1.0000	1.0000	1.0000
100	0.0000	0.0000	0.0000	0.2000

Conc-%	Transform: Arcsin Square Root						Rank Sum	1-Tailed Critical	Number Resp	Total Number	
	Mean	N-Mean	Mean	Min	Max	CV%					
Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4		0	20	
0	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
6.25	0.9500	0.9500	1.2857	1.1071	1.3453	9.261	4	16.00	10.00	1	20
12.5	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
25	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
50	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
*100	0.0500	0.0500	0.2850	0.2255	0.4636	41.771	4	10.00	10.00	19	20

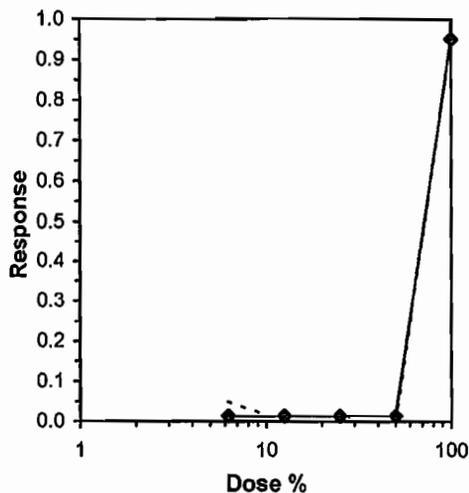
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p \leq 0.01$)	0.70981	0.896	-5E-14	6.47308
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	50	100	70.7107	2

Treatments vs Control

Trimmed Spearman-Kärber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%	71.698	68.789	74.729
20.0%	71.698	68.789	74.729
Auto-5.0%	71.698	68.789	74.729



Acute Fish Test-48 Hr Survival

Start Date: 8/19/2014	Test ID: graldPP	Sample ID: MO0045420
End Date: 8/21/2014	Lab ID: MO 00987	Sample Type: AMB1-Ambient water
Sample Date: 8/19/2014	Protocol: EPAA 91-EPA/600/4-90/027F	Test Species: PP-Pimephales promelas
Comments:		

Dose-Response Plot

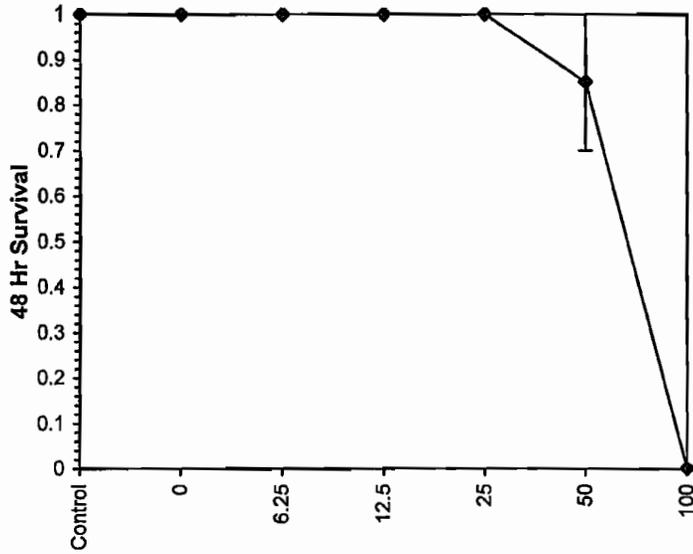


TABLE III

ACUTE TOXICITY OF THE CITY OF GERALD TO
FATHEAD MINNOW (*Pimephales promelas*)

FATHEAD MINNOW

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
AJH/MA	24HR	CONTROL	24.6	7.67	8.29
AJH/MA	24HR	0	24.4	5.43	8.15
AJH/MA	24HR	6.25	24.7	5.49	8.08
AJH/MA	24HR	12.5	24.4	5.55	8.17
AJH/MA	24HR	25	24.4	5.21	8.19
AJH/MA	24HR	50	24.2	5.30	8.15
AJH/MA	24HR	100	24.3	10.00	8.29
AJH/MA	48HR	CONTROL	24.6	7.10	8.26
AJH/MA	48HR	0	25.1	6.63	7.81
AJH/MA	48HR	6.25	24.8	6.17	8.04
AJH/MA	48HR	12.5	24.7	6.57	8.16
AJH/MA	48HR	25	24.7	5.99	8.18
AJH/MA	48HR	50	24.6	5.56	8.16
AJH/MA	48HR	100	24.5	4.74	8.33

