

**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.	3
Maximum: 10 pt Design Flow (avg. day) or peak month; use greater (Max 10 pts.)	1 pt. / MGD or major fraction thereof.	3
<b>EFFLUENT DISCHARGE RECEIVING WATER SENSITIVITY:</b>		
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
<b>PRELIMINARY TREATMENT – Headworks</b>		
Screening and/or comminution	3	3
Grit removal	3	-
Plant pumping of main flow (lift station at the headworks)	3	3
<b>PRIMARY TREATMENT</b>		
Primary clarifiers	5	-
Combined sedimentation/digestion	5	-
Chemical addition (except chlorine, enzymes)	4	-
<b>REQUIRED LABORATORY CONTROL – performed by plant personnel (highest level only)</b>		
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	-
<b>ALTERNATIVE FATE OF EFFLUENT</b>		
Direct reuse or recycle of effluent	6	-
Land Disposal – low rate	3	-
High rate	5	-
Overland flow	4	-
<b>Total from page ONE (1)</b>	<b>----</b>	<b>20</b>

**APPENDIX - CLASSIFICATION WORKSHEET (CONTINUED):**

ITEM	POINTS POSSIBLE	POINTS ASSIGNED
<b>VARIATION IN RAW WASTE (highest level only) (DMR exceedances and Design Flow exceedances)</b>		
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	-
<b>SECONDARY TREATMENT</b>		
Trickling filter and other fixed film media with secondary clarifiers	10	-
Activated sludge with secondary clarifiers (including extended aeration and oxidation ditches)	15	-
Stabilization ponds without aeration	5	-
Aerated lagoon	8	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	-
<b>DISINFECTION</b>		
Chlorination or comparable	5	-
Dechlorination	2	-
On-site generation of disinfectant (except UV light)	5	-
UV light	4	4
<b>SOLIDS HANDLING – SLUDGE</b>		
Solids Handling Thickening	5	-
Anaerobic digestion	10	-
Aerobic digestion	6	-
Evaporative sludge drying	2	-
Mechanical dewatering	8	-
Solids reduction (incineration, wet oxidation)	12	-
Land application	6	-
<b>Total from page TWO (2)</b>	<b>----</b>	<b>14</b>
<b>Total from page ONE (1)</b>	<b>---</b>	<b>20</b>
<b>Grand Total</b>	<b>---</b>	<b>34</b>

- 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	10.28	1.5	1.23	76.00	23/0.25	2.10	1.35	NO
Total Ammonia as Nitrogen (Winter) mg/L	12.1	19.32	3.1	2.30	76.00	33.4/0.25	1.12	1.75	YES

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).

