Supplemental Instructional Guidance For Water Quality and Antidegradation Review Assistance

A Technical Guidance for Assembling
Water Quality and Antidegradation Review Documents

Missouri
Department of
Natural Resources

Prepared by

Division of Environmental Quality, Water Protection Program

February 2010

Missouri Department of Natural Resources

Water Protection Program
Water Pollution Control Branch

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APPENDIX B. CALCULATING WATER QUALITY-BASED EFFLUENT LIMITS

APPENDIX C. AMMONIA WATER QUALITY-BASED EFFLUENT LIMITATION EXAMPLES

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TEMPLATES--Directory Location: E:\PERMITS\Templates:

Water Quality Reviews with Antidegradation:
WQAR_template v3 form_minimally degrading antidegradation review 1_22_10
WQAR_template v3 form_significantly_degrading antidegradation review 1_22_10
WQRA Applicability Review_ XXXX WWTF_date

Water Quality Reviews without Antidegradation:
WQRS_METALS_template form_1_22_10
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BACKGROUND

Overview

The water quality and antidegradation review process determines and documents appropriate effluent limitations and monitoring requirements for a wastewater treatment facility by examining the quality, quantity, and characteristics of the facility discharge and the stream, lake or reservoir that receives the facility effluent. The water quality and antidegradation review captures information unique to the facility and receiving water that aid in the determination of effluent limitations and monitoring requirements that are protective of water quality and consistent with state and federal regulation and guidance. This instructional guidance contains methods and procedures that supplement the existing Missouri Statues and Regulations, EPA Guidance, and *Antidegradation Rules and Implementation Procedure*, May 2008 (AIP) [http://www.dnr.mo.gov/env/wpp/docs/aip-cwc-appr-050708.pdf].

For more information on basis for water quality reviews, refer to Part 1 of the *Guidance for Water Quality and Antidegradation Review Assistance* (hereafter, *Guidance for WQRA*).

Intent

The intent of this guidance is to establish instructions that will enable a reviewer or permit writer to construct a water quality review for new and expanded state operating permits or for those occasions when a water quality review without the antidegradation review is needed for existing, non-expanding facilities. The instructional guide will provide reference to sections in the *Guidance for WQRA* that will aide in assembling a review document. This guidance document cannot encompass all of the situations encountered when developing a water quality and antidegradation review (WQAR). It is intended to provide basic instruction in reviewing and documenting: 1) Facility Information, 2) Receiving Water body Information, 3) Antidegradation Review Information, 4) Mixing Considerations. 5) Permit Limitations and Monitoring Requirements, 6) Derivation and Discussion of Limits, and 7) WQAR Finalization.

FACILITY INFORMATION

Much of these data can be obtained from the departmental interactive map viewer at: http://dnr.mo.gov/internetmapviewer/.

Facility Name

Name of the facility as found on the Missouri State Operating Permit if an existing facility; otherwise, the name of the facility as found on the WQRA request form.

MSOP #

Seven-digit Missouri State Operating Permit (MSOP) number if an existing facility; otherwise, the facility MSOP# designation is "NEW."

Facility Description

Description of the wastewater treatment facility from the MSOP or proposed new or expanded facility description from the WQRA request form or the alternative analysis. Facility description should include

the facility design flow (MGD), predominant treatment type (e.g. activated sludge, extended aeration, trickling filter, etc.), and any supplementary treatment processes (e.g., chlorination, UV disinfection, chemical phosphorous removal). The preferred alternative as part of the alternative analysis should be mentioned.

Ecological Drainage Unit (EDU) and Ecoregion

Aggregated watersheds that are hydrologically connected, share similar ecological characteristics (e.g. physiography, hydrology, zoogeography) and host relatively unique aquatic assemblages. Missouri Ecological Drainage Units have been developed by the Missouri Resource Assessment Partnership (MoRAP) and a map depicting Missouri EDUs can be found in **Figure 1. Missouri Ecological Drainage Unit (EDU) Map.** Due to the different topography, soils, and geology, nutrient criteria (10 CSR 20-7.031(4)(N)) for lakes and reservoirs will be determined by the use of four (4) major Ecoregions. See Ecoregion Map link for nutrient regulations: **http://mdcgis.mdc.mo.gov/website/ecoregions_book/viewer.asp.** Also, see Figure 2. Missouri Ecoregions Map. The difference between the map on the provided weblink as part of the *Atlas of Ecoregions* and the Figure 2 that reflects the regulations is due to consolidating the Plains Ecoregions and highlighting the Big Rivers Ecoregions

8-Digit Hydrologic Unit Code (HUC)

A unique, eight-digit code that identifies a specific drainage basin (hydrologic unit) as defined by the United States Geological Survey (USGS). Hydrologic Unit Codes are used by USGS for data storage and retrieval at NWISWeb, the National Water Information System Web Site [http://waterdata.usgs.gov/mo/nwis/nwis]. The department interactive map viewer has HUC could at: http://dnr.mo.gov/internetmapviewer/.

