

Missouri Clean Water Commission Meeting
Department of Natural Resources
Lewis and Clark State Office Building
LaCharrette/Nightingale Creek Conference Rooms
1101 Riverside Drive
Jefferson City, Missouri

January 12, 2011

**10 CSR 20-8.110 Engineering – Reports, Plans and Specifications
Regulation Public Hearing**

Issue: Public Hearing on the Proposed Amendment to 10 CSR 20-8.110, Engineering – Reports, Plans and Specifications regulation.

Background: In July 2008, Department staff convened a stakeholders group to review and amend the Engineering – Reports, Plans and Specifications regulation. It was proposed and accepted that the Chapter 8 Design Standards rules would be based upon the 2004 version of the “Recommended Standards for Wastewater Facilities” developed by the Wastewater Committee of the Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (commonly referred to as the 10 States Standards). Missouri is a contributing state to this nationally recognized standard. A draft amendment was completed in the summer of 2009. The Commission signed a Finding of Necessity for Rulemaking on March 3, 2010.

The Regulatory Impact Report (RIR) was on public notice from May 17, 2010 through July 16, 2010. The Department received one comment from the Department of Health and Senior Services. This comment did not influence the proposed rulemaking.

On October 15, 2010, the Proposed Amendment to 10 CSR 20-8.110, Engineering – Reports, Plans and Specifications, was placed on public notice. The public comment period is from October 15, 2010, date of publication in the *Missouri Register*, through January 19, 2011.

Recommended Action: No action is requested. This is an opportunity for staff, and the public, to present and comment on the proposed amendment to 10 CSR 20-8.110, Engineering – Reports, Plans and Specifications.

Suggested Motion Language: None, hearing only.

List of Attachments:

- Proposed rulemaking for 10 CSR 20-8.110, as published in the *Missouri Register* on October 15, 2010

(B) Articles listed in section (3) originating in an area not known to have Thousand Cankers Disease but transiting through an area known to have Thousand Cankers Disease will be considered to be regulated articles; and

(C) Regulated articles to be used for research purposes, at the discretion of the state entomologist, may move under a compliance agreement between the state entomologist and the Missouri recipient. At minimum, the compliance agreement shall require inspection of the regulated articles at the point of origin, a state phytosanitary certificate issued by the state plant regulatory official in the state of origin, and at least twenty-four (24) hours pre-shipment notification.

(6) Regulated articles transported in violation of this quarantine may be destroyed, or returned to the point of origin, at the discretion of the state entomologist. Common carriers or other carriers, persons, firms, or corporations who transport or move regulated articles in violation of this quarantine and these rules will be subject to the penalties named in section 263.180, RSMo, of the Missouri Plant Law.

(7) These rules are distinct from, and in addition to, any federal statute, regulation, or quarantine order addressing the interstate movement of articles from the known infested areas.

AUTHORITY: sections 263.040, 263.050, and 263.180, RSMo 2000. Emergency rule filed April 2, 2010, effective April 12, 2010, expires Jan. 19, 2011. Original rule filed Sept. 24, 2010.

PUBLIC COST: This proposed rule will not cost state agencies or political subdivisions more than five hundred dollars (\$500) in the aggregate.

PRIVATE COST: This proposed rule will not cost private entities more than five hundred dollars (\$500) in the aggregate.

NOTICE TO SUBMIT COMMENTS: Anyone may file a statement in support of or in opposition to this proposed rule with the Missouri Department of Agriculture, PO Box 630, Jefferson City, MO 65102. To be considered, comments must be received within thirty (30) days after publication of this notice in the Missouri Register. No public hearing is scheduled.

**Title 10—DEPARTMENT OF NATURAL RESOURCES
Division 20—Clean Water Commission
Chapter 8—Design Guides**

PROPOSED AMENDMENT

10 CSR 20-8.110 Engineering—Reports, Plans, and Specifications. The Missouri Department of Natural Resources (department) is amending the purpose statement, sections (1), (6), (7), and (8), and subsection (4)(B); adding a new subsection (1)(A), sections (2), (3), (4), and (5), and Figure 1; and deleting the editor's note, sections (2), (3), (5), and (9), and subsection (4)(A) of the rule in the *Code of State Regulations*.

PURPOSE: This amendment will update the rule to current industry practices. Providing specific and clear requirements for engineering reports, facility plans, plans, and specifications will increase understanding and efficiency of submitted and reviewed construction permit applications.

PURPOSE: The following criteria have been prepared as a guide for the preparation of engineering reports or facility plans and detail plans and specifications. This rule is to be used with rules 10 CSR 20-8.120[—]through 10 CSR 20-8.220 for the planning and design

of the complete treatment facility. This rule reflects the minimum requirements of the Missouri Clean Water Commission [as] in regard[s] to adequacy of design, submission of plans, approval of plans, and approval of completed [sewage works] wastewater treatment facilities. It is not reasonable or practical to include all aspects of design in these standards. The design engineer should obtain appropriate reference materials which include but are not limited to: copies of all ASTM International standards, design manuals such as Water Environment Federation's Manuals of Practice (MOPs), and other sewer and wastewater treatment design manuals that are considered as containing principles of accepted engineering practice. Deviation from these minimum requirements will be allowed where sufficient documentation is presented to justify the deviation. These criteria are taken largely from the 2004 edition of the Great Lakes-Upper Mississippi River Board of State [Sanitary Engineers] and Provincial Public Health and Environmental Managers Recommended Standards for [Sewage Works] Wastewater Facilities and are based on the best information presently available. These criteria were originally filed as 10 CSR 20-8.030. It is anticipated that they will be subject to review and revision periodically as additional information and methods appear. [Addenda or supplements to this publication will be furnished to consulting engineers and city engineers. If others desire to receive addenda or supplements, please advise the Clean Water Commission so that names can be added to the mailing list.]

(1) Definitions. Definitions as set forth in the Clean Water Law and 10 CSR 20-2.010 shall apply to those terms when used in this rule, unless the context clearly requires otherwise. Where the terms "shall" and "must" are used, they are to mean a mandatory requirement insofar as approval by the [agency] Missouri Department of Natural Resources (department) is concerned, unless justification is presented for deviation from the requirements. Other terms, such as "should," "recommend," "preferred," and the like, indicate [discretionary requirements on the part of the agency and deviations are subject to individual consideration] the preference of the department for consideration by the design engineer.

(A) Deviations. Deviations from these rules may be approved by the department when engineering justification satisfactory to the department is provided. Justification must substantially demonstrate in writing and through calculations that a variation(s) from the design rules will result in either at least equivalent or improved effectiveness. Deviations are subject to case-by-case review with individual project consideration.

[(2) Exceptions. This rule shall not apply to facilities designed for twenty-two thousand five hundred (22,500) gallons (85.4 m³) per day or less (see 10 CSR 20-8.020 for the requirements for those facilities).]

(2) Applicability. This rule shall apply to all facilities with a design flow of one hundred thousand (100,000) gallons (378.5 m³) per day or greater. This rule shall also apply to all facilities with a design flow of twenty-two thousand five hundred (22,500) gallons (85.2 m³) per day or greater until such time as 10 CSR 20-8.020 is amended.

[(3) Engineering services are performed in three (3) steps—engineering report or facilities plan; preparation of construction plans, specifications and contractual documents; and construction compliance, inspection, administration and acceptance. These services are generally performed by engineering firms in private practice but may be executed by municipal, state or federal agencies. All reports, plans and specifications should be submitted at least sixty (60) days prior to the date upon which action by the agency is desired,

or in accordance with NPDES or other schedules. The documents, at the appropriate times, should be submitted for formal approval and should include the engineer's report (facilities plan) and design drawings and specifications. For nongrant projects which are unusual or complex, it is suggested that the engineer meet with the appropriate regional office to discuss the project and that preliminary reports be submitted for review prior to the preparation of final plans and specifications. These documents are used by the owner in programming future action, by the agency to evaluate probable compliance with statutes and regulations, by bond attorneys and investment houses to develop and evaluate financing and by the news media. Preliminary reports and plans shall broadly describe existing problems; consider methods for alternate solutions including site and/or route selection; estimate capital and annual costs; and outline steps for further project implementation, including financing and approval by regulatory agencies. No approval for construction can be issued until final, detailed plans and specifications have been submitted to the agency and found to be satisfactory.]

(3) General.

(A) Engineering Services. Engineering services are performed in three (3) steps—

1. Engineering report or facility plan;
2. Preparation of construction plans and specifications; and
3. Contractual documents, construction compliance, inspection, administration, and acceptance.

(B) 10 CSR 20-8.110 Engineering—Reports, Plans, and Specifications covers the items in paragraphs (3)(A)1. and 2. above.

(C) All reports, plans, and specifications must be submitted at least one hundred eighty (180) calendar days prior to the date upon which action by the department is desired, or in accordance with a National Pollutant Discharge Elimination System (NPDES) permit or other departmental schedules. The documents, at the appropriate times, must be submitted for formal approval and should include the engineer's report or facility plan, design drawings, and specifications. Engineering reports or facility plans must be approved by the department prior to the submittal of the design drawings, specifications, and the appropriate permit applications and fees. For projects involving both collection systems and wastewater treatment facilities, the information required in subsection (4)(B) must be included in the facility plan. These documents are used by the owner in programming future action, by the department to evaluate probable compliance with statutes and regulations, and by bond attorneys and investment houses to develop and evaluate financing. Engineering reports and facility plans should broadly describe existing problems; consider methods for alternate solutions including site and/or route selection; estimate capital and annual costs; and outline steps for further project implementation, including financing and approval by the department and other agencies. No approval for construction can be issued until final detailed plans and specifications with the design engineer's imprint of his/her registration seal with the date and engineer's signature affixed have been submitted and found to be satisfactory by the department.