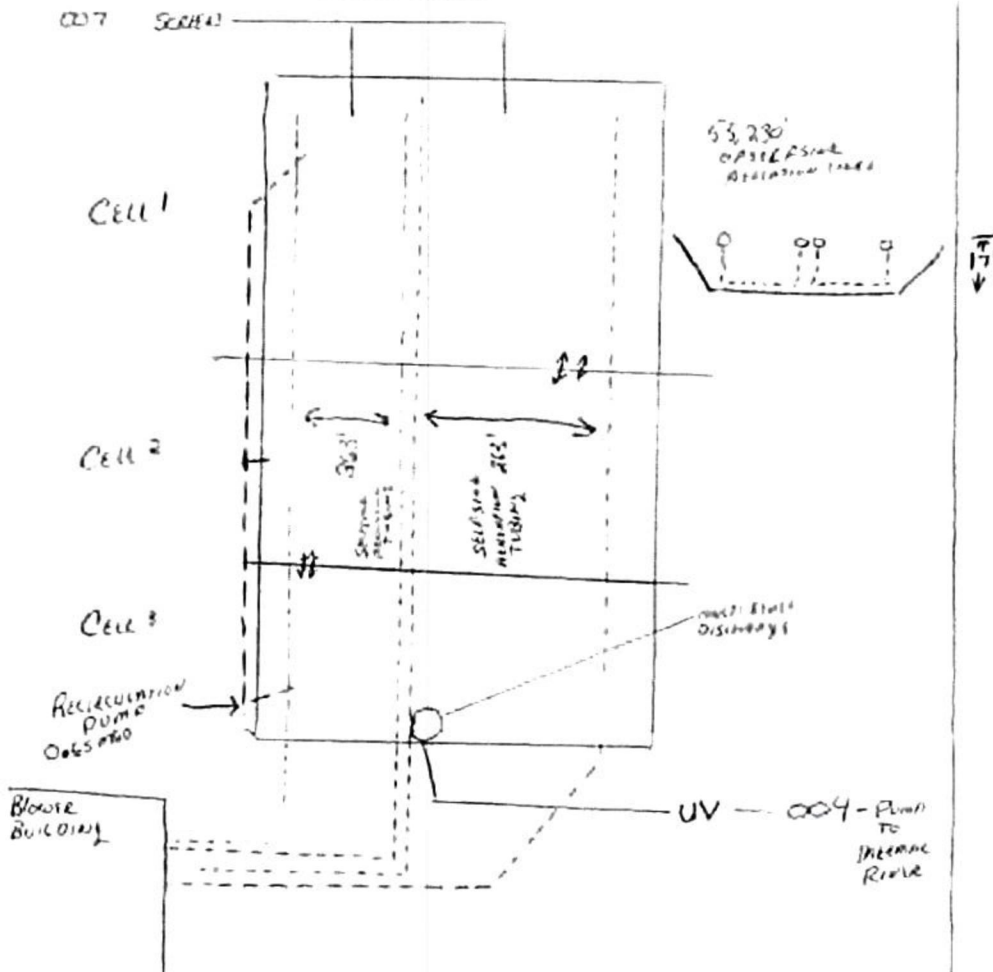
n – Is the number of samples.

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 – ALTERNATIVE: FACILITY LAYOUT





APPENDIX – ALTERNATIVE: FACILITY MAP





**APPENDIX – COST ANALYSIS FOR COMPLIANCE:**

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

**Eureka WWTF, Permit Renewal  
City of Eureka  
Missouri State Operating Permit #MO-0039659**

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 CAPDETWORKS (CapDet). CapDet is a preliminary design and costing software program from Hydromantis<sup>1</sup> 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 brand new treatment facility or 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.

The Department is required to issue a permit with final effluent limits in accordance with 644.051.1.(1) RSMo, 644.051.1.(2) RSMo, and the Clean Water Act. The table below summarizes the results of this cost analysis for the City of Eureka. The practical result of this analysis is to incorporate a long compliance schedule into the permit in order to mitigate adverse impact to distressed populations resulting from the costs of upgrading the wastewater treatment facility.

**Cost Analysis for Compliance Summary Table**

Estimated present worth to upgrade to an oxidation ditch	Median Household Income (MHI) for the State of Missouri*	Estimated monthly cost per user as a percent of MHI
\$14,219,632	\$49,008	0.47%

\* Due to the fact that the Median Household Income of the City of Eureka (\$88,829) is higher than the State of Missouri’s Median Household income, the State of Missouri’s Median Household Income of \$49,008 has been used to complete this analysis.

**Current Facility Description:** Influent lift station / bar screen / three-cell aerated lagoon / UV disinfection / sludge is retained in lagoon

**Flow evaluated:** 2.8 MGD

Residential Connections:	<u>not provided by permittee</u>
Commercial Connections:	<u>not provided by permittee</u>
Industrial Connections:	<u>not provided by permittee</u>
Total Connections for this facility:	<u>3,743*</u>

\*Connections obtained from the Department’s Fee Tracking System

**New Permit Requirements:**

The permit requires compliance with new effluent limitations for ammonia, which may require the design, construction and operation of different treatment technology. The cost assumptions in this cost analysis anticipate complete replacement of the existing treatment facility. 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 multiple technologies through CapDet at a range of flows, then, using a linear interpolation, develops a spreadsheet outlining high and low costs for treatment plants. For this analysis the Department has selected the mechanical treatment technology that could be the most practical solution to meet the new requirements for the community. 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 metals, total hardness, total nitrogen, total phosphorus, and chronic WET testing. The permit requires a SWPPP be develop and implemented. BOD<sub>5</sub> and TSS sampling frequencies have been increased from monthly to weekly.