County

Missouri county where the facility discharge is located.

Legal Description

Location of the main facility outfall using the Public Land Survey System (PLSS) method of township, range, section, and quarter section or land grant. Legal description should be established to the most accurate extent practicable and in the format quarter-section(s), section, township, and range (Figure 3. Public Land Survey System Example)

Universal Transverse Mercator (UTM) Zone 15N Easting/Northing

Location of the main facility outfall using Universal Transverse Mercator (UTM) Zone 15N Easting/Northing coordinates. UTM should be established to the most accurate extent practicable using the North American Datum of 1983 (NAD83) as the coordinate system and in the format (X-538453.8 / Y-4333821.8). If coordinates are provided as Lat/Long, the interactive map viewer will perform the conversion.

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WATER QUALITY INFORMATION

Water Quality History

This history is not limited to the facility discharge but includes stream water quality information. Discharge monitoring report (DMR) data for the past five (5) years should be queried and analyzed for compliance with effluent limitations; noncompliance and significant noncompliance should be noted. Provide a brief synopsis of available water quality data and impacts attributable to the facility being reviewed. Sources of these data include basin inventory, stream survey data, and inspection. These data can be found in the Missouri Cleanwater Information System (MOCWIS) at www.dnr.mo.gov/cwis/. Basin Inventory details impacts to the receiving stream from a facility discharge, and Stream Survey Data provides the results of chemical and visual surveys of a facility and receiving stream. Both survey and inventory give information on the miles of unclassified and classified streams that are affected or impaired. Review facility inspection information and the results of chemical and/or visual analyses that are conducted. Section 305(b) and 303(d) lists should also be consulted for receiving water impairments.

Example DMR Data Reporting: During the last permit cycle, the facility failed to report any of the required sampling for Outfall #005 – Stormwater Outfall. For Outfall #007, exceedences were as follows: 1) Oil and Grease – twice in 2003; 2) Lead – once in 2004; 3) TSS – once in 2004 and 2005; 4) CBOD5 – once in 2005; 5) Chromium – once in 2004.

Outfall

Outfall number as found on the Missouri State Operating Permit or WQRA request form

Design Flow

Design average flow in cubic feet per second (cfs) of the outfall. To calculate low-flow (or dry weather) design flow in cfs from million gallons per day (MGD): MGD x 1.55 = cfs

Treatment Level

Level of treatment provided at the outfall. Options for this entry include the following:

Primary – discharge has undergone primary treatment (e.g. primary clarifier).
Secondary – discharge has undergone secondary treatment to meet the effluent requirements of 40 CFR 133.102 (e.g. activated sludge, oxidation ditch, SBR, and MBR).
Equivalent to Secondary (Equiv. Secondary) – discharge has undergone equivalent to secondary treatment to meet the effluent requirements of 40 CFR 133.105 (e.g. trickling filters and waste stabilization ponds).
Advanced – discharge has undergone treatment greater than secondary (e.g. filtration or nutrient removal).
Storm water – discharge is composed of precipitation-induced runoff from the facility. Type of facility: Domestic/Municipal, etc. Storm water can have settling basin, filtration, or no treatment.

Receiving Water body

Name of receiving water body for the facility outfall. Name of the first classified water body.

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Distance to Classified Segment

Distance to downstream, classified water body segment, in miles. This information may be used for regulatory compliance.

RECEIVING WATERBODY INFORMATION

Water body Name

Name of receiving water body identified as receiving flow from facility outfall. Example: Unnamed tributary to Campbell Creek.

Class

See Section 2.3 of the *Guidance for WQRA*. Water body classification from 10 CSR 20-7.031(1)(F); if the receiving water body is unclassified, "U" is to be entered. Class may be obtained using GIS, or MO Cleanwater Information System, Water Quality Standards search.

Water body Identification Number (WBID)

Unique, five-digit water body identification number for a classified water body segment. WBID may be obtained using GIS, or MO Cleanwater Information System, Water Quality Standards search, or the Missouri State Operating Permit.

Low-Flow Values

Low flow statistics for a receiving water body can be determined through three methods. See Section 2.5.1., Low Flow Conditions of the *Guidance for WQRA* for additional information. If you use low-flow values from previous reviews, the flows should not be more than 5 years old, if USGS gage station data is available. Professional judgment should be exercised on use of data older than 5 years. In addition, availability of new flow information or previous method of calculating flow may influence use of older low flow values. Below are the predominate stream flow conditions that are used in developing effluent limitations:

1Q10 – The one (1)-day, one (1)-in-ten (10)-year low flow (1-day Q_{10}) is the lowest average flow for one (1) day that has a probable recurrence interval of once-in-ten (10) years [10 CSR 20-7.031(1)(O)4.]