(D) Engineering reports and facility plans shall include a statement identifying the continuing authority, a contact person for the authority, and the continuing authority phone number and address, along with the design engineer's imprint of his/her registration seal with the date and engineer's signature affixed to the document.

[(4) Engineering Report or Facility Plan. For construction grant projects the federal regulations describe requirements

for the facility plan which must be met. The engineering report, for nongrant projects, assembles basic information; presents design criteria and assumptions; examines alternate projects with preliminary layouts and cost estimates; describes financing methods giving anticipated charges for users; reviews organizational and staffing requirements; offers a conclusion with a proposed project for client consideration; and outlines official actions and procedures to implement the project. The concept, including process description and sizing, factual data and controlling assumptions and considerations for the functional planning of sewerage facilities are presented for each process unit and for the whole system. These data form the continuing technical basis for detail design and preparation of construction plans and specifications. Architectural, structural, mechanical and electrical designs are usually excluded. Sketches may be desirable to aid in presentation of a project. Outline specifications of process units, special equipment, etc., are occasionally included.

(A) Format for Content and Presentation. It is urged that the following paragraphs be utilized as a guideline for content and presentation of the project engineering report to the agency for review and approval.

1. Title. The wastewater facilities report—collection, conveyance, processing and discharge of wastewater.

2. Letter of transmittal. A one (1) page letter typed on the firm's letterhead and bound into report should include submission of report to the client, statement of feasibility of recommended project, acknowledgment to those giving assistance and reference to project as outgrowth of approved area-wide wastewater management plans.

3. Title page. Title of project; municipality, county or other sponsoring agency; names of officials, managers, superintendents; name and address of firm preparing report; seal and signature of the professional engineer in charge of project.

4. Table of contents. (Number all pages; cross-reference by page number.) Section heading, chapter heading and sub-headings; maps; graphs; illustrations, exhibits; diagrams; appendices.

5. Summary. Highlight, very briefly, what was found from the study.

A. Findings. Population—present, design (when), ultimate; land use and zoning—portion per residential, commercial, industrial, greenbelt, etc.; wastewater characteristics and concentrations—portions of total hydraulic, organic and solids loading attributed to residential, commercial and industrial fractions; collection system projects—immediate needs to implement recommended project, deferred needs to complete recommended project and pump stations, force mains, appurtenances, etc.; selected process and site—characteristics of process expected for effluent quality and description of site, environmental assessment of selected process; receiving waters—existing water quality and quantity, classifications and downstream water uses and impact of project on receiving water; proposed project—total project costs, total annual expense requirements for debt service; operation, personnel and operation and nonpersonnel; finances—indicate financing requirements and typical annual charges; organization—administrative control necessary to implement project, carry through to completion, operate and maintain wastewater facility and system; and changes—alert client to situations that could alter recommended project.

B. Conclusions. Project(s) recommended to client for immediate construction, suggested financing program and other.

C. Recommendations. Summarized, step-by-step actions, for client to follow to implement conclusions—official acceptance of report; adoption of recommended project;

submission of report to agency for review and approval; authorization of engineering services for approved project (construction plans, specifications, contract documents, etc.); legal services; enabling ordinances, resolutions, etc., required; adoption of sewer-use ordinance; adoption of operating rules; financing program requirements; organization and administration (structure, personnel, employment, etc.); time schedules—implementation, construction, completion dates, reflecting applicable hearings, stipulations, abatement orders.

6. Introduction. Purpose—reasons for report and circumstances leading up to report; scope—coordination of recommended project with approved comprehensive master plan and guideline for developing the report.

7. Existing conditions and projections.

A. Planning period. Total period of time for which program is to be studied.

B. Land use. Existing area, expansion, annexation, intermunicipal service, ultimate planning area; drainage basin, portion covered; and residential, commercial and industrial land use, zoning, population densities, industrial types and concentrations.

C. Demographic and economic data. Population growth, trends, increase during design of life of facility (graph); assessed valuation, tax structure, tax rates, portions for residential, commercial, industrial property; employment, from within and outside service area; transportation systems, effect on commuter influx, exempt property (schools, colleges, churches, foundations, governmental agencies, etc.) and effect on project; and costs of present water and wastewater services.

D. General. Topography, general geology and effect on project; and meteorology, precipitation, runoff, flooding, etc. and effect on project.

E. Forecasts of flow and waste loads. Water consumption (total, unit, industrial); wastewater flow pattern, peaks, total design flow; physical, chemical and biological characteristics and concentrations; residential, commercial, industrial, infiltration/inflow fractions, considering organic, solids, toxic, aggressive, etc. substances; tabulate each fraction separately and summarize.

F. Local regulations. Existing ordinances and rules including defects and deficiencies, etc.; recommended amendments, revisions or cancellation and replacement; sewer-use ordinance (toxic, aggressive, volatile, etc. substances) surcharge based on volumes and concentration for industrial wastewaters; existing contracts and agreements (intermunicipal, etc.); and enforcement provisions including inspection, sampling, detection, penalties, etc.

8. Existing facilities evaluation.

A. Existing collection system. Inventory of existing sewers; isolation from water supply wells; adequacy to meet project needs (structural condition, hydraulic capacity tabulation); gauging and infiltration/inflow analysis; overflows and required maintenance, repairs, improvements and methods for control; outline repair, replacement and storm-water separation requirements; evaluation of costs for treating infiltration/inflow versus cost for rehabilitation of system; establish renovation priorities, if selected; present recommended annual program to renovate sewers; and indicate required annual expenditure.

B. Existing treatment plant site. Area for expansion, terrain, subsurface conditions; isolation from habitation; isolation from water supply structures; enclosures of units, odor control, landscaping, etc.; and flooding (predict elevation of twenty-five (25) and one hundred (100)-year flood stage).

C. Existing facilities. Tabulate capacities and adequacy

of units (wastewater treatment, sludge processing and sludge disposal); relationship and/or applicability to proposed project; age and condition; adaptability to different usages; structures to be retained, modified or demolished; and outfall.

D. Existing wastewater characteristics. Water consumption from records (total, unit, industrial); wastewater flow pattern, peaks, total design flow (verify accuracy of installed metering equipment); physical, chemical and biological characteristics and concentrations; residential, commercial, industrial, infiltration/inflow fractions, considering organic solids, toxic, aggressive, etc. substances; tabulate each fraction separately and summarize.

E. Evaluation of unsewered communities. Types of existing residential systems and their construction of deficiencies, operational problems and number of residents served.

9. Basic project development.

A. Proposed collection system. Inventory of proposed additions, isolation from water supply wells, reservoirs, facilities, etc.; area of service; unusual construction problems; utility interruption and traffic interference; restoration of pavements, lawns, etc.

B. Design wastewater characteristics. Character of wastewater necessary to insure amenability to process selected; need to pretreat industrial wastewater before discharge to sewers; portion of residential, commercial, industrial wastewater fractions to comprise projected growth.

C. Receiving water considerations. Upstream wastewater discharges; receiving water base flow; characteristics (concentrations) of receiving waters; downstream water uses including water supply, recreation, agricultural, industrial, etc.; impact of proposed discharge on receiving waters; tabulation of plant performance versus receiving water requirements; listing of effluent characteristics; and correlation of plant performance versus receiving water requirements. A determination from the Department of Natural Resources, Division of Geology and Land Survey, of whether the receiving stream is losing or gaining shall be included in the engineering report (facility plan).

D. Effluent limitations. Allowable concentration of pollutants in the effluent based on 10 CSR 20-7.015 Effluent Regulations.

E. Treatment plant site requirements. Compare advantages and disadvantages relative to cost, hydraulic requirements, flood control, accessibility, enclosure of units, odor control, landscaping, etc. and isolation with respect to potential nuisances and protection of water supply facilities.

F. Alternatives. Consider such items as regional solutions, optimum operation of existing facilities, flow and waste reduction, location of facilities, phased construction, necessary flexibility and reliability, sludge disposal, alternative treatment sites, alternative collection and treatment processes and institutional arrangements.

G. Alternative process and sites. Describe and delineate (line diagrams); preliminary design for cost estimates; estimates of total project cost (dated, keyed to construction cost index, escalated, etc.); advantages and disadvantages of each; individual differences, requirements, limitations; characteristics of process output; comparison of process performances; environmental assessment of each (including both primary and secondary impacts); operation and maintenance expense and energy requirements; and annual expense requirements (tabulation of annual operation, maintenance, personnel, debt obligation for each alternate).

H. Selected process and site. Identify and justify process and site selected; adaptability to meet initial and future needs; environmental assessment; outfall location;

and describe immediate and deferred construction.

I. *Project financing.* Review applicable, financing methods; effect of state and federal assistance; assessment (a combination of methods should most probably be applied to distribute cost and expenses as equitably as possible in relation to benefit received) by valuation, front foot, area unit or other benefit; charges (a combination of methods should most probably be applied to distribute cost and expenses as equitably as possible in relation to benefit received) by connection, occupancy, readiness-to-serve, water consumption, industrial wastewater discharge, etc.; existing debt service requirements; bond retirement schedule; tabulate all expenses; show how representative properties and users are to be affected; and show anticipated typical annual charge to user and nonuser.