TABLE IV

REFERENCE TOXICITY TEST
CERIODAPHNIA DUBIA

Ceriodaphnia Dubia
RECORD # OF ALIVE SPECIMENS

Concentration %	Start	24hr A	24hr B	24hr C	24hr D	48hr A	48hr B	48hr C	48hr D
0.0 g/l	1:45	5	5	5	5	5	5	5	5
1.0 g/l	1:45	1	3	0	0	0	0	0	0
1.5 g/l	1:45	0	0	0	0	0	0	0	0
2.0g/l	1:45	0	0	0	0	0	0	0	0
2.5 g/l	1:45	0	0	0	0	0	0	0	0
3.0 g/l	1:45	0	0	0	0	0	0	0	0
TECHNICIAN	RLC	MA	MA	MA	MA	AJH/MA	AJH/MA	AJH/MA	AJH/MA

REFERENCE TOXICITY TEST
CERIODAPHNIA DUBIA

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
MA	24HR	0.0 g/l	24.1	7.99	8.41
MA	24HR	1.0 g/l	24.5	7.91	8.63
MA	24HR	1.5 g/l	24.4	8.38	8.64
MA	24HR	2.0g/l	24.7	8.09	8.70
MA	24HR	2.5 g/l	24.7	7.81	8.68
MA	24HR	3.0 g/l	24.6	7.78	8.66
AJH/MA	48HR	0.0 g/l	24.2	8.13	8.27
AJH/MA	48HR	1.0 g/l	24.5	7.88	8.48
AJH/MA	48HR	1.5 g/l	24.2	7.82	8.54
AJH/MA	48HR	2.0g/l	24.3	7.37	8.56
AJH/MA	48HR	2.5 g/l	24.2	7.39	8.58
AJH/MA	48HR	3.0 g/l	24.2	7.33	8.59

Ceriodaphnia Survival and Reproduction Test-48 Hr Survival

Start Date: 8/19/2014	Test ID: RT081914CD	Sample ID: MORT081914
End Date: 8/21/2014	Lab ID: MO 00987	Sample Type: AMB1-Ambient water
Sample Date: 8/21/2014	Protocol: EPAF 94-EPA/600/4-91/002	Test Species: CD-Ceriodaphnia dubia

Conc-%	1	2	3	4
Control	1.0000	1.0000	1.0000	1.0000
0	0.0000	0.0000	0.0000	0.0000
6.25	0.0000	0.0000	0.0000	0.0000
12.5	0.0000	0.0000	0.0000	0.0000
25	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000	0.0000

Conc-%	Transform: Arcsin Square Root						Rank Sum	1-Tailed Critical	Skew	Kurt	
	Mean	N-Mean	Mean	Min	Max	CV%					
Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	10.00	10.00	0	20
*0	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	10.00	10.00	20	20
*6.25	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	10.00	10.00	20	20
*12.5	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	10.00	10.00	20	20
*25	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	10.00	10.00	20	20
*50	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	10.00	10.00	20	20
*100	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	10.00	10.00	20	20

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	1	0.896		
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	<0	0		
Treatments vs Control				