7Q10 – The seven (7)-day, one (1)-in-ten (10)-year low flow (7-day Q_{10}) is the lowest average flow for seven (7) consecutive days that has a probable recurrence interval of once-in-ten (10) years [10 CSR 20-7.031(1)(O)1.]

30Q10 – The thirty (30)-day, one (1)-in-ten (10)-year low flow (30-day Q_{10}) is the lowest average flow for thirty (30) consecutive days that has a probable recurrence interval of once-in-ten (10) years [10 CSR 20-7.031(1)(O)3.]

Method #1: A **direct** determination of low-flow statistics can be achieved through statistical analysis of daily stream flow data from the receiving water body. The statistical analyses may be conducted using available software (USGS' SWSTAT or EPA's DESCON) or through spreadsheet calculations (low-flow

frequency analyses). See the attached memorandum from Kansas City Regional Office on "Low flow calculations from USGS Gage Station Data."

Method #2: A **relative** determination of low-flow statistics can be achieved through a comparative analysis between a reference water body with similar hydrologic and physiographic characteristics and the subject water body. The reference water body would have information available for a direct determination of low-flow statistics and the subject water body would have low-flow statistics determined through a comparison of watershed areas. See reference provided in Section 2.5.1.3 of the *Guidance for WQRA*.

Method #3: A **default** determination of low-flow statistics can be achieved using the default low-flow values determined through interpretation of water body classification from 10 CSR 20-7.031(1)(F). Default 1Q10 low flow values for classified and unclassified streams are found on Table 3, Section 2.5.1.3 of the *Guidance for WQRA*.

Reviewer may include a graphic presentation of the low-flow frequency analysis as an attachment to the WQAR.

Designated Uses

Described in detail in the *Guidance for WQRA*, Section 2.2, reviewer provides designated beneficial uses of the receiving water body as identified in Tables G and H of 10 CSR 20-7.031. Information on the designated beneficial uses a water body can be obtained using GIS. For unclassified waters not listed in Tables G and H of 10 CSR 20-7.031, the "General Criteria" of 10 CSR 20-7.031(3) apply.

Receiving Water Body Segment

According to the AIP, "A segment is a section of water that is bound, at a minimum, by significant existing sources and confluences with other significant water bodies. The use of this term is intended to provide a framework for tracking changes in assimilative capacity. An evaluation of the existing water quality (EWQ) must be made for each segment to be significantly degraded by a new or expanded discharge. Because the EWQ will vary along the entire segment, the applicant may use statistical modeling to describe the variation in degradation for each segment spatially and/or during specific periods or seasons."

The beginning coordinate of the segment will be the lat/long or UTM outfall of the facility and the end segment will be lat/long or UTM of the confluence with a water body or another outfall of another facility that may allow for additional dilution or change in existing water quality. A second segment may be needed if modeling shows that a pollutant of concern (POC) will continue to impart degradation into another segment. Dissolved oxygen modeling may be a major determining factor in deciding the segment length of the degradation.

Comments

Additional comments or information regarding the facility, receiving water body, and/or water quality history not detailed in the sections above. Examples of additional information include details on the facility upgrade/expansion, permitted facilities to be eliminated, or the status of the receiving water body

as losing or impaired (i.e., receiving water body on the Missouri 303(d) list). If site is industrial, describe the processes and process water flow that is discharged and type of industry. Sources of additional information include the permit application, WQRA request, and the department's geographic information system (GIS). The results of the Geohydrologic evaluation should be discussed, related to status of the receiving stream as gaining or losing. For reviewers, Geohydrologic evaluations are located on the central office network T: drive.

ANTIDEGRADATION REVIEW INFORMATION

Section 2.5 of the *Guidance for WQRA* for information on Antidegradation Considerations.

Tier Determinations

Dischargers must submit a determination of assigned tier(s) of protection to water quality for all w**aters of the state** on a pollutant-by-pollutant basis. The applicant or the department can accomplish tier determinations if data is available using the approved procedure in Appendix 2 of the AIP. The discharger should consult AIP, Section 1.B. for the process of assigning tier protection levels. A spreadsheet is available for the determination.

Both Tier 1 and 2 Reviews are conducted on a pollutant-by-pollutant basis. Outstanding National and State Resource waters listed on Table D and E in the WQS at 10 CSR 20-7.031 are automatically assigned Tier 3 Reviews that are conducted on a waterbody-by-waterbody basis.