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:**

**Costs associated with mechanical treatment:**

The costs estimated in CAPDEWORKS are associated with a complete reconstruction of a new treatment plant. The total present worth for complete replacement of the existing treatment facility in order to meet new ammonia effluent limits is estimated at \$14,219,632 (*CAPDEWORKS cost estimator was used*). This cost, if financed through user fees, might cost each household approximately \$19.03 per month. The Department has estimated the construction and treatment costs for an oxidation ditch. The treatment type has been set to meet effluent ammonia limits of less than 1.0 mg/L and losing stream criteria for BOD<sub>5</sub> and TSS. Sludge handling and sludge treatment were not included in the capital, operations, maintenance, and present worth cost estimations as there are multiple ways for sludge handling to occur, including reuse of existing sludge equipment. It is the Department’s opinion that and oxidation ditch is the most practical mechanical treatment technology for your community based on the current design flow. A more detailed engineering and design report conducted for your specific facility will be completed by your hired engineer. This may reflect a different type of treatment option than what is described within this analysis and may include additional collection system work or additional upgrades at the treatment plant.

**Cost associated with new sampling requirements:**

The costs estimated for new sampling requirements are as follows:

New effluent parameters:	Estimated annual cost:	New instream parameters:	Estimated annual cost:
Total Phosphorus	\$96	Total Phosphorus	\$96
Total Nitrogen	\$292	Total Nitrogen	\$292
Cadmium	\$72	Total Hardness	\$80
Chromium III	\$68		
Chromium VI	\$80	Increased sampling:	
Copper	\$68	BOD <sub>5</sub>	\$1,640
Lead	\$68	TSS	\$640
Nickel	\$68		
Zinc	\$68	<b>Total annual cost:</b>	<b>\$3,628</b>

The Department estimates the cost of a chronic WET test to be \$1,550 or \$310 per year over five years. The estimated cost of the development and implementation of a SWPPP is \$10,000. That accounts for a \$20/hour employee working 500 hours. The cost would be \$2,000 annually over five years.

The total costs for these new permit requirements is \$5,938 annually. If financed through user fees, it might cost each household an extra \$0.13 per month. Due to the minimal cost associated with this new requirement, the Department anticipates an extremely low to no rate increase will be necessary that could impact individuals or households of the community.

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>\$6.50</u>
Rate Capacity or Pay as You Go Option:	<u>not provided by permittee</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>

Though the Department has made attempts to gather financial information from the City of Eureka; no information has been provided. The Department has relied heavily on readily available data to complete this analysis.

**(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>\$6.50</u>

**B Estimated Costs for Mechanical Plant Pollution Control Option**

Estimated total present worth of pollution control*:	<u>\$14,219,632</u>
Estimated capital cost of pollution control**:	<u>\$9,646,400</u>
Annual cost of operation and maintenance***:	<u>\$366,968</u>
Estimated resulting user cost per household per month****:	<u>\$19.03</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)***** <sup>2</sup> :	<u>\$88,829</u>
MHI for State of Missouri:	<u>\$49,008</u>
Cost per household as a percent of median household income <sup>3</sup> :	<u>0.47%</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 mechanical treatment facility to be approximately \$14,219,632. If financed through user costs, the future user costs have the potential to be estimated at \$19.03 per month. These costs assume a 5% interest rate over 20 years for mechanical treatment. It is the Department's opinion that an oxidation ditch is the most practical mechanical treatment option for the design flow of this facility. All treatment technologies were set to meet effluent ammonia limits of less than 1.0 mg/L and losing stream criteria for BOD<sub>5</sub> and TSS. Sludge handling, sludge treatment, and disinfection have not been included in the capital, operations and maintenance, and present worth cost estimations.