Dose-Response Plot

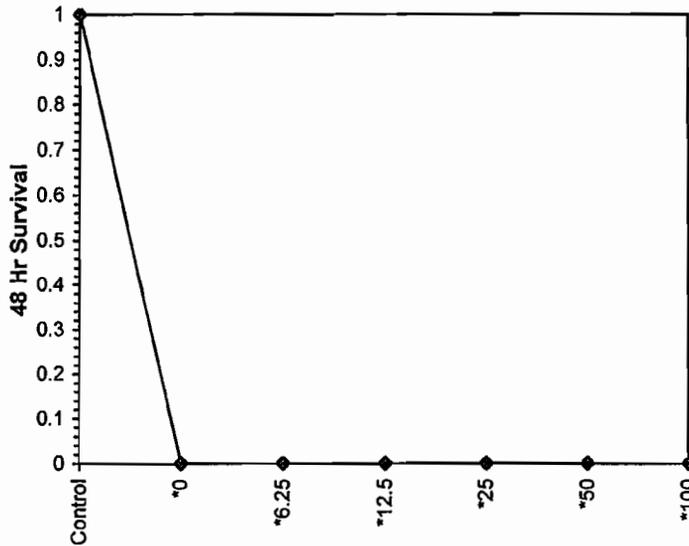


TABLE V

**REFERENCE TOXICITY TEST
FATHEAD MINNOW (*PIMEPHALES PROMELAS*)**

**FATHEAD MINNOW
RECORD # OF ALIVE SPECIMENS**

CONCENTRATION %	START	24HR A	24HR B	48HR A	48HR B
0	2:10	10	10	10	10
4.0	2:10	4	4	3	2
6.0	2:10	10	10	10	10
8.0	2:10	3	4	3	0
10.0	2:10	0	0	0	0
12.0	2:10	0	0	0	0
TECHNICIAN	RLC/MA	MA	MA	AJH/MA	AJH/MA

**REFERENCE TOXICITY TEST
FATHEAD MINNOW (*PIMEPHALES PROMELAS*)**

**FATHEAD MINNOW
WATER CHEMISTRIES**

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
MA	24HR	0	24.6	7.53	8.37
MA	24HR	4	24.6	7.23	8.52
MA	24HR	6	25.1	6.84	8.50
MA	24HR	8	25.0	7.24	8.46
MA	24HR	10	24.8	7.17	8.56
MA	24HR	12	24.8	7.25	8.60
AJH/MA	48HR	0	24.6	7.30	8.12
AJH/MA	48HR	4	24.6	7.35	8.49
AJH/MA	48HR	6	25.0	7.18	8.49
AJH/MA	48HR	8	25.2	7.20	8.47
AJH/MA	48HR	10	25.4	7.04	8.50
AJH/MA	48HR	12	25.1	6.91	8.46

Acute Fish Test-48 Hr Survival

Start Date: 9/18/2014	Test ID: RT091814PP	Sample ID: MO
End Date: 9/21/2014	Lab ID: MO 00987	Sample Type: AMB1-Ambient water
Sample Date: 9/21/2014	Protocol: EPAA 91-EPA/600/4-90/027F	Test Species: PP-Pimephales promelas

Comments:

Conc-%	1	2
Control	1.0000	1.0000
0	1.0000	1.0000
4	0.3000	0.2000
6	1.0000	1.0000
8	0.3000	0.0000
10	0.0000	0.0000
12	0.0000	0.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				N
			Mean	Min	Max	CV%	
Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2
0	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2
4	0.2500	0.2500	0.5216	0.4636	0.5796	15.723	2
6	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2
8	0.1500	0.1500	0.3692	0.1588	0.5796	80.603	2
10	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	2
12	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	2