Existing Water Quality (EWQ)

Reviewer provides a summary of the sampling, if any, that was conducted by the applicant or by another entity. Reviewer provides documentation of the source of the data. Another discharger may use this documentation. The AIP says, "Once established, EWQ is a fixed quantity/quality expressed as a concentration of a water quality parameter. For waters receiving pollutants from an existing source (where full design capacity has not been reached), the EWQ shall include the levels of pollutants already permitted to be discharged at maximum design flow." Once established for surface water, this EWQ is the yardstick against which degradation is measured during all future antidegradation reviews on the segment. See *Water Quality Monitoring in Support of Missouri's Antidegradation Rule* for information on sampling. Sources of water quality data include the department, EPA STORET, and USGS Water Quality Monitoring sites.

Facility Assimilative Capacity

Depending on the type of review that the applicant has conducted, the minimal-degradation pathway requires a determination of the assimilative capacity consumed by the POCs. A spreadsheet is available for this determination. A table of the major inputs to the FAC equations should be used. The AIP has a set of examples for different discharge scenarios that can provide reference for the reviewer. A table of the calculations and the results of each parameter should be provided.

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Example Table of Assimilative Capacity with Proposed Ammonia Effluent Concentration

Pollutant of Concern (mg/L)	**Water Quality Standards**		**Water Quality**		**Facility Assimilative Capacity**		
	Acute Criteria Aquatic Life	Chronic Criteria Aquatic Life	Existing Water Quality	Proposed Effluent Concen-tration	Discharge load (lbs/day)	FAC (lbs/day)	FAC_{ratio}
Ammonia-Summer	19.9	2.5	0.01	25	4.4	486	0.009
Ammonia-Winter	19.9	4.3	0.01	25	4.4	837	0.005

It will not be necessary to include the wasteload allocation and limitation in this portion.

Alternative Analysis

The AIP Section II.B includes the requirements for the submitted Tier 2 antidegradation review. If the applicant has submitted an antidegradation review assuming significant degradation for one or all POCs, a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance must be included in the report. The purpose the alternative analysis is to evaluate a range of options that can be reasonably expected to achieve greater pollution reduction. The AIP provides examples for treatment that are designed to meet those ends.

The practicability analysis requires a water quality analysis of the base case of the treatment options to ensure that water quality standards will be protected. They must provide an analysis, i.e., Streeter Phelps or QUAL2, for each treatment alternative and effluent limits for all treatment alternatives. Alternatives that do or do not meet Missouri Water Quality Standards should be noted. Please identify the base case among the set of treatment options and indicate whether it meets water quality standards. All other treatments should have greater economic efficiency for the POC and thus perform better than meeting water quality standards. Summarize the analysis of alternatives ranging from non-degrading to less degrading to the degrading base case alternative. The evaluation should include no discharge alternatives such as land application and discharge to a regional wastewater treatment facility. All alternatives must meet WQS. The preferred alternative is the most economically efficient alternative that meets water quality standards. Include a discussion on the method used to analyze the alternatives. A table similar to the one presented below should be included. The comparison values for each POC should be effluent concentrations or assimilative capacity values.

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Example #1 Table of Effluent Limits and Economic Efficiency Analysis with Present Worth Costs

DISCHARGING ALTERNATIVES	BOD_5 (MG/L)	TSS (MG/L)	FECAL COLI (#/100 ML)	DO (MG/L)	NH_4 (MG/L)	PRESENT WORTH COST*	% BASE COST
A	10	10	400	5	2.0	$150,909	100% (BASE)
B	20	20	400	5	2.0	$185,549	123%
C	5	5	400	5	1.0	$210,909	140%
D	20	20	400	5	2.0	$274,000	182%
CONNECT TO REGIONAL SYSTEM	–	–	–	–	–	$400,000	265%

* Present Worth Cost: 20 year design life and X% interest

Example #2 Table of Effluent Limits and Economic Efficiency Analysis with Annual Costs

PARAMETER	TREAMENT ALTERNATIVES A	B	C	D	E
BOD_5 (mg/L)	≤10	≤8	≤10	≤10	≤10
TSS (mg/L)	≤10	≤12	≤10	≤15	≤10
DO (mg/L)	≥5	≥5	≥5	≥5	≥5
Ammonia (mg/L)	≤1	≤3	≤3	≤3	≤3
Fecal Coliform (/100 ml)	≤400	≤400	≤400	≤400	≤ 400 CFU
E. Coli (/100 mL)	≤126	≤126	≤126	≤126	≤ 126 CFU
Oil & Grease (mg/L)	≤10	≤10	≤10	≤10	≤10
Practicable	Yes	Yes	Yes	Yes	Yes
Annual Cost*	$103,295	$179,723	$66,602	$115,179	$106,892
Cost per Gallon	$1.72	$3.00	$1.10	$1.92	$1.78
Base-to-Alternative Ratio	1:1.6	1:2.7	Base	1:1.7	1:1.6
Economically Efficient	No	No	Yes	No	No