J. *Legal and other considerations.* Needed enabling legislation, ordinances, rules; statutory requirements and limitations, contractual considerations for intermunicipal cooperation; and public information and education.]

(4) Engineering Report or Facility Plan.

(A) General.

1. The engineering report or facility plan identifies and evaluates wastewater related problems; assembles basic information; presents criteria and assumptions; examines alternate projects, with preliminary layouts and cost estimates; describes financing methods; sets forth anticipated charges for users; reviews organizational and staffing requirements; offers a conclusion with a proposed project for client consideration; and outlines official actions and procedures to implement the project. The planning document must include sufficient detail to demonstrate that the proposed project meets applicable criteria.

2. The overall plan, including process description and sizing, factual data, and controlling assumptions and considerations for the functional planning of wastewater facilities, is presented for each process unit and for the whole system. These data form the continuing technical basis for the detailed design and preparation of construction plans and specifications.

3. Architectural, structural, mechanical, and electrical designs are usually excluded. Sketches may be desirable to aid in presentation of a project. Outline specifications of process units, special equipment, etc., are occasionally included.

4. Engineering reports must be completed for projects involving gravity sewers, pressure sewer systems, wastewater pumping stations, and force mains. Facility plans must be completed for projects involving wastewater treatment facility projects and projects receiving funding through the grant and loan programs under 10 CSR 20-4.

A. Unless required by the department, an engineering report will not have to be submitted for projects limited to only eight-inch (8") (20 cm) gravity sewer extensions.

(B) Engineering Reports. Engineering reports shall contain the following information and other pertinent information as required by the department:

1. Problem defined. Description of the existing system must include an evaluation of the conditions and problems needing correction;

2. Flow loads. The existing and design average and peak flows and waste load must be established. The basis of the projection of initial and future flows and waste load must be included and must reflect the existing, or initial service area, and the anticipated future service area. Flow loading information and data needed for new facilities are included in paragraph (4)(C)4. of this rule;

3. Impact on existing wastewater facilities. The impact of the proposed project on all existing wastewater facilities, including gravity sewers, pump stations, and treatment facilities, must be evaluated. Refer to 10 CSR 20-8.120 and 10 CSR 20-8.130;

4. Project description. A written description of the project

is required;

5. Drawings. Drawings or sketches identifying the site of the project and anticipated location and alignment of proposed facilities are required;

6. Technical information and design criteria. All technical and design information used to design the collection system(s), pump station(s), etc., must be provided either in the engineering report or in the summary of design and shall include, at a minimum, design tabulation flow, size, and velocities; all pump station calculations including energy requirements; special appurtenances; stream crossings; and system map (report size). Outline unusual specifications, construction materials, and construction methods; maps, photographs, and diagrams; and other supporting data needed to describe the system. If an engineering report is not required, this information must be included in the summary of design. Refer to 10 CSR 20-8.110(5);

7. Site information. Project site information should include topography, soils, geologic conditions, depth to bedrock, groundwater level, floodway or floodplain considerations, distance to water supply structures, roads, residences, and other pertinent site information; and

8. It is preferred that any request for a deviation from 10 CSR 20-8 be addressed along with the engineering justifications in the engineering report. Otherwise, all requests for deviations from 10 CSR 20-8.120 and 10 CSR 20-8.130 must accompany the plans and specifications.

(C) Facility Plans. Facility plans shall contain the following and other pertinent information as required by the department:

1. Problem evaluation and existing facility review—

A. Descriptions of existing system, including condition and evaluation of problems needing correction; and

B. Summary of existing and previous local and regional wastewater facility and related planning documents, if applicable;

2. Planning and service area. Drawings identifying the planning area, the existing and potential future service area, the site of the project, and anticipated location and alignment of proposed facilities are required;

3. Population projection and planning period. Present and predicted population shall be based on a twenty (20)-year planning period. Phased construction of wastewater facilities shall be considered in rapid growth areas. Sewers and other facilities with a design life in excess of twenty (20) years shall be designed for the extended period;

4. Hydraulic capacity.

A. Flow definitions and identification. The following flows for the design year shall be identified and used as a basis for design for sewers, pump stations, wastewater treatment facilities, treatment units, and other wastewater handling facilities. Where any of the terms defined in this section are used in these design standards, the definition contained in this section applies.

(I) Design average flow—The design average flow is the average of the daily volumes to be received for a continuous twelve (12)-month period expressed as a volume per unit time. However, the design average flow for facilities having critical seasonal high hydraulic loading periods (e.g., recreational areas, campuses, and industrial facilities) shall be based on the daily average flow during the seasonal period.

(II) Design maximum daily flow—The design maximum daily flow is the largest volume of flow to be received during a continuous twenty-four (24)-hour period expressed as a volume per unit time.

(III) Design peak hourly flow—The design peak hourly flow is the largest volume of flow to be received during a one (1)-hour period expressed as a volume per unit time.

(IV) Design peak instantaneous flow—The design peak instantaneous flow is the instantaneous maximum flow rate to be received.

B. Hydraulic capacity for existing collection and treatment systems.

(I) Projections shall be made from actual flow data to the extent possible.

(II) The probable degree of accuracy of data and projections shall be evaluated. This reliability estimation shall include an evaluation of the accuracy of existing data, based on no less than one (1) year of data, as well as an evaluation of the reliability of estimates of flow reduction anticipated due to infiltration/inflow (I/I) reduction or flow increases due to elimination of sewer overflows and backups.

(III) Critical data and methodology used shall be included. Graphical displays of critical peak wet weather flow data (refer to parts (4)(C)4.A.(II), (III), and (IV) of this rule) shall be included for a sustained wet weather flow period of significance to the project.

C. Hydraulic capacity for new collection and treatment systems.

(I) The sizing of wastewater facilities receiving flows from new wastewater collection systems shall be based on an average daily flow of one hundred (100) gallons (0.38 m³) per capita per day plus wastewater flow from industrial facilities and major institutional and commercial facilities unless water use data or other justification upon which to better estimate flow is provided.

(II) The one hundred (100) gallons (0.38 m³) per capita per day figure shall be used, which, in conjunction with a peaking factor from the following Figure 1, included herein, is intended to cover normal infiltration for systems built with modern construction techniques. Refer to 10 CSR 20-8.120.

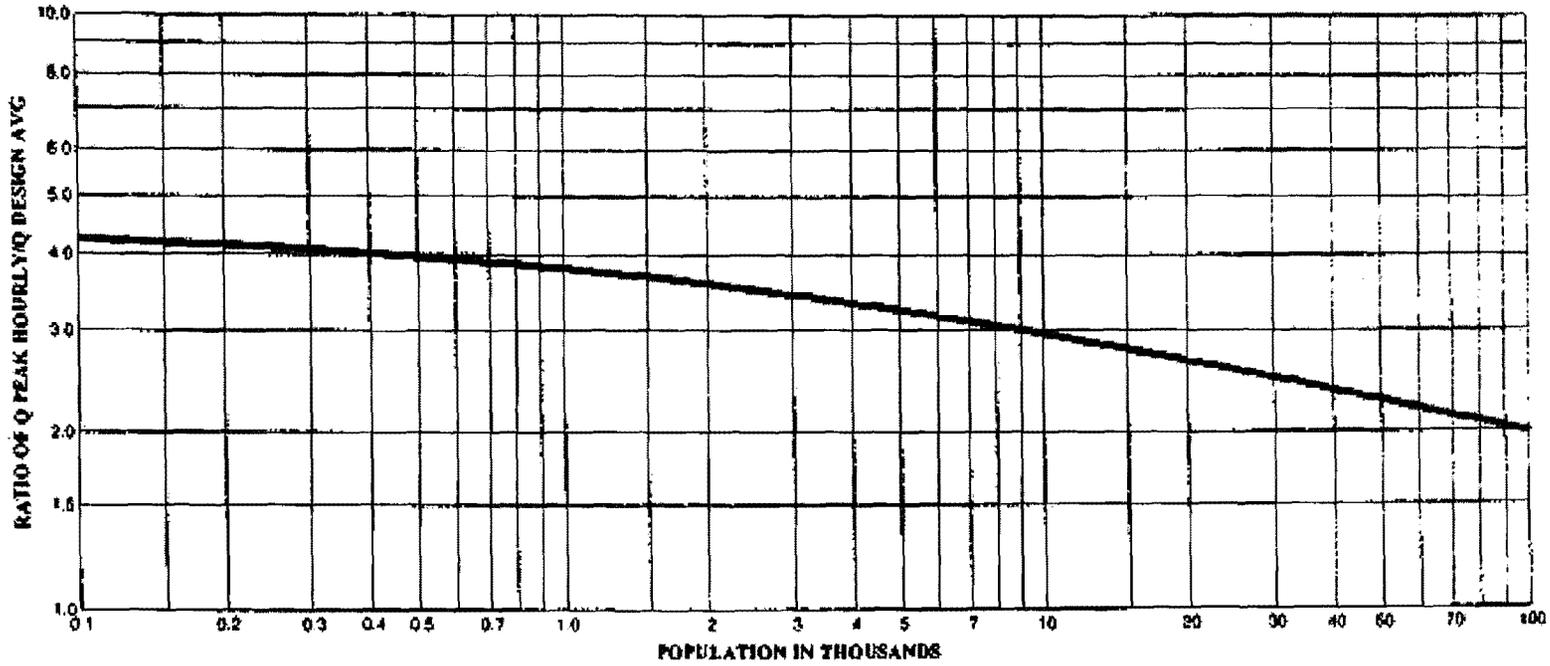


Figure 1. Ratio of peak hourly flow to design average flow.

where

Q peak hourly = Maximum Rate of Wastewater Flow (Peak Hourly Flow)

Q design avg = Design Average Daily Wastewater Flow

$$\text{Equation: } Q \text{ Peak Hourly} / Q \text{ Design Avg} = \frac{18 + \sqrt{P}}{4 + \sqrt{P}}$$

where

P = population in thousands

(III) If the new collection system is to serve existing development the likelihood of infiltration/inflow (I/I) contributions from existing service lines and non-wastewater connections to those services lines shall be evaluated and wastewater facilities designed accordingly.