- \* Total Present Worth includes a five percent interest rate to construct and perform annual operation and maintenance of the new treatment plant 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.
- \*\*\*\*\* Due to the fact that the Median Household Income of the City of Eureka is higher than the State of Missouri's Median Household income, the State of Missouri's Median Household Income of \$49,008 has been used to complete this analysis. The resulting cost per household as a percent of MHI is 0.47% using the state's MHI. The resulting cost per household as a percent of MHI will be used as the residential indicator in Criteria 7 below.

### **(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 achieve a level of water quality that provides for the protection and propagation of fish, shellfish, wildlife and recreation in and on the water.

#### **Total Ammonia Nitrogen Treatment**

The technologies evaluated by CapDet are a sequencing batch reactor, extended aeration mechanical plant with triangular basin, and an extended aeration oxidation ditch. All treatment technologies were designed to meet effluent ammonia of less than 1.0 mg/L and losing stream criteria for BOD<sub>5</sub> and TSS of less than 10 mg/L and have demonstrated the capability of meeting the 2013 ammonia criteria when operated and maintained at a proper level. Please see the Water Protection Program fact sheet titled "Changes to the Water Quality Standard for Ammonia" at <http://dnr.mo.gov/pubs/pub2481.htm>.

#### **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.

#### **Stormwater Pollution Prevention Plan**

Stormwater runoff is water from rain or snowmelt that does not immediately infiltrate into the ground and flows over or through natural or man-made storage or conveyance systems. When undeveloped areas are converted to land uses with impervious surfaces such as buildings, parking lots, and roads, the natural hydrology of the land is altered and can result in increased surface runoff rates, volumes, and pollutant loads. Stormwater runoff picks up industrial pollutants and typically discharges them directly into nearby waterbodies or indirectly via storm sewer systems. Runoff from areas where industrial activities occur can contain toxic pollutants (e.g., heavy metals and organic chemicals) and other pollutants such as trash, debris, and oil and grease, when facility practices allow exposure of industrial materials to stormwater. This increased flow and pollutant load can impair waterbodies, degrade biological habitats, pollute drinking water sources, and cause flooding and hydrologic changes to the receiving water, such as channel erosion. Industrial facilities typically perform a portion of their activities in outdoor areas exposed to the elements. This may include activities such as material storage and handling, vehicle fueling and maintenance, shipping and receiving, and salt storage, all of which can result in pollutants being exposed to precipitation and capable of being carried off in stormwater runoff. Also, facilities may have performed industrial activities outdoors in the past and materials from those activities still remain exposed to precipitation. In addition, accidental spills and leaks, improper waste disposal, and illicit connections to storm sewers may also lead to exposure of pollutants to stormwater.



A SWPPP is a written document that identifies the industrial activities conducted at the site, including any structural control practices, which the industrial facility operator will implement to prevent pollutants from making their way into stormwater runoff. The SWPPP also must include descriptions of other relevant information, such as the physical features of the facility, and procedures for spill prevention, conducting inspections, and training of employees. The SWPPP is intended to be a “living” document, updated as necessary, such that when industrial activities or stormwater control practices are modified or replaced, the SWPPP is similarly revised to reflect these changes.

**(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<sup>4,6</sup>:**

Potentially Distressed Populations – City of Eureka	
Total Population	10,270
Unemployment	4.6%
Adjusted Median Household Income (MHI)*	\$88,829
Percent Change in MHI (2000-2012)	+19.6%
Percent Population Growth/Decline (2000-2012)	+33.6%
Median Age in Years	36.7
Percent of Households in Poverty	3.6%
Percent of Households Relying on Food Stamps	5.2%

\*State’s MHI of \$49,008 was used in calculations in this cost analysis

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)	3
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%	3
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%	not provided

\* Financial Capability Indicators are specific to the State of Missouri

Financial Capability (FCI) Indicators Average Score: 2.5  
 Mechanical Plant Residential Indicator (RI, from Criteria #2 above): 0.47%

**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 Mechanical Plant: 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 mechanical plant could result in a Low financial burden placed on the community due to the Mid-Range FCI paired with the Low RI. Please see Criteria #2 for more information on the costs specific to each treatment technology.