*20 year design life and 4.5% interest rate; present annual cost were calculated for the 0.060 MGD facility

The AIP requests the present worth framework for reporting cost information. However, annualized costs are acceptable. A waste water construction database is available at: http://www.dep.state.pa.us/dep/DEPUTATE/Watermgt/wsm/WSM_TAO/InnovTech/CostDB.htm. The database has current cost data (no more than 10 years old) for the construction of wastewater treatment plants and ancillary facilities and equipment. See page 26 of the AIP for explanation of the cost comparison procedures. Also, see EPA's *Interim Economic Guidance* at: http://www.epa.gov/waterscience/standards/econworkbook/. Worksheets for these calculations are available.

As a *non-binding rule-of-thumb,* alternatives less than 120 percent of the base cost of pollution control measures are economically efficient (% Base Cost is present worth). Unless evidence exists to the contrary, alternatives greater than 120 percent of the base costs are generally not considered economically efficient.

Affordability is an optional process; however, please note that if no affordability analysis is provided, all treatments that are practicable and economically efficient will be considered affordable (Page 27, AIP). EPA's *Interim Economic Guidance* at http://www.epa.gov/waterscience/standards/econworkbook/ contains worksheets that would be useful for this process. Other department worksheets for these calculations are available.

Regionalization Alternative

If a continuous authority is operative in the area of the proposed discharge, a waiver is required under 10 CSR 20-6.010(3) (B) Continuing Authorities. In order for us to approve a permit, a waiver from the continuous authority is required. Reviewer needs to indicate if a waiver is needed to prevent conflict with area wide management plan approved under Section 208 of the Clean Water Act and/or under 10 CSR 20-6.010(3) (B) 1 or 2 Continuing Authorities. Enter "Y" for yes. Otherwise, enter "N" for no.

Social and Economic Importance Determination

The reviewer should place emphasis on adequately describing and documenting the social and ecomonic importance of the discharge. Social and economic importance analysis must clarify the project's design life. Over that design life, the long-term benefit to the affected community must be identified and discussed. To ensure that the applicant has answered the importance determination, a worksheet for *Documenting Socio-Economic Importance of the Proposed Discharge* will help with this process (Attachment #2). Another option for this review requirement is to request that the city superintendent, mayor, or community leader write a letter expressing the importance of the proposed discharge to the community.

Identify all relevant factors, and within a Social and Economic Benefits section provide subheadings composed of these factors. For example, what is the present tax base and the projected growth documented within a published community plan, for instance (if one exists), that supports the statement that the "tax base will increase as a result of the project?" In addition, we believe this analysis should include the type of population growth. Is population growth related to business or residential housing? If environmental benefits are relevant factors, the affected community's use of the water resource should be considered. For instance, if bacteria loading will decrease due to disinfection, where no disinfection exists, identify the beneficial use that will be affected and how that will benefit the affected community. Is this a correction of a public health problem? Will the reductions in loading of the BOD5 and ammonia reduce odor, improve oxygen levels, or reduce periphyton within and for the aquatic community?

Preliminary Determination

The review must state that per the requirements of the AIP the department developed effluent limits to be protective of beneficial uses and to retain the remaining assimilative capacity. It is the reviewer's task to determine if the submitted review is sufficient, meets the requirements of the AIP and no further analysis is needed for this discharge.

MIXING CONSIDERATIONS

Mixing zones are areas of limited size near a facility outfall where numeric water quality criteria may be exceeded, but the General Criteria found in 10 CSR 29-7.031(3) must be met. Mixing zones are limited

in size (volume, area, and length) so that designated beneficial uses and aquatic communities are not adversely impacted.

See Section 2.5. Regulatory Mixing Zones of the *Guidance for WQRA*.

Regulatory Mixing Zones

Streams with seven (7)-day Q_{10} low flows of less than 0.1 cfs:

Regulation: 10 CSR 20-7.031(4)(A)4.B.(I)
Stream Class: Unclassified and Class C
Mixing Zone: Not allowed.
Zone of Initial Dilution: Not allowed.

Streams with seven (7)-day Q_{10} low flow of one-tenth to twenty (0.1 – 20) cfs:

Regulation: 10 CSR 20-7.031(4)(A)4.B.(II)
Stream Class: Class P and P1
Mixing Zone: Mixing zone one-quarter (1/4) stream width, cross-sectional area, or volume of flow; length one-quarter (1/4) mile.
Up to one-half (1/2) stream width, cross-sectional area, or volume of flow if rapid and complete mixing is suspected. Rapid and complete mixing is defined as less than a five (5) percent difference in concentration across the receiving water body within close downstream proximity of the facility outfall.
Zone of Initial Dilution: ZID one-tenth (0.1) of the mixing zone width, cross-sectional area, or volume of flow.