D. Combined sewer interceptors. In addition to the above requirements, interceptors for combined sewers shall have capacity to receive sufficient quantity of combined wastewater for transport to treatment facilities to ensure attainment of the appropriate water quality standards;

5. Organic capacity.

A. Organic load definitions and identification. The following organic loads for the design year shall be identified and used as a basis for design of wastewater treatment facilities. Where any of the terms defined in this section are used in these design standards, the definition contained in this section applies.

(I) Biochemical Oxygen Demand—The five (5)-day Biochemical Oxygen Demand (BOD_5) is defined as the amount of oxygen required to stabilize biodegradable organic matter under aerobic conditions within a five (5)-day period.

(a) Total five (5)-day Biochemical Oxygen Demand ($TBOD_5$) is equivalent to BOD_5 and is sometimes used in order to differentiate carbonaceous plus nitrogenous oxygen demand from strictly carbonaceous oxygen demand.

(b) The carbonaceous five (5)-day Biochemical Oxygen Demand ($CBOD_5$) is defined as BOD_5 less the nitrogenous oxygen demand of the wastewater.

(II) Design average BOD_5 —The design average BOD_5 is generally the average of the organic load received for a continuous twelve (12)-month period for the design year expressed as weight per day. However, the design average BOD_5 for facilities having critical seasonal high loading periods (e.g., recreational areas, campuses, and industrial facilities) shall be based on the daily average BOD_5 during the seasonal period.

(III) Design maximum day BOD_5 —The design maximum day BOD_5 is the largest amount of organic load to be received during a continuous twenty-four (24)-hour period expressed as weight per day.

(IV) Design peak hourly BOD_5 —The design peak hourly BOD_5 is the largest amount of organic load to be received during a one (1)-hour period expressed as weight per day.

B. Design of organic capacity of wastewater treatment facilities to serve existing collection systems.

(I) Projections shall be made from actual wasteload data to the extent possible.

(II) Projections shall be compared to subparagraph (4)(C)5.C of this rule and an accounting made for significant variations from those values.

(III) Impact of industrial sources shall be documented.

C. Organic capacity of wastewater treatment facilities to serve new collection systems.

(I) Domestic wastewater treatment design shall be on the basis of at least 0.17 pounds (0.08 kg) of BOD_5 per capita per day and 0.20 pounds (0.09 kg) of suspended solids per capita per day, unless information is submitted to justify alternate designs.

(II) Impact of industrial sources shall be documented.

(III) Data from similar municipalities may be utilized in the case of new systems. However, thorough investigation that is adequately documented shall be provided to the department to establish the reliability and applicability of such data;

6. Wastewater treatment facility design capacity. The wastewater treatment facility design capacity is the design average flow at the design average BOD_5 . Refer to paragraphs (4)(C)4. and (4)(C)5. of this rule for peaking factors that will be required.

A. Engineering criteria. Engineering criteria and assumptions used in the design of the project shall be provided in the facility plan. Refer to subsection (4)(D) of this rule for additional information.

B. If the project includes the land application of wastewater, the requirements in 10 CSR 20-8.220 must be included with the facility plan;

7. Initial alternative development. For projects receiving funding through the grant and loan programs in 10 CSR 20-4, the process of selection of wastewater treatment and collection system alternatives for detailed evaluation shall be discussed. All wastewater management alternatives considered and the basis for the engineering judgment for selection of the alternatives chosen for detailed evaluation shall be included;

8. Detailed alternative evaluation. The following shall be included for the alternatives to be evaluated in detail.

A. Sewer system revisions. Proposed revisions to the existing sewer system including adequacy of portions not being changed by the project.

B. Wet weather flows. Facilities to transport and treat wet weather flows in a manner that complies with state and local regulations must be provided. The design of wastewater treatment facilities and sewers shall provide for transportation and treatment of all flows including wet weather flows unless the owner's National Pollutant Discharge Elimination System (NPDES) permit authorizes a bypass.

C. Site evaluation. When a site must be used which is critical with respect to these items, appropriate measures shall be taken to minimize adverse impacts.

(I) Compatibility of the treatment process with the present and planned future land use, including noise, potential odors, air quality, and anticipated sludge processing and disposal techniques, shall be considered. Non-aerated lagoons should not be used if excessive sulfate is present in the wastewater. Wastewater treatment facilities should be separate from habitation or any area likely to be built up within a reasonable future period and shall be separated in accordance with state and local requirements.

(II) Zoning and other land use restrictions shall be identified.

(III) An evaluation of the accessibility and topography of the site shall be submitted.

(IV) Area for future plant expansion shall be identified.

(V) Direction of prevailing wind shall be identified.

(VI) Flood considerations, including the twenty-five (25)-year and one hundred (100)-year flood levels, impact on floodplain and floodway, and compliance with applicable regulations in 10 CSR 20-8 regarding construction in flood-prone areas, shall be evaluated.

(VII) Geologic information, depth to bedrock, karst features, or other geologic considerations of significance to the project shall be included. A copy of a geological site evaluation from the department's Division of Geology and Land Survey providing stream determinations (gaining or losing) must be included for all new wastewater treatment facilities. A copy of a geological site evaluation providing site collapse and overall potentials from the department's Division of Geology and Land Survey must be included for all earthen basin structures. Earthen basin structures shall not be located in areas receiving a severe overall geological collapse potential rating.

(VIII) Protection of groundwater including public and private wells is of utmost importance. Demonstration that protection will be provided must be included. If the proposed wastewater facilities will be near a water source or other water facility, as determined by the department's Division of Geology and Land Survey or by the department's Public Drinking Water Branch addressing the allowable distance between these wastewater facilities and the water source must be included with the facility plan. Refer to 10 CSR 20-8.130 and 10 CSR 20-8.140.

(IX) Soil type and suitability for construction and depth to normal and seasonal high groundwater shall be determined.

(X) The location, depth, and discharge point of any

field file in the immediate area of the proposed site shall be identified.

(XI) Present and known future effluent quality and monitoring requirements determined by the department shall be included. Refer to subparagraph (4)(C)8.N. of this rule.

(XII) Access to receiving stream for the outfall line shall be discussed and displayed.

(XIII) A preliminary assessment of site availability shall be included.

D. Unit sizing. Unit operation and preliminary unit process sizing and basis shall be discussed.

E. Flow diagram. A preliminary flow diagram of treatment facilities including all recycle flows shall be provided.

F. Emergency operation. Emergency operation requirements as outlined in 10 CSR 20-8.130 and 10 CSR 20-8.140 shall be discussed and provided.

G. The no-discharge option must be examined and included as an alternative in the facility plan.

H. Technology not included in these standards. 10 CSR 20-8.140 outlines procedures for introducing and obtaining approval to use technology not included in these standards. Proposals to use technology not included in these standards must address the requirements of 10 CSR 20-8.140.

I. Biosolids. The solids disposal options considered and method selected must be included. This is critical to completion of a successful project. Compliance with requirements of 10 CSR 20-8.170 and any conditions in the owner's National Pollutant Discharge Elimination System (NPDES) permit must be assured.

J. Treatment during construction. A plan for the method and level of treatment to be achieved during construction shall be developed and included in the facility plan that must be submitted to the department for review and approval. This approved treatment plan must be implemented by inclusion in the plans and specifications to be bid for the project. Refer to paragraph (5)(A)5. and subsection (7)(D) of this rule.

K. Operation and maintenance. Portions of the project which involve complex operation or maintenance requirements shall be identified, including laboratory requirements for operation, industrial sampling, and self monitoring.

L. Cost estimates. Cost estimates for capital and operation and maintenance (including basis) must be included for projects receiving funding through the grant and loan programs in 10 CSR 20-4.

M. Environmental review.

(I) Compliance with planning requirements of local government agencies must be documented.

(II) Any additional environmental information meeting the criteria in 10 CSR 20-4.050, for projects receiving funding through the state grant and loan programs.

N. Water quality reports. Include all reviews, studies, or reports required by 10 CSR 20-7, Water Quality, and approved by the department. Any information or sections in an approved study or report required by 10 CSR 20-7 that addresses the requirements in subsection (4)(C) of this rule can be incorporated into the facility plan in place of these sections;

9. Final project selection. The project selected from the alternatives considered under paragraph (4)(C)10. of this rule shall be set forth in the final facility plan document to be forwarded to the department for review and approval, including the financing considerations and recommendations for implementation of the plan; and

10. It is preferred that any request for a deviation from 10 CSR 20-8 be addressed along with the engineering justifications in the facility plan. Otherwise, all requests for deviations along with the engineering justification from 10 CSR 20-8.120 through 10 CSR 20-8.220 must accompany the plans and specifications.