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

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



## 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 sampling requirements.

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 complete replacement of the existing treatment facility in order to meet new ammonia effluent limits could be \$19.03 for mechanical treatment. Using this analysis, the Department finds that an oxidation ditch is the most practical and affordable option for your community. The construction and operation of an oxidation ditch 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 the City of Eureka has received a five (5) year schedule of compliance for the design and construction of an oxidation ditch.

### Suggested milestones to meet:

- Year 1. Hire an engineer and evaluate rate structure and treatment plant
- Year 2. Hold bond election, apply for State Revolving Fund loans and/or grants, and submit facility plan
- Year 3. Apply for Construction Permit and close on loan
- Year 4. Construction
- Year 5. Complete construction

The schedule of compliance allows the community the first three years to hire an engineer, evaluate operations and rate structure, obtain an engineering report, hold a bond election, and close on a loan. At this time the community will know what the user rates will be based on the present worth of the chosen treatment type decided on by the community and the design engineer hired by the community. It is anticipated by the Department that rates will be increased to mitigate the cost of compliance of the new requirements. 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.

The remaining two years of the schedule give the community time to construct the facility and complete the project. If the community wishes to seek funding from the Department, please contact the Financial Assistance Center for more information.  
<http://www.dnr.mo.gov/env/Wpp/srf/index.html>

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.  $(19.03/(49,008/12))100 = 0.47\%$  (mechanical)
4. Unemployment data was obtained from Missouri Department of Economic Development (November 2015) – <http://www.missourieconomy.org/pdfs/ure11511.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?\\_ft=table](http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?_ft=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=t>

APPENDIX – WATER QUALITY REVIEW SHEET:

**Water Quality Review Sheet**  
*Determination of Effluent Limits*

**Facility Information**

FACILITY NAME: Eureka Sewage Treatment Plant NPDES #: MO-0039659

FACILITY TYPE/DESCRIPTION: Proposed 2.8 MGD aerated lagoon (facility expansion)

ECOREGION: Ozark Highlands 8- DIGIT HUC: 07140102 COUNTY: St. Louis  
Central Irregular Plains Osage Plains  
Mississippi Alluvial Plains Ozark Highlands

LEGAL DESCRIPTION: NE NE Sec 31, T44N, R4E LATITUDE/LONGITUDE: New Outfall Location

WATER QUALITY HISTORY: Failure of WET test in 1999 is believed to be due to ammonia toxicity. DMRs indicate continuously high ammonia concentrations in effluent.

**Outfall Characteristics**

OUTFALL	DESIGN FLOW (CFS)	TREATMENT TYPE	RECEIVING WATERBODY	OTHER
004	4.34	Aerated Lagoon	Meramec River	

**Receiving Waterbody Information**

WATERBODY	CLASS	7Q10 (CFS)	*DESIGNATED USES	OTHER CHARACTERISTICS
Meramec River	P	306	AQL, CLF, IND, BTG, DWS, LWW, WBC	WBID: 2185

\*Cool Water Fishery (CLF), Cold Water Fishery (CDF), Irrigation (IRR), Industrial (IND), Boating & Canoeing (BTG), Drinking Water Supply (DWS), Whole Body Contact Recreation (WBC), Protection of Warmwater Aquatic Life and Human Health (AQL), Livestock & Wildlife Watering (LWW)

COMMENTS: City wants to expand facility and change current outfall location from Flat Creek to Meramec River. Current outfall location on Flat Creek has led to 305(b) designation of the stream not supporting beneficial uses. There are three outfalls listed on Flat River Creek, so the proposed outfall is labeled as 004. Ultraviolet Disinfection (UV) is also being added.