Streams with seven (7)-day Q_{10} low flow of greater than twenty (20) cfs:

Regulation: 10 CSR 20-7.031(4)(A)4.B.(III)
Stream Class: Class P and P1
Mixing Zone: Mixing zone one-quarter (1/4) stream width, cross-sectional area, or volume of flow; length one-quarter (1/4) mile.
Zone of Initial Dilution: ZID one-tenth (0.1) of the mixing zone width, cross-sectional area, or volume of flow and no more than ten (10) times the effluent design flow volume unless the use of diffusers or specific mixing zone studies can justify more dilution.

Lakes or reservoirs:

Regulation: 10 CSR 20-7.031(4)(A)4.B.(IV)
Stream Class: L2 and L3
Mixing Zone: Not to exceed one-quarter (1/4) of the lake width at the discharge point or one hundred feet (100') from the discharge point, whichever is less.
Zone of Initial Dilution: Not allowed.

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Regulatory mixing zones are to be listed and include the applicable citation from the water quality standards. Receiving water low-flow values and respective mixing zone and zone of initial dilution values are to be listed in the table at the end of the section. If a mixing zone or zone of initial dilution is not allowed, "N/A" is placed in the table.

Dilution ratios for both the mixing zone and zone of initial dilution may be calculated and recorded. Dilution ratios are calculated by dividing the applicable receiving water flow (MZ and ZID) by the facility design flow.

$$A.E.C.\% = \left(\frac{DesignFlow + ZIDFlow}{DesignFlow} \right)^{-1} \times 100$$

The Allowable Effluent Concentration (AEC) as percentage must be provided for WET testing. See WET Testing below.

PERMIT LIMITS AND MONITORING INFORMATION

The WQAR "Permit Limits and Monitoring Information" section details the effluent limitations and monitoring requirements necessary to ensure and achieve compliance with applicable effluent regulations and water quality standards. Part 3 and 4 of the *Guidance for WQRA* should be referenced to determine the effluent limitations. In addition, the WET testing is discussed in more detail in the *Water Pollution Control Branch Permit Writer's Manual.*

Wasteload Allocation Study Completed

If one or more wasteload allocation (WLA) studies have been completed for the facility and a water quality-based wasteload allocation has been determined, enter "Y" in this field. Otherwise, enter "N".

Water load Allocation studies -- A waste load allocation is the process by which allowable concentrations of constituents in discharge from wastewater treatment plants are determined such that acceptable water quality can be maintained in the water body. These are studies that are conducted for a period of time as defined by the agency. The Water Protection Program outlined the requirements of these studies in the *Water Quality Monitoring in Support of Missouri's Antidegradation Rule.* These studies should not be confused with Streeter Phelps Modeling. Qual2 modeling is a wasteload allocation study. All wasteload allocation studies require an approved quality assurance project plan. The reviewer should coordinate with the Water Quality Monitoring and Assessment Section for approval (See Guideline 1: *DO Modeling & BOD Effluent Limit Development Administrative Guidance*).

Use Attainability Analysis

If a Use Attainability Analysis (UAA) has been conducted for the downstream classified water body to determine whether the whole body contact recreation use is attainable, enter "Y" in this field. Otherwise, enter "N."

Recreational Use Attainability Analysis -- A use attainability analysis, or UAA, by definition in the water quality standards, is a structured scientific assessment of the factors affecting the attainment of the use, which may include physical, chemical, biological and economic factors. For a list of completed UAAs, see the following web link: http://dnr.mo.gov/env/wpp/wqstandards/uaa/index.html

Whole Body Contact Use Retained

If a UAA has been conducted for the downstream classified water body and the whole body contact recreation use is retained, enter "Y" in this field. If a UAA has been conducted for the downstream classified water body and the whole body contact recreation use is removed, enter "N" in this field. If a UAA has not been conducted for the downstream classified water body, the default designation of whole body contact is applied and a "Y" should be entered.

OUTFALL TABLE

Each facility outfall must have a table with effluent limitations and monitoring requirements that apply to the outfall. Outfalls with similar effluent limitations and monitoring requirements (e.g., storm water outfalls) may be combined into one entry.

WET Test

Section 2.8, Whole Effluent Toxicity (WET) Testing, of the *Guidance for WQRA* describes WET testing in more detail. If a WET test is required for a facility outfall, enter "Y" in this field. Typically, WET test is not required for Non-POTW or facilities less than 22,500 gpd (see table below). An annual WET test is the minimum requirement for all permitted facilities meeting the following criteria:

- All Major Dischargers, all facilities designated as Major Dischargers and all facilities with design flows equal to or greater than 1 million gallons per day or having an average discharge equal to or greater than 1.55 cubic feet per second over any consecutive 24 hour period
- Permitted facilities that are exceeding or routinely exceed their design flow. This includes facilities that have been granted an extension by the department permitting the exceedance of facility design flows.