((B))/(D) Appendices. Technical Information and Design Criteria. Due to the complexity of wastewater facilities or funding issues,

the following information shall be included upon the request of the department. All system design information can be submitted as, and for all review purposes will be considered, preliminary design data.

[1. Collection system. Design tabulation—flow, size, velocities, etc.; regulator or overflow design; pump station calculations including energy requirements; special appurtenances; stream crossings; and system map (report size).]

[2.]1. Process facilities. Criteria selection and basis; hydraulic and organic loadings—minimum, average, maximum, and effect (wastewater and sludge processes); unit dimensions; rates and velocities; detentions concentrations; recycle; chemical additive control; physical control and flow metering; removals; effluent concentrations, etc. (include a separate tabulation for each unit to handle solid and liquid fractions); energy requirement; and flexibility.

[3.]2. Process diagrams. Process configuration, interconnecting piping, processing, flexibility[, etc.]; hydraulic profile; organic loading profile; solids profile; solids control system; and flow diagram with capacities, etc.

[4.]3. Laboratory. Physical and chemical tests and frequency to control process; time for testing; space and equipment requirements; and personnel requirements—number, type, qualifications, salaries, benefits (tabulate), and a brief description of the laboratory facility. See 10 CSR 20-8.140.

[5.]4. Operation and maintenance. Routine special maintenance duties; time requirements; tools, spare parts, equipment, vehicles, safety[, etc.]; maintenance workspace and storage; and personnel requirements—number, type, qualifications, training, salaries, benefits (tabulate).

[6. Office space for administrative personnel and records.

7. Personnel services. Locker rooms and lunch rooms.]

[8.]5. Chemical control. Processes needing chemical addition; chemicals and feed equipment; tabulation of amounts and unit and total costs.

[9.]6. Collection systems control. Cleaning and maintenance; regulator and overflow inspection and repair; flow gauging; industrial sampling and surveillance; ordinance enforcement; equipment requirements; trouble-call investigation; and personnel requirements—number, type, qualifications, salaries, benefits, training (tabulate).

[10.]7. Control summary. Personnel; equipment; chemicals, utilities, list power requirements of major units; and summation.

[11. Support data. Outline unusual specifications, construction materials and construction methods; maps, photographs, diagrams; and other.]

[[5] Preliminary Design Review. On all grant projects the consulting engineer shall submit the project for review at approximately a twenty percent (20%) design stage. The design information to be submitted shall include a layout of the study area delineating all proposed improvements, including subareas, with contributing flows and design populations. All calculations regarding sizing of lift stations and treatment plan units shall also be included. A conference between the consultant and the review engineer may be arranged to discuss the project.]

(5) Summary of Design. A summary of design shall accompany the plans and specifications and shall include the following:

(A) Flow and waste projections including design and peak hydraulic and organic loadings shall be provided for sewers, pump stations, and wastewater treatment facilities. Information shall be submitted to verify adequate downstream capacity of sewers, pump stations, and wastewater treatment and sludge handling unit(s);

(B) Type and size of individual process units including unit dimensions; rates and velocities; detention times; concentrations; recycle; chemical additive control; physical control, flexibility,

and flow metering;

(C) Show process diagrams, including flow diagrams with capacities;

(D) Expected removal rates and concentrations of permitted effluent parameters in the discharge from the wastewater treatment facility, including a separate tabulation for each unit to handle solid and liquid fractions;

(E) Design calculations, tabulations, assumptions, and deviations from 10 CSR 20-8.120 through 10 CSR 20-8.220 used in the design of the system(s);

(F) Include unusual specifications, construction materials, and construction methods; maps, photographs, diagrams; and other support data needed to describe the system; and

(G) Unless required in 10 CSR 20-8.120 through 10 CSR 20-8.220, specific design calculations for the architectural, structural, and mechanical components of a system do not have to be included with the design criteria.

(6) Plans.

(A) General.

1. One (1) set of drawings shall be submitted to the department for review. In addition to the set of drawings, an electronic version of the plans can be submitted to assist in the review. Additional sets of drawings may be required by the department for final approval.

2. **Plan title.** All plans for [sewage works] wastewater facilities shall bear a suitable title showing the name of the municipality, sewer district, or institution; and shall show the scale in feet, a graphical scale, the north point, [data] date, and the name of the engineer, certificate number, and imprint of his/her registration seal with the engineer's signature. [A space should be provided for signature and/or approval stamp of the appropriate reviewing and approving officials and/or agencies.]

3. **Plan format.** The plans shall be clear and legible (suitable for microfilming or scanning). They shall be drawn to [a] scale, which will permit all necessary information to be plainly shown for review and suitable for the contracting and construction of the facilities. [The size of the plans generally should not be larger than thirty by forty-two inches (30" x 42") (76 cm x 107 cm).]

A. To allow for microfilming or scanning, plans must not be smaller than twenty-four inches by thirty-six inches (24" x 36") (61 cm x 91 cm) or larger than thirty-six inches by forty-eight inches (36" x 48") (91.4 cm x 122 cm). Datum used [should] shall be indicated. Locations and logs of test borings, when [made] required, shall be shown on the plans. Test boring logs must be included on the plans or in the specifications as an appendix. Blueprints shall not be submitted.

4. **Plan contents.** Detail plans shall consist of—plan views, elevations, sections, and supplementary views which, together with the specifications and general layouts, provide the working information for the contract and construction of the [works] facilities. They shall also include dimensions and relative elevations of structures, the location and outline form of equipment, location and size of piping, water levels, and ground elevations.

5. **Operation during construction.** Project construction documents shall specify the procedure for operation during construction that complies with the plan required by subparagraph (4)(C)8.J. and subsection (7)(D) of this rule.

(B) Plans of Sewers.

1. **General plan.** A [comprehensive] plan of [the] existing and proposed sewers shall be submitted for projects involving new sewer systems and substantial additions to existing systems. This plan shall show the following:

A. Geographical features.

(I) **Topography and elevations.** Existing or proposed streets and all streams or water surfaces shall be clearly shown. Contour lines at suitable intervals should be included.

(II) **Streams.** The direction of flow in all streams and high and low water elevations of all water surfaces [at sewer outlets] and overflows shall be shown.

(III) **Boundaries.** The boundary lines of the municipality [and] or the sewer district [or] and the area to be sewered shall be shown[.]; and

B. **Sewers.** The plan shall show the location, size, and direction of flow of all existing and proposed sanitary and combined sewers draining to the treatment [works] facility concerned.

2. **Detail plans.** Detail plans shall be submitted. Profiles [should] shall have a horizontal scale of not more than one hundred feet (100') to the inch (12 m to the cm) and a vertical scale of not more than ten feet (10') to the inch ([12 dm] 1.2 m to the cm). Plan views should be drawn to a corresponding horizontal scale and must be shown on the same sheet. Plans and profiles shall show—

A. Location of streets and sewers;

B. Line of ground surface, pipe size, length between manholes, invert and surface elevation at each manhole, grade of sewer between each two (2) adjacent manholes, [and] pipe material and type, and where special construction features are required. All manholes shall be numbered on the plan and correspondingly numbered on the profile[.];

C. Where there is any question of the sewer being sufficiently deep to serve any residence, the elevation and location of the basement floor shall be plotted on the profile of the sewer which is to serve the house in question. The engineer shall state that all sewers are sufficiently deep to serve adjacent basements except where otherwise noted on the plans;

[C./D.] Locations of all special features such as inverted siphons, concrete encasements, elevated sewers, etc.;

[D./E.] All known existing structures and utilities both above and below ground, which might interfere with the proposed construction[,] or require isolation setback, particularly water mains[,] and water supply structures (i.e., wells, clear wells, basins, etc.), gas mains [and], storm drains, and telephone, cable, and power conduits; and

[E./F.] Special detail drawings, made to a scale to clearly show the nature of the design, [and] shall be furnished to show the following particulars:

(I) [a]All stream crossings [and sewer outlets,] with elevations of the stream bed and [of normal and extreme] high, normal, and low water levels; and

(II) [d]Details of all special sewer joints and cross-sections; details of all sewer appurtenances such as manholes, lamp-holes, inspection chambers, inverted siphons, regulators, tide gates, and elevated sewers.

(C) Plans of [Sewage] Wastewater Pumping Stations.

1. **Location plan.** A plan shall be submitted for projects involving construction or revision of pumping stations. This plan shall show the following: the location and extent of the tributary area; any municipal boundaries with the tributary area; the location of the pumping station and force main; and pertinent elevations.

2. **Detail plans.** Detail plans shall be submitted showing the following, where applicable:

A. Topography of the site;

B. Existing pumping station;

C. Proposed pumping station, including provisions for installation of future pumps [or ejectors];

D. Elevation of high water at the site and maximum elevation of [sewage] wastewater in the collection system upon occasion of power failure;

E. Maximum hydraulic gradient in downstream gravity sewers when all installed pumps are in operation; and

F. Test boring and groundwater elevations.

(D) Plans of [Sewage] Wastewater Treatment Plants.

1. **Location plan.**

A. A plan shall be submitted showing the [sewage] wastewater treatment plant in relation to the remainder of the system.

B. Sufficient topographic features shall be included to indicate its location with relation to streams and the point of discharge of treated effluent.