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Dose-Response Plot

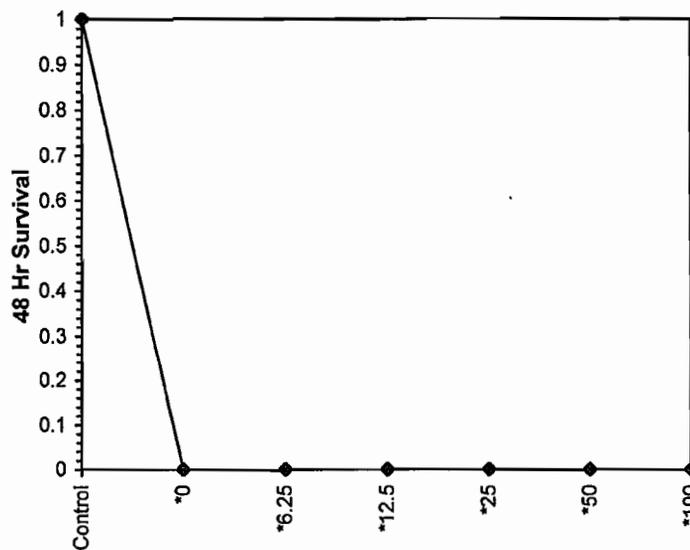


TABLE I
CITY OF GERALD
INITIAL WATER QUALITY PARAMETERS



ANALYSIS	UPSTREAM DILUTION WATER	EFFLUENT	TECHNICIAN
TEMPERATURE °C	22.0	22.4	AJH
PH S.U.	7.08	7.62	AJH
CONDUCTIVITY μS	309	969	AJH
DISSOLVED OXYGEN MG/L	4.67	7.50	AJH
TOTAL RESIDUAL CHLORINE MG/L	0.04	0.05	AJH
AMMONIA MG/L	0.03	16.6	AJH/MA
ALKALINITY MG/L	$4.8 \times 20 = 96$	$13.5 \times 20 = 270$	AJH
HARDNESS MG/L	$16.5 \times 20 = 330$	$12.5 \times 20 = 250$	AJH

^a Temperature (°C) - Glass Mercury Thermometer

^b pH – perHect pH meter Standard Methods #19-4500-H⁺ B

^c Alkalinity & Hardness (mg/l as CaCO₃) - Titrimetric method adapted from Standard Methods #19-2320-B, #19-2340-C

^d Conductivity (μMhos/cm)-Oakton conductivity meter Standard Methods #19-2510 B

^e Total Ammonia As N (mg/l) - Nessler Method Standard Methods #17-4500-NH₃ C

^f Residual Chlorine (mg/l) - Colorimetric Method Standard Methods #19-4500-Cl G

^g Dissolved Oxygen (mg/l) - YSI D.O. Meter

TABLE II

ACUTE TOXICITY OF THE CITY OF GERALD TO
CERIODAPHNIA DUBIA

CERIODAPHNIA DUBIA
Record # of alive specimens

CONCENTRATION %	START	24HR A	24HR B	24HR C	24HR D	48HR A	48HR B	48HR C	48HR D
CONTROL	2:45	5	5	5	5	5	5	5	5
0	2:40	5	5	5	5	5	5	5	5
6.25	↓	5	5	5	5	5	5	5	5
12.5		5	5	5	5	5	5	5	5
25		5	5	5	5	5	5	5	5
50		5	5	5	5	5	5	5	5
100		5	5	5	5	0	0	0	0
TECHNICIAN	RLC/MA	ASH/MA				MA/ADN			

ACUTE TOXICITY OF THE CITY OF GERALD TO
FATHEAD MINNOW (*Pimephales promelas*)

FATHEAD MINNOW
RECORD # OF ALIVE SPECIMENS

CONCENTRATION %	START	24HR A	24HR B	48HR A	48HR B
CONTROL	2:10	10	10	10	10
0	2:50	10	10	10	10
6.25	↓	10	10	10	10
12.5		10	10	10	10
25		10	10	10	10
50		10	10	10	7
100		0	0	0	0
TECHNICIAN	RLC/MA	ASH/MA			

TABLE III

ACUTE TOXICITY OF THE CITY OF GERALD TO
CERIODAPHNIA DUBIA

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
ASH/MA	24HR	CONTROL	24.2	8.15	8.13
	24HR	100 UPSTREAM	24.6	7.78	8.26
	24HR	6.25 EFFLUENT	24.8	7.86	8.38
	24HR	12.5 EFFLUENT	25.0	7.95	8.35
	24HR	25 EFFLUENT	25.0	7.86	8.54
	24HR	50 EFFLUENT	24.8	7.73	8.55
	24HR	100 EFFLUENT	25.2	7.64	8.71
ASH/MA	48HR	CONTROL	24.3	7.80	7.73
	48HR	100 UPSTREAM	24.6	7.67	7.69
	48HR	6.25 EFFLUENT	24.6	7.68	8.27
	48HR	12.5 EFFLUENT	24.8	7.63	8.35
	48HR	25 EFFLUENT	24.8	7.55	8.43
	48HR	50 EFFLUENT	25.0	7.42	8.44
	48HR	100 EFFLUENT	25.0	7.12	8.53