**MIXING CONSIDERATIONS**

**7Q10 Calculation:** USGS stream gauge data were used to calculate the seven (7)-day one (1)-in-ten (10)-year low flow (7Q10) for the Meramec River near Eureka, MO. The 7Q10 of a stream is the average minimum flow for seven (7) consecutive days that has a probable recurrence interval of once-in-ten (10) years.

## Water Quality Review Sheet - Page 2

*Determination of Effluent Limits*

All available data from USGS-07019000 were used to generate 7-day low-flow values using the USGS SWSTAT 4.1 surface water statistics program. The resulting 7-day low-flows were fitted using the Log-Pearson Type III frequency distribution. A 7Q10 value of 306 cubic feet/second (cfs) was determined from this analysis (Appendix A.)

**Mixing Zone (MZ).** One-quarter (1/4) of the stream volume of flow; length one-quarter (1/4) mile [10 CSR 20-7.031(4) (A)5.B. (III) (a)]. MZ Volume of Flow = 76.5 cfs, Dilution Factor = 18.6:1

**Zone of Initial Dilution (ZID).** One-tenth (0.1) of the mixing zone width volume of flow [10 CSR 20-7.031(4) (A)5.B. (III) (b)]. ZID Volume of Flow = 7.65 cfs, Dilution Factor = 2.8:1

### Permit Limits And Information

TMDL WATERSHED:  N W.L.A. STUDY CONDUCTED:  N DISINFECTION REQUIRED:  Y DISINFECTION WAIVER:  N  
(Y OR N) (Y OR N) (Y OR N) (Y, N, NA)

#### OUTFALL# 004

WET TEST (Y OR N):  Y FREQUENCY: ONCE/YEAR A.E.C. 36% LIMIT: NO SIGNIFICANT MORTALITY

PARAMETER	UNITS	MAXIMUM DAILY LIMIT	WEEKLY AVERAGE LIMIT	AVERAGE MONTHLY LIMIT	MONITORING FREQUENCY	SAMPLE TYPE
BIOCHEMICAL OXYGEN DEMAND (BOD <sub>5</sub> )	MG/L		45	30	WEEKLY	grab
NON-FILTERABLE RESIDUE	MG/L		45	30	WEEKLY	grab
PH	SU	6 - 9		6 - 9	WEEKLY	grab
FECAL COLIFORM	COL./100ML	1000		400	WEEKLY	grab
AMMONIA AS N (SUMMER) <sup>1</sup>	MG/L	23.3		11.6	WEEKLY	grab
AMMONIA AS N (WINTER) <sup>1</sup>	MG/L	47.6		23.7	WEEKLY	grab
TOTAL NITROGEN	MG/L			*	Monthly	grab
TOTAL PHOSPHOROUS	MG/L			*	Monthly	grab

\* - MONITORING REQUIREMENT ONLY

1 - SUMMER (APR 1 - OCT 31) AND WINTER (NOV 1 - MAR 31) SEASONS TAKEN FROM PREVIOUS VERSION OF WQRS [M. OSBORN, DATE: 1/14/02, REVISED: 2/28/03]

### Receiving Water Monitoring Requirements

#### Site S1.

PARAMETER(S)	SAMPLING FREQUENCY	SAMPLE TYPE	LOCATION
Dissolved Oxygen	Once/quarter	Grab	Immediately upstream of outfall
Ammonia Nitrogen	Once/quarter	Grab	
Non-filterable residue	Once/quarter	Grab	
Total nitrogen	Once/quarter	Grab	
Total Phosphorus	Once/quarter	Grab	



**Site S2.**

PARAMETER (S)	SAMPLING FREQUENCY	SAMPLE TYPE	LOCATION
Dissolved Oxygen	Once/quarter	Grab	One-quarter (¼) mile downstream of outfall
Ammonia Nitrogen	Once/quarter	Grab	
Non-filterable residue	Once/quarter	Grab	
Total nitrogen	Once/quarter	Grab	
Total Phosphorus	Once/quarter	Grab	

**Derivation and Discussion of Limits**

Wasteload allocations were calculated using water quality criteria and the dilution equation below:

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

Where C = downstream concentration  
 C<sub>s</sub> = upstream concentration  
 Q<sub>s</sub> = upstream flow (cfs)  
 C<sub>e</sub> = effluent concentration  
 Q<sub>e</sub> = effluent flow (cfs)

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 acute 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 monthly average 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).