2. General layout. Layouts of the proposed [sewage] wastewater treatment plant shall be submitted showing []—

A. [t/Topography of the site;

B. [s/Size and location of plant structures;

C. [s/Schematic flow diagram(s) showing the flow through various plant units and [for the various] showing utility systems serving the plant processes;

D. [p/Piping, including any arrangement for bypassing individual units; materials handled and direction of flow through pipes shall be shown;

E. [h/Hydraulic profiles showing the flow of [sewage] wastewater, supernatant [liquid] liquor, and sludge; and

F. [t/Test borings[;] and groundwater elevations shall be provided.

3. Detail plans. Detail plans shall show the following, unless otherwise covered by the specifications or [engineer's reports—] facility plan:

A. [l/Location, dimensions, and elevations of all existing and proposed plant facilities;

B. [e/Elevations of high and low water level of the body of water to which the plant effluent is to be discharged;

C. [t/Type, size, pertinent features, and operating capacity of all pumps, blowers, motors, and other mechanical devices;

D. [m/Minimum, design average, and [maximum] peak hourly hydraulic flow in profile; and

E. [a/Adequate description of any other features pertinent to the design.

(7) Specifications.

(A) Complete technical specifications shall be submitted for the construction of sewers, [sewage] wastewater pumping stations, [sewage] wastewater treatment plants, and all appurtenances and shall accompany the plans.

(B) The specifications accompanying construction drawings shall include, but not be limited to, all construction information not shown on the drawings which is necessary to inform the builder, in detail, of the design requirements [as to] for the quality of materials, [and] workmanship, and fabrication of the project [and].

(C) The specifications shall also include: the type, size, strength, operating characteristics, and rating of equipment; allowable infiltration; the complete requirements for all mechanical and electrical equipment, including machinery, valves, piping, and jointing of pipe; electrical apparatus, wiring, instrumentation, and meters; laboratory fixtures and equipment; operating tools; construction materials; special filter materials such as stone, sand, gravel, or slag; miscellaneous appurtenances; chemicals when used; instructions for testing materials and equipment as necessary to meet design standards; and performance tests for the completed [works] facilities and component units. It is suggested that these performance tests be conducted at design load conditions wherever practical.

(D) Operation During Construction. Specifications shall contain a program for keeping existing wastewater treatment plant units in operation during construction of plant additions. Should it be necessary to take plant units out of operation, specifications shall include detailed construction requirements and schedules to avoid unacceptable temporary water quality degradation in accordance with subparagraph (4)(C)8.J. and paragraph (5)(A)5. of this rule.

(8) Revisions to Approved Plans. Any deviations from approved plans or specifications affecting capacity, flow, system layout, operation of units, or point of discharge shall be approved by the department in writing before such changes are made. Plans or specifications so revised should, therefore, be submitted [therefore,] well in advance of any construction work which will be affected by [the]

such changes, to permit sufficient time for review and approval. Structural revisions or other minor changes not affecting capacities, flows, or operation will be permitted during construction without approval. As[-] built plans clearly showing the alterations shall be submitted to the [agency] department at the completion of the work.

[(9) Operation During Construction. Specifications shall contain a program for keeping existing treatment plant units in operation during construction of plant additions. Should it be necessary to take plant units out of operation, a shutdown schedule which will minimize pollutional effects on the receiving stream shall be reviewed and approved in advance by the agency and shall be adhered to.]

AUTHORITY: section 644.026, RSMo [1986] 2000. Original rule filed Aug. 10, 1978, effective March 11, 1979. Amended: Filed Sept. 14, 2010.

PUBLIC COST: This proposed amendment will increase the department work hours without an increase in employees. It is estimated that the department will review one hundred (100) engineering reports and fourteen (14) facility plans per year that will require revisions and additional education per the amended rule. As consultants become more familiar and understand the requirements of the proposed rule, a decrease in costs and work hours will occur over time. This proposed amendment will cost the department and public entities a total estimate of one hundred seventy-two thousand one hundred sixteen dollars (\$172,116) for three (3) years after this rule becomes effective.

PRIVATE COST: This proposed amendment will cost private entities a total estimate of one hundred seventy-four thousand one hundred ninety-four dollars (\$174,194) for three (3) years after this rule becomes effective.

NOTICE OF PUBLIC HEARING AND NOTICE TO SUBMIT COMMENTS: Anyone may file a statement in support of or in opposition to this proposed amendment with the Department of Natural Resources, Water Protection Program, Emily Lyon, PO Box 176, Jefferson City, MO 65102 or hand-delivered to the Lewis and Clark State Office Building, 1101 Riverside Drive, Jefferson City, Missouri. Comments may be sent with name and address through email to emily.lyon@dnr.mo.gov. Public comments must be received by January 19, 2011. The Missouri Clean Water Commission will hold a public hearing on this proposed amendment at 9:00 a.m., January 12, 2011, at the Lewis and Clark State Office Building, La Charrette & Nightingale Creek Conference Room, 1101 Riverside Drive, Jefferson City, Missouri 65102.

FISCAL NOTE
PUBLIC COST

- I. Department Title: Department of Natural Resources
Division Title: Clean Water Commission
Chapter Title: Engineering – Reports, Plans and Specifications

Rule Number and Name:	10 CSR 20-8-110 Engineering - Reports, Plans and Specifications
Type of Rulemaking:	Proposed Rule Amendment

II. SUMMARY OF FISCAL IMPACT

Affected Agency or Political Subdivision	Estimated Cost of Compliance in the Aggregate
Department of Natural Resources	The cost of compliance is \$34,594
Publicly Owned Treatment Works (POTWs) which includes Municipalities and Sewer Districts	The cost of compliance is \$137,522
Department and POTWs	The total cost of compliance is \$172,116

Note: Aggregate costs rounded.

III. WORKSHEET

DNR Cost

	FY 2012	FY 2013	FY 2014
I. Fund Costs by Category			
Salaries - Environmental Engineer II	\$14,304.00	\$7,661.00	\$0.00
Fringe Benefits - 0.48	\$6,956.00	\$3,726.00	\$0.00
Equipment and Expense	\$911.00	\$1,036.00	\$0.00
Local Assistance	\$0.00	\$0.00	\$0.00
Other Fund Costs	\$0.00	\$0.00	\$0.00
TOTAL FUND COSTS - ALL CATEGORIES	\$22,171.00	\$12,423.00	\$0.00
	\$0.00	\$0.00	\$0.00
ESTIMATED NET EFFECT ON FUND	(\$22,171.00)	(\$12,423.00)	\$0.00

Note: FY 2012 salary is based on a 0.25 FTE (524 hours of 2,080 annual hours = 0.25 FTE).
FY 2013 salary is based on a 0.13 FTE (262 hours of 2,080 annual hours = 0.13 FTE).
FY 2014 no additional staff hours needed.
A 3% inflation rate increase was applied for FY 2012 through FY2013.
Amounts in parentheses are negative values representing costs.

DNR Cost Calculations

Costs are based on reviewing one hundred (100) engineering reports at three (3) hours of additional review time per report. Costs are also based on reviewing fourteen (14) facility plans with an increase in review time of sixteen (16) hours per facility plan.

$$(100 \text{ engineering reports}) \times (3 \text{ hours/engineering report}) = 300 \text{ hours}$$

$$(14 \text{ facility plans}) \times (16 \text{ hours/facility plan}) = 224 \text{ hours}$$

$$\text{Total Hours of Additional Review Time} = 300 \text{ hours} + 224 \text{ hours} = 524 \text{ hours}$$

It is anticipated that the rule will become effective on June 30, 2011. Therefore, no costs are associated with FY 2011.

FY 2012 will have an increase in review time of 524 hours.

$$(524 \text{ review hours}) \div (2,080 \text{ annual hours}) = 0.25 \text{ FTE}$$

It is assumed that there will be a fifty percent (50%) reduction in additional review time in FY 2013.

$$(524 \text{ hours}) \times 50\% = 262 \text{ hours}$$

$$(262 \text{ review hours}) \div (2,080 \text{ annual hours}) = 0.13 \text{ FTE}$$

The increase in review time will be reduced to zero for FY 2014, which means costs are also reduced to zero.

POTW Cost

	FY 2012	FY 2013	FY 2014	FY 2015
L. POTW Costs by Fiscal Years				
Consulting Engineer Costs (\$125.00/hour)	(\$77,250.00)	(\$39,783.00)	(\$20,488.50)	\$0.00
Fiscal Year Totals	(\$77,250.00)	(\$39,783.00)	(\$20,488.50)	\$0.00

Note: A 3% inflation rate increase was applied for FY 2012 through FY2014.
 Amounts in parentheses are negative values representing costs.

POTW Cost Calculations

Costs are based on fifteen (15) engineering reports and it is estimated to require an additional eight (8) hours of preparation time per engineering report by a consulting engineer. Also, costs are based on twelve (12) facility plans where it is estimated to require an additional forty (40) hours of preparation time per facility plan by a consulting engineer.

$$(15 \text{ engineering reports}) \times (8 \text{ hours/engineering report}) = 120 \text{ hours}$$

$$(12 \text{ facility plans}) \times (40 \text{ hours/facility plan}) = 480 \text{ hours}$$

Total Hours of Additional Consulting Time = 120 hours + 480 hours = 600 hours

It is anticipated that the rule will become effective on June 30, 2011. Therefore, no costs are associated with FY 2011.

A three percent (3%) inflation rate was applied to the publicly owned treatment works (POTW) consulting engineering costs for each year. The initial rate for consulting costs was \$125 per hour based on Department cost for consulting engineers.