In addition to the facilities listed above, Water Protection Program policy requires WET testing for all municipal wastewater treatment facility discharges. The frequency of municipal WET test requirements and those established using BPJ must be at a minimum as follows:

Design Flow (gpd)	Frequency	WET Test
< 22,500	Not required	BPJ
22,500 – 999,999	Once/Permit Cycle	Fourth Year
> 1,000,000	Once/Year	Every year

See the Section 2.8 of *Guidance for WQRA* for the Industrial Facility requirements.

Additional details concerning WET test requirements can be found within the August 5, 2005, memorandum *Revision of Missouri State Operating Permit Language for Whole Effluent Toxicity (WET) Tests, Uniform Application of Proposed Guidance and New WET Test Reporting Form* or within the *Water Pollution Control Branch Permit Manual* (*see* Section 5.2 *Effluent Limits / WET Testing for Compliance Bio-monitoring*).

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WET Test Frequency

WET Test frequency required by memorandum or established using the table above.

WET Test Allowable Effluent Concentration (AEC)

The percent of effluent calculated to be present at the downstream edge of the zone of initial dilution. As defined at 10 CSR 20-7.031(1)(DD), the zone of initial dilution is a small area of initial mixing below an effluent outfall beyond which acute toxicity criteria must be met. For unclassified waters and classified waters where a zone of initial dilution is not allowed, the AEC is one hundred percent (100%). For all other waters, the acute AEC can be calculated using the following formula and the ZID Dilution Ratio:

$$AEC\% = \left(\frac{100}{DilutionRatio + 1}\right)$$

For chronic AEC, see the department's Permit Manual in Section 5.2 *Effluent Limits / WET Testing for Compliance Bio-monitoring.*

WET Test Method

WET Test method dilution is multiple. See the Water Pollution Control Branch *Permit Manual*.

Effluent Limits and Monitoring Requirements

The effluent limit and monitoring requirement table for each outfall must include all applicable effluent limits and monitoring requirements. Each applicable effluent parameter must be listed. Each parameter must include the limitation or monitoring requirement, units of measurement, and frequency of testing. Effluent limitations are required for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause or contribute to an in-stream excursion above a narrative or numeric water quality standard (See Part 4, Section 4.1 of *Guidance for WQRA*). Examples include non-conventional and toxic pollutants (e.g. ammonia and metals, respectively). For existing facilities undergoing expansions, a reasonable potential analysis (RPA) using the procedures found in Appendix A may be conducted to determine whether an effluent limitation or reduced monitoring requirement are needed.

Example Table for a Waste Water Outfall

Parameter	Daily Maximum	Weekly Average	Monthly Average	Basis for Limit	Monitoring Frequency
Flow (cfs)	*		*	FSR	
BOD_5 (mg/L)		45	30	FSR	
TSS (mg/L)		45	30	FSR	
pH (S.U.)	6.0 – 9.0		6.0 – 9.0	FSR	
Temperature (°C)	*		*	N/A	
Ammonia as N (mg/L) (Apr 1 – Sept 30)	*		*	N/A	
Ammonia as N (mg/L) (Oct 1 – Mar 31)	*		*	N/A	

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The following are the categories for the type of effluent limitations and acronyms that applies in the outfall table:

Effluent Limitations	Acronym	Reference to *Guidance for WQRA*
Water Quality-based Effluent Limit -	WQBEL	Part 3
Minimally Degrading Effluent Limit-	MDEL	Part 4, Section 4.3.4
Preferred Alternative Effluent Limit -	PEL	Part 3, Section 3.3.2.4
Technology-Based Effluent Limit-	TBEL	Primarily Part 3, Section 3.3.1
No Degradation Effluent Limit-	NDEL	Maintain loading, Tier 1 or Tier 2 Insignificance
Federal/State Regulation-	FSR	Part 3, Section 3.3.2.1
Not Applicable-	N/A	monitoring only

For each POC in the Outfall Table, one of the above limitation types will be selected under "Basis for Limit" as a description of the effluent limitation.

Considerations for Effluent Limitations:

1) BOD5, TSS, pH -- For domestic and municipal wastewater treatment facilities, numeric limitations for BOD5 (or an alternative, e.g. CBOD), TSS, pH are required. Effluent limitations for BOD5 and TSS must be expressed in terms of both 30-day (monthly) average and 7-day (weekly) average limits. Exception: A maximum (1-day) daily limit is used when limitation is calculated through the WQBEL wasteload allocation process and used in conjunction with the average monthly limit. pH range is provided in the daily maximum and monthly average column of the table.