TABLE III

ACUTE TOXICITY OF THE CITY OF GERALD TO
FATHEAD MINNOW (*Pimephales promelas*)

FATHEAD MINNOW

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
ASH/MA	24HR	CONTROL	24.6	5.43	8.29
	24HR	0	24.4	5.49	8.15
	24HR	6.25	24.7	5.49	8.08
	24HR	12.5	24.4	5.55	8.17
	24HR	25	24.4	5.21	8.19
	24HR	50	24.2	5.30	8.15
	24HR	100	24.3	10.00	8.29
MA/ASH	48HR	CONTROL	24.6	7.10	8.26
	48HR	0	25.1	6.63	7.81
	48HR	6.25	24.8	6.77	8.04
	48HR	12.5	24.7	6.57	8.16
	48HR	25	24.7	5.99	8.18
	48HR	50	24.6	5.56	8.16
	48HR	100	24.5	4.74	8.33

TABLE VI

REFERENCE TOXICITY TEST
CERIODAPHNIA DUBIA

Ceriodaphnia Dubia
 RECORD # OF ALIVE SPECIMENS

Concentration %	Start	24hr A	24hr B	24hr C	24hr D	48hr A	48hr B	48hr C	48hr D
0.0 g/l	1.45	S	S	S	S	S	S	S	S
1.0 g/l	↓	0	3	0	0	0	0	0	0
1.5 g/l	↓	0	0	0	0	0	0	0	0
2.0 g/l	↓	0	0	0	0	0	0	0	0
2.5 g/l	↓	0	0	0	0	0	0	0	0
3.0 g/l	↓	0	0	0	0	0	0	0	0
TECHNICIAN	RLC	MA				MA/ASH			

TALBE VII
 REFERENCE TOXICITY TEST
CERIODAPHNIA DUBIA

Ceriodaphnia Dubia
 RECORD # OF ALIVE SPECIMENS

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
MA	24HR	0.0 g/l	24.1	7.99	8.41
↓	24HR	1.0 g/l	24.5	7.91	8.63
↓	24HR	1.5 g/l	24.4	8.38	8.64
↓	24HR	2.0 g/l	24.7	8.09	8.70
↓	24HR	2.5 g/l	24.7	7.81	8.68
↓	24HR	3.0 g/l	24.6	7.78	8.66
MA/ASH	48HR	0.0 g/l	24.2	8.13	8.27
↓	48HR	1.0 g/l	24.5	7.88	8.48
↓	48HR	1.5 g/l	24.2	7.82	8.54
↓	48HR	2.0 g/l	24.3	7.37	8.56
↓	48HR	2.5 g/l	24.2	7.39	8.58
↓	48HR	3.0 g/l	24.2	7.33	8.59

TABLE VIII

REFERENCE TOXICITY TEST
FATHEAD MINNOW (*PIMEPHALES PROMELAS*)

FATHEAD MINNOW
RECORD # OF ALIVE SPECIMENS

CONCENTRATION %	START	24HR A	24HR B	48HR A	48HR B
0	2:10	10	10	10	10
4.0	↓	4	4	3	2
6.0	↓	10	10	10	10
8.0	↓	3	4	3	0
10.0	↓	0	0	0	0
12.0	↓	0	0	0	0
TECHNICIAN	MA/RUC	MA	→	MAH MA	→

TABLE IX

REFERENCE TOXICITY TEST
FATHEAD MINNOW (*PIMEPHALES PROMELAS*)