FY 2012 will have an increase in consulting time of 600 hours.

$$\$125.00/\text{hour} + (\$125.00/\text{hour} \times 3\%) = \$128.75 \text{ per hour}$$

$$(600 \text{ hours}) \times (\$128.75/\text{hour}) = \$77,250.00$$

It is assumed that there will be a fifty percent (50%) reduction in additional consulting time in FY 2013.

$$(600 \text{ hours}) \times 50\% = 300 \text{ hours}$$

$$\$128.75/\text{hour} + (\$128.75/\text{hour} \times 3\%) = \$132.61 \text{ per hour}$$

$$(300 \text{ hours}) \times (\$132.61/\text{hour}) = \$39,783.00$$

It is assumed that there will be a seventy-five percent (75%) reduction in additional consulting time in FY 2014, which will yield twenty-five (25%) additional consulting time.

$$(600 \text{ hours}) \times 25\% = 150 \text{ hours}$$

$$\$132.61/\text{hour} + (\$132.61/\text{hour} \times 3\%) = \$136.59 \text{ per hour}$$

$$(150 \text{ hours}) \times (\$136.59/\text{hour}) = \$20,488.50$$

The increase in consulting time will be reduced to zero for FY 2015, which means costs are also reduced to zero.

IV. ASSUMPTIONS

The rule is assumed to be effective June 30, 2011.

The duration of costs for the Department in the proposed rule are indicated for FY 2012 through FY 2013. Costs imposed by the proposed rule sunset in FY 2014. The above estimates are based on current dollar values, with the exception that a three percent (3%) inflation rate was applied to the Department engineering costs.

The cost of compliance to the Department is \$34,594.00.

The duration of costs for the Publicly Operated Treatment Works (POTW) in the proposed rule are indicated for FY 2012 through FY 2014. Costs imposed by the proposed rule sunset in FY 2015. The above estimates are based on current dollar values, with the exception that a three percent (3%) inflation rate was applied to the POTW consulting engineering costs.

The cost of compliance to the POTWs is \$137,521.50.

General Assumptions Applicable To All Costs

The Department has used Chapters 10 and 20 of the 2004 version of the "Recommended Standards for Wastewater Facilities" developed by the Wastewater Committee of the Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (commonly referred to as the 10 States Standards) as a basis for the proposed changes to 10 CSR 20-8.110. These standards are nationally accepted industry standards and considered good engineering practice.

The standards will provide clarity and consistency in submittal and review of engineering documents for the design and construction of collection systems and wastewater treatment facilities. The benefits of this proposed rule for those who apply for construction permits are well planned and designed collection systems and wastewater treatment facilities.

All applicants requesting a construction permit will have to comply with the requirements in the proposed amendment to 10 CSR 20-8.110, Engineering – Reports, Plans and Specifications. The preparation of engineering reports, facility plans, construction plans and specifications are essentially the responsibility of the consulting engineer hired by the applicant.

No costs are associated with the revisions of this rule with the exception of engineering reports and facility plans.

Due to a learning curve involving the preparation of facility plans and engineering reports to the degree required by the proposed rule, there may be some initial costs. Some applicants may experience an increase in costs in preparing their engineering reports and facility plans while others may see a decrease. The requirements for the preparation of these reports and plans are now mandatory when submitting the construction permit application. Requiring a concise but thorough engineering report or facility plan will result in the benefits discussed in the above paragraphs.

Cost estimates were derived from an analysis of existing construction permit data from the years 2006 through 2008, based on the records of the Department's Regional Offices and the Financial Assistance Center. The data used pertains to wastewater treatment facilities with design flows greater than or equal to one hundred thousand gallons per day (100,000 gpd) and for sewer extensions to collection systems that can be expanded. A review of construction permit data for the first few months of 2009 indicates a significant drop in the number of new wastewater treatment facilities and sewer extensions. Consequently the data from 2009 was not included,

because the data from 2006 through 2008 provides a better historical and conservative estimate of the number of construction permits received by the Department.

Please note that although this rule applies to wastewater treatment facilities with design flows of 100,000 gpd or greater, the rule for small wastewater systems, found in 10 CSR 20-8.020 (Design of Small Sewage Works), requires that all extensions of sewers to systems that can be expanded must comply with the design rules for large systems contained in 10 CSR 20-8.120 and 10 CSR 20-8.130. Because of this regulation (10 CSR 20-8.020(9)), the Department estimates that the requirements for engineering reports, contained in this amended rule, will apply to all sewer extensions, regardless of the actual size of the extension. An exception to the proposed engineering report requirements is that these reports may not be required with simple eight (8)-inch gravity sewer extensions. This cost analysis is only considering sewer extensions containing pump stations, forcemains and gravity sewers greater than eight (8)-inches in size.

In addition, state funded projects require a facility plan regardless of the type of system (collection or treatment) or the design flow of the system per 10 CSR 20-4.

The data for the number of facility plans and engineering reports received each year is as follows:

Total sewer extensions	560/year
Eight (8)-inch gravity sewer extensions	335/year
Sewer Extensions requiring engineer reports (pressure sewer systems, pump stations and gravity sewers larger than eight (8)-inches)	200/year
Wastewater treatment facilities and State funded projects requiring Facility Plans	54/year

Our cost estimates are only for the anticipated increased costs due to changes in this rule and do not reflect the total cost of preparing engineering reports and facility plans or the department's total cost related to review and approve engineering reports and facility plans.

The Department assumes that half of the engineering reports for sewer extensions may see a temporary increase in costs due to increased hours needed by an engineering consultant. The basis for the fiscal impact analysis is one hundred (100) engineering reports per year.

The Department assumes that half of the consultants will require more time, since at least half or a vast majority, already prepare engineering reports comparable to the proposed standards. Of the fifty-four 54 projects each year that need a facility plan it is estimated that only twenty-five percent (25%) or fourteen (14) projects will incur an increase in costs. A majority of the consultants are expected to experience little, if any difficulty, in preparing facility plans as required in the proposed standards.

Costs to the Department of Natural Resource

It is estimated that the Department will temporarily expend more work hours in the first two years of implementing this rule, informing engineering consultants of the new requirements. This increase in work hours will be absorbed without an actual increase in FTEs. It is assumed that the Department will spend three (3) additional work hours on an engineering report and sixteen (16) additional work hours on each facility plan. After the initial work to educate the consulting engineers regarding the new requirements, the consistent application of the amended rule will reduce Department work hours to zero by FY 2014.

Costs to Publicly Operated Treatment Works

The Department works with many consultants with varying degrees of wastewater experience and regulation knowledge. The Department realizes that not every consultant will apply for a construction permit within the first year that the proposed rule becomes effective. Although there are no costs to the Department in FY 2014, it was conservatively estimated that some consultants may accrue costs in FY 2014. The costs experienced in FY 2014, are based on consultations with the Department in FY 2012 and 2013, which resulted in additional consulting time to prepare an engineering report or facility plan. Wastewater projects can take a number of years to plan, design and construct. It is estimated that over the course of three (3) years the entire consultant engineering community will have had the opportunity to apply the amended regulations. By FY 2015, engineering consultants unfamiliar with the rule are expected to decrease to zero. This assumption is based on the decreased amount of time needed to become familiar with the standards.

Of the one hundred (100) engineering reports that may add to the costs of preparation due to increased consulting engineer time, it is estimated that only fifteen percent (15%) or fifteen (15) engineering reports will be publicly funded. Engineering reports will accompany construction permit applications for pressure sewers, pump stations, and gravity sewers larger than eight (8)-inches in diameter.

It is also assumed that eighty-five percent (85%) of the fourteen (14) facility plans submitted to the Department, which may add to the costs of preparation due to increased consulting engineer time, twelve (12) facility plans will be funded publicly. Facility plans will accompany construction permit applications for wastewater treatment facilities or wastewater projects receiving state funding.

Based upon the Department's contract costs for consulting engineers, a consultant's rate is conservatively estimated as \$125.00 per hour. The actual cost charged on a project varies considerably due to the size and complexity of the project and based on the expertise of the personnel assigned to work on a particular project.

It was assumed that due to the amended rule, an increase of eight (8) hours of work per engineering report would be needed. In addition, an increase of forty (40) hours of work per facility plan would be necessary. This increase in work for an engineering report or a facility

plan would be applicable for about three (3) years after the rule becomes effective. Each year the amount of time necessary to meet these new requirements will decrease eventually to zero in FY 2015, as a result of gained familiarity and understanding of the proposed rule.

Summary of Costs

Estimated Department costs are \$34,594 in the aggregate to comply with this proposed rule making. Beginning in FY 2014, aggregate costs of compliance are reduced to zero.

Consultant engineering costs for POTWs are \$137,522 in the aggregate, to comply with this proposed rule. POTWs include municipalities and sewer districts. Beginning in FY 2015, aggregate costs of compliance are reduced to zero.

The total aggregate cost of compliance for the Department and for POTWs is \$172,116.

**FISCAL NOTE
PRIVATE COST**

- I. Department Title: Department of Natural Resources**
- Division Title: Clean Water Commission**
- Chapter Title: Engineering – Reports, Plans and Specifications**

Rule Number and Name:	<i>10 CSR 20-8 110 Engineering – Reports, Plans and Specifications</i>
Type of Rulemaking:	<i>Proposed Rule Amendment</i>

II. SUMMARY OF FISCAL IMPACT

Estimate of the number of entities by class which would likely be affected by the adoption of the rule.	Classification by types of the business entities which would likely be affected:	Estimated in the Aggregate as to the cost of compliance with the rule by the affected entities:
890	Developers and Private Sewers Companies	\$174,194

Note: The aggregate rounded.