- **Biochemical Oxygen Demand (BOD<sub>5</sub>)**. 30 mg/L monthly average, 45 mg/L weekly average [10 CSR 20-7.015(8)(B)1.]
- **Non-Filterable Residue (NFR)**. 30 mg/L monthly average, 45 mg/L weekly average [10 CSR 20-7.015(8)(B)1.]
- **pH**. pH shall be maintained in the range from six to nine (6 - 9) standard units [10 CSR 20-7.015(8)(B)2.]
- **Fecal Coliform**. 400 colonies/100 mL monthly average, 1000 colonies/100 mL daily maximum [10 CSR 20-7.015(8)(B)4.A.]

- **Ammonia as Nitrogen.** Due to the absence of ammonia criteria for waters designated as cool-water fisheries in Missouri's Water Quality Standards, general warm-water fishery ammonia criteria should apply [10 CSR 20-7.031, Table B]. Background Ammonia as Nitrogen for the Meramec River near Eureka, MO = 0.25 mg/L

Season	Temp (°C)	pH (SU)	Total Ammonia CCC (mg/L)	Total Ammonia CMC (mg/L)
Summer	26	7.8	1.2	14.0
Winter	6	7.8	2.1	16.4

$$C_e = ((Q_e + Q_s)C - (C_s * Q_s))/Q_e$$

Summer

Ammonia as Nitrogen CCC = 1.2/1.2 = 1.0 mg/L  
Ammonia as Nitrogen CMC = 14.0/1.2 = 11.7 mg/L

Chronic WLA:  $C_e = ((4.34 + 76.5)1.0 - (76.5 * 0.25))/4.34$   
 **$C_e = 14.2$  mg/L**

Acute WLA:  $C_e = ((4.34 + 7.65)11.7 - (7.65 * 0.25))/4.34$   
 $C_e = 31.9$  mg/L

$LTA_c = 14.2$  mg/L (0.527) = 7.48 [CV = 0.6, 99<sup>th</sup> Percentile]

MDL = 7.48 \* 3.11 = 23.3 mg/L [CV = 0.6, 99<sup>th</sup> Percentile]  
AML = 7.48 \* 1.55 = 11.6 mg/L [CV = 0.6, 95<sup>th</sup> Percentile, n = 4]

Winter

Ammonia as Nitrogen CCC = 2.1/1.2 = 1.8 mg/L  
Ammonia as Nitrogen CMC = 16.4/1.2 = 13.7 mg/L

Chronic WLA:  $C_e = ((4.34 + 76.5)1.8 - (76.5 * 0.25))/4.34$   
 **$C_e = 29.1$  mg/L**

Acute WLA:  $C_e = ((4.34 + 7.65)13.7 - (7.65 * 0.25))/4.34$   
 $C_e = 37.4$  mg/L

$LTA_c = 29.1$  mg/L (0.527) = 15.3 [CV = 0.6, 99<sup>th</sup> Percentile]

MDL = 15.3 \* 3.11 = 47.6 mg/L [CV = 0.6, 99<sup>th</sup> Percentile]  
AML = 15.3 \* 1.55 = 23.7 mg/L [CV = 0.6, 95<sup>th</sup> Percentile, n = 4]

Season	Maximum Daily Limit (mg/L)	Average Monthly Limit (mg/L)
Summer	23.3	11.6
Winter	47.6	23.7

Reviewer: John Hoke  
Date: 2/19/04  
Unit Chief: Richard J. Laux

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.



STANDARD CONDITIONS FOR NPDES PERMITS  
ISSUED BY  
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES  
MISSOURI CLEAN WATER COMMISSION  
REVISED  
AUGUST 1, 2014

SCHEDULE BEW-2  
PAGE 43 of 108

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 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 recurrence of the noncompliance.