FATHEAD MINNOW
WATER CHEMISTRIES

TECHNICIAN	TEST TIME	CONCENTRATION %	TEMPERATURE °C	DISSOLVED OXYGEN	PH
MA	24HR	0	24.6	7.53	8.37
↓	24HR	4	24.6	7.23	8.52
↓	24HR	6	25.1	6.84	8.50
↓	24HR	8	25.0 25.0	7.24	8.46
↓	24HR	10	24.8	7.17	8.56
↓	24HR	12	24.8	7.25	8.60
MA/ASH	48HR	0	24.6	7.50	8.12
↓	48HR	4	24.6	7.30	8.49
↓	48HR	6	25.0	7.18	8.49
↓	48HR	8	25.2	7.20	8.47
↓	48HR	10	25.4	7.04	8.50
↓	48HR	12	25.1	6.91	8.46

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Tel: 970/484-5091 Fax: 970/484-2514

ORGANISM HISTORY

DATE: 8/18/2014

SPECIES: *Ceriodaphnia dubia*

AGE: < 24 hour

LIFE STAGE: Neonate

HATCH DATE: 8/18/2014

BEGAN FEEDING: Immediately

FOOD: YTC, *P. subcapitata*

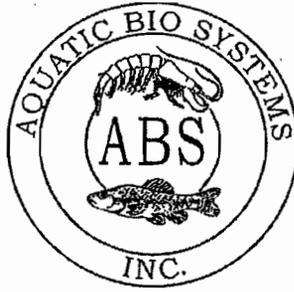
Water Chemistry Record:	Current	Range
TEMPERATURE:	<u>24°C</u>	<u>--</u>
SALINITY/CONDUCTIVITY:	<u>--</u>	<u>--</u>
TOTAL HARDNESS (as CaCO ₃):	<u>120 mg/l</u>	<u>--</u>
TOTAL ALKALINITY (as CaCO ₃):	<u>100 mg/l</u>	<u>--</u>
pH:	<u>7.64</u>	<u>--</u>

Comments:



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ORGANISM HISTORY

DATE: 8/18/2014

SPECIES: *Pimephales promelas*

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 8/18/2014

BEGAN FEEDING: N/A

FOOD: N/A

Water Chemistry Record:

	Current	Range
TEMPERATURE:	<u>25°C</u>	<u>--</u>
SALINITY/CONDUCTIVITY:	<u>--</u>	<u>--</u>
TOTAL HARDNESS (as CaCO ₃):	<u>110 mg/l</u>	<u>--</u>
TOTAL ALKALINITY (as CaCO ₃):	<u>85 mg/l</u>	<u>--</u>
pH:	<u>7.83</u>	<u>--</u>

Comments:



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Algae Preparation History

DATE: 8/18/2014

SPECIES: *Pseudokirschneriella subcapitata**

INOCULATION DATE: 8/1/2014

HARVEST DATE: 8/7/2014

CONCENTRATION DATE: 8/13/2014

CELL COUNT (/ml): 3.0×10^7 cells/ml

Comments:

- * Formerly known as *Selenastrum capricornutum*
- ** All concentrated algae diluted to proper cell count with reconstituted moderately hard DI water.



Supervisor

OZARK TESTING
 Division of Anderson & Associates Consulting Engineers, L.L.C.
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 Rolla, MO 65402-0806

CHAIN OF CUSTODY FORM

Email Address:				NPDES Permit #:					
Site: <u>Berald</u>									
<u>TREATMENT PLANT</u>									
Client Address:				Temperature of Sample during Collection:					
Client Telephone #:									
Samples Collected by: <u>CARL WHEELER</u>									
Print Name		Title		Signature					
Samples Relinquished by: <u>RON PARMENTIER</u>									
Print Name		Title		Signature					
Mode of Transportation:						Date:			
Sample ID	Sample Collection				Sample Type		Volume	Preservation	Analysis Requested
	Beginning		Ending		Grab	Comp.			
	Date	Time	Date	Time					
	<u>8/19/14</u>	<u>7:45</u>							<u>WET</u>
Received By: _____				Signature: <u>Charles Carter</u>		Date: <u>8/19/14</u>			
Print Name		Title		Signature		Date			
Comments:				Time Sample Dropped off: <u>10:40</u>					