III. WORKSHEET

Private Facility Costs

	FY 2012	FY 2013	FY 2014	FY 2015
I. Private Facility Costs by Fiscal Year				
Consulting Engineer Costs (\$125.00/hour)	(\$97,850.00)	(\$50,391.80)	(\$25,952.10)	\$0.00
Fiscal Year Totals	(\$97,850.00)	(\$50,391.80)	(\$25,952.10)	\$0.00

Note: A 3% inflation rate increase was applied for FY 2012 through FY2014.
Amounts in parentheses are negative values representing costs.

Private Facility Cost Calculations

Costs are based on eighty-five (85) engineering reports and it is estimated to require an additional eight (8) hours of preparation time per engineering report by a consulting engineer. Also costs are based on two (2) facility plans where it is estimated to require an additional forty (40) hours of preparation time per facility plan by a consulting engineer.

$$\begin{aligned}
 &(85 \text{ engineering reports}) \times (8 \text{ hours/engineering report}) = 680 \text{ hours} \\
 &(2 \text{ facility plans}) \times (40 \text{ hours/facility plan}) = 80 \text{ hours} \\
 &\text{Total Hours of Additional Consulting Time} = 680 \text{ hours} + 80 \text{ hours} = 760 \text{ hours}
 \end{aligned}$$

It is anticipated that the rule will become effective on June 30, 2011. Therefore, no costs are associated with FY 2011.

A three percent (3%) inflation rate was applied to the private facility cost for consulting engineering costs for each year. The initial rate for consulting costs was \$125.00 per hour based on Department cost for consulting engineers.

FY 2012 will have an increase in consulting time of 760 hours

$$\$125.00/\text{hour} + (\$125.00/\text{hour} \times 3\%) = \$128.75 \text{ per hour}$$

$$(760 \text{ hours}) \times (\$128.75/\text{hour}) = \$97,850.00$$

It is assumed that there will be a fifty percent (50%) reduction in additional consulting time in FY 2013.

$$(760 \text{ hours}) \times 50\% = 380 \text{ hours}$$

$$\$128.75/\text{hour} + (\$128.75/\text{hour} \times 3\%) = \$132.61 \text{ per hour}$$

$$(380 \text{ hours}) \times (\$132.61/\text{hour}) = \$50,391.80$$

It is assumed that there will be a seventy-five percent (75%) reduction in additional consulting time in FY 2014, which will yield twenty-five (25%) additional consulting time.

$$(760 \text{ hours}) \times 25\% = 190 \text{ hours}$$

$$\$132.61/\text{hour} + (\$132.61/\text{hour} \times 3\%) = \$136.59 \text{ per hour}$$

$$(190 \text{ hours}) \times (\$136.59/\text{hour}) = \$25,952.10$$

The increase in consulting time will be reduced to zero for FY 2015, which means costs are also reduced to zero.

IV. ASSUMPTIONS

The rule is assumed to be effective June 30, 2011.

The duration of costs for the proposed rule are indicated for FY 2012 through FY 2014. Costs imposed by the proposed rule sunset in FY 2015. The above estimates are based on current dollar values, with the exception of a three percent (3%) inflation rate applied to the consulting engineering costs.

The cost of compliance to the private entities is \$174,193.90.

General Assumptions Applicable To All Costs

The Department has used Chapters 10 and 20 of the 2004 version of the "Recommended Standards for Wastewater Facilities" developed by the Wastewater Committee of the Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (commonly referred to as the 10 States Standards) as a basis for the proposed changes to 10 CSR 20-8.110. These standards are nationally accepted industry standards and considered good engineering practice.

The standards will provide clarity and consistency in submittal and review of engineering documents for the design and construction of collection systems and wastewater treatment facilities. The benefits of this proposed rule for those who apply for construction permits are well planned and designed collection systems and wastewater treatment facilities.

All applicants requesting a construction permit will have to comply with the requirements in the proposed amendment to 10 CSR 20-8.110, Engineering - Reports, Plans and Specifications. The preparation of engineering reports, facility plans, construction plans and specifications are essentially the responsibility of the consulting engineer hired by the applicant.

No costs are associated with the revisions of this rule with the exception of engineering reports and facility plans.

Due to a learning curve involving the preparation of facility plans and engineering reports to the degree required by the proposed rule, there may be some initial costs. Some applicants may experience an increase in costs in preparing their engineering reports and facility plans while others may see a decrease. The requirements for the preparation of these reports and plans are now mandatory when submitting the construction permit application. Requiring a concise but thorough engineering report or facility plan will result in the benefits discussed in the above paragraphs.

Cost estimates were derived from an analysis of existing construction permit data from the years 2006 through 2008, based on the records of the Department's Regional Offices and the Financial Assistance Center. The data used pertains to wastewater treatment facilities with design flows greater than or equal to one hundred thousand gallons per day (100,000 gpd) and for sewer extensions to collection systems that can be expanded. A review of construction permit data for the first few months of 2009 indicates a significant drop in the number of new wastewater treatment facilities and sewer extensions. Consequently the data from 2009 was not included, because the data from 2006 through 2008 provides a better historical and conservative estimate of the number of construction permits received by the Department.

Please note that although this rule applies to wastewater treatment facilities with design flows of 100,000 gpd or greater, the rule for small wastewater systems, found in 10 CSR 20-8.020 (Design of Small Sewage Works), requires that all extensions of sewers to systems that can be expanded must comply with the design rules for large systems contained in 10 CSR 20-8.120 and 10 CSR 20-8.130. Because of this regulation (10 CSR 20-8.020(9)), the Department estimates that the requirements for engineering reports, contained in this amended rule, will apply to all

sewer extensions, regardless of the actual size of the extension. An exception to the proposed engineering report requirements is that these reports may not be required with simple eight (8)-inch gravity sewer extensions. This cost analysis is only considering sewer extensions containing pump stations, forcemains and gravity sewers greater than eight (8)-inches in size.

In addition, state funded projects require a facility plan regardless of the type of system (collection or treatment) or the design flow of the system per 10 CSR 20-4.

The data for the number of facility plans and engineering reports received each year is as follows:

Total sewer extensions	560/year
Eight (8)-inch gravity sewer extensions	335/year
Sewer Extensions requiring engineer reports (pressure sewer systems, pump stations and gravity sewers larger than eight (8)-inches)	200/year
Wastewater treatment facilities and State funded projects requiring Facility Plans	54/year

Our cost estimates are only for the anticipated increased costs due to changes in this rule and do not reflect the total cost of preparing engineering reports and facility plans or the department's total cost related to review and approve engineering reports and facility plans.

The Department assumes that half of the engineering reports for sewer extensions may see a temporary increase in costs due to increased hours needed by an engineering consultant. The basis for the fiscal impact analysis is one hundred (100) engineering reports per year.

The Department assumes that half of the consultants will require more time, since at least half or a vast majority, already prepare engineering reports comparable to the proposed standards. Of the fifty-four 54 projects each year that need a facility plan it is estimated that only twenty-five percent (25%) or fourteen (14) projects will incur an increase in costs. A majority of the consultants are expected to experience little, if any difficulty, in preparing facility plans as required in the proposed standards.

Costs to Private Entities

The Department works with many consultants with varying degrees of wastewater experience and regulation knowledge. The Department realizes that not every consultant will apply for a construction permit within the first year that the proposed rule becomes effective. Although there are no costs to the Department in FY 2014, it was conservatively estimated that some consultants may accrue costs in FY 2014. The costs experienced in FY 2014, are based on consultations with the Department in FY 2012 and 2013, which resulted in additional consulting

time to prepare an engineering report or facility plan. Wastewater projects can take a number of years to plan, design and construct. It is estimated that over the course of three (3) years the entire consultant engineering community will have had the opportunity to apply the amended regulations. By FY 2015, engineering consultants unfamiliar with the rule are expected to decrease to zero. This assumption is based on the decreased amount of time needed to become familiar with the standards.

Of the one hundred (100) engineering reports that may add to the costs of preparation due to increased consulting engineer time, it is estimated that only eighty-five (85%) or eighty-five (85) engineering reports will be privately funded. Engineering reports will accompany construction permit applications for pressure sewers, pump stations, and gravity sewers larger than eight (8)-inches in diameter.

It is also assumed that fifteen percent (15%) of the fourteen (14) facility plans submitted to the Department, which may add to the costs of preparation due to increased consulting engineer time, two (2) facility plans will be funded privately. Facility plans will accompany construction permit applications for wastewater treatment facilities or wastewater projects receiving state funding.

Based upon the Department's contract costs for consulting engineers, a consultant's rate is conservatively estimated at \$125.00 per hour. The actual cost charged on a project varies considerably due to the size and complexity of the project and based on the expertise of the personnel assigned to work on a particular project.

It was assumed that due to the amended rule, an increase of eight (8) hours of work per engineering report would be needed. In addition, an increase of forty (40) hours of work per facility plan would be necessary. This increase in work for an engineering report or a facility plan would be applicable for about three (3) years after the rule becomes effective. Each year the amount of time necessary to meet these new requirements will decrease eventually to zero in FY 2015, as a result of gained familiarity and understanding of the proposed rule.

Summary of Costs

Consultant engineering costs for developers and private sewer companies are \$174,194 in the aggregate, to comply with this proposed rule. Beginning in FY 2015, aggregate costs of compliance are reduced to zero.