2) Bacteria (E. coli) -- Effluent limitations for must be included if the discharge is to or within two (2) miles of a losing stream or water body with a designated or existing use for whole body contact recreation.

3) Oil and Grease -- Effluent limitations for are required for all municipal discharges per Water Protection Program policy. Average monthly of 10 mg/L and maximum daily of 15 mg/L.

4) Percent Removal -- For all POTWs, percent removal requirements for BOD and TSS must be included in the water quality review and consistent with the secondary treatment requirement for 85% removal. Alternate percent removal requirements may be allowed for equivalent to secondary treatment (65% removal) where justified or in accordance with provisions found in 40 CFR Part 133. This statement should be footnoted with the wastewater outfall table: This facility is required to meet a removal efficiency of 85% or more for BOD_5 and TSS. Influent BOD_5 and TSS data should be reported to ensure removal efficiency requirements are met.

Appropriate units of measure: Effluent limitations requirements are to be expressed in the appropriate units of measure (e.g. concentration, mass, SU). Units vary with the pollutant of concern.

Total Recoverable and Dissolved Metals- ug/L
E.coli – colonies/100 mL
BOD, TSS, ammonia, total residual chlorine, and oil and grease – mg/L
Nutrients – mg/L

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Effluent limitations requirements are expressed in terms of concentration, except when limitations are required to be expressed in terms of mass by an effluent limit guideline (ELG), Total Maximum Daily Load (TMDL), or water quality-based calculation. When effluent limitations are expressed in terms of mass, the following equation is used:

Mass, lbs./day = (Flow, MGD) x (Concentration, mg/L) x (8.34 lbs/gal)

Effluent monitoring frequency: Monitoring frequency must be set at the minimum requirement found in regulation (10 CSR 20-7.015). See Appendix U: Missouri State Operating Permits Monitoring Frequency and Sampling Types of the *Water Pollution Control Branch Permit Manual*. Sample type is not a consideration of the WQAR. Typically, monitoring frequency must match the design flow of the facility and meet the minimum requirements. A reduction in monitoring frequency below the minimum requirement may only be granted if the facility can demonstrate consistent effluent quality.

Consider the EPA's Permit Manual for establishing alternative sampling requirements. *The monitoring frequency may be adjusted to reflect the compliance history of the facility. A facility with problems achieving compliance generally should be required to perform additional monitoring to characterize the source or cause of the problems or to detect noncompliance.* It has been procedure of the Water Pollution Control Branch to establish once/month minimum sampling on all new facilities, which allows us to be consistent. By having a once/month sampling requirement, the department can determine whether this facility is having a negative impact to the receiving waters and ensure that the new facility is operated correctly.

Example Table of Regulatory Minimum Monitoring Frequency (10 CSR 20-7.015 (8))

Design Flow (gpd)	Once/Year	Once/Quarter	Once/Month	Once/Week	Once/Day
0 – 50,000	X				
50,001 – 200,000		X			
200,001 – 600,000			X		
600,001 – 999,999				X	
> 999,999					X

If the facility is greater than 1 MGD, the minimum requirements are 20 samples per year. In 10 CSR 20-7.015(8)) says one sample for every 50,000 gpd, thus for a 20 MGD facility the calculations would be:

20 MGD x 20 samples per MDG per year = 400 samples per year or 400 / 365 days = 1.1 or once per day.

Receiving Water Monitoring Requirements (In-stream Monitoring)

In some rare circumstance, instream monitoring may be required to document that the water quality standards are being met. Typically, monitoring is at the end of the mixing zone or at the confluence with the classified segment. Permitting will have special requirements and conditions for this monitoring. Consult a permit writer or the Monitoring and Assessment Section for appropriate conditions and parameters. Instream monitoring will require an approved quality assurance project plan. Coordinate with the Monitoring and Assessment Section for this approval. At a minimum, the following information is needed:

Site ID. The site ID usually consists of two or three characters identifying the location of the in-stream monitoring site. For example, S1 or US1 can be used to indicate that this site is the upstream site or site #1, and S2 or DS2 can be used to indicate that this site is the downstream site or site #2.

Parameter(s). The parameters are typically the same as those required of the effluent outfall minus TSS and plus dissolved oxygen, temperature, conductivity, phosphorus, and/or nitrogen species.

Sampling Frequency. The frequency can be the same as the effluent monitoring or at a lesser rate depending on the situation. Usually, this is determined by the extent of pollution believed to be entering the stream.

Sample Type. This is typically a grab sample but depends on the chemical and situation.

Location. Give the legal description or the GPS location of the sampling site along with the narrative location. For example, one could write "A quarter (1/4) mile downstream of outfall 001 in Turkey Creek; LatDMS: +00 00 00.0; LongDMS: -000 00 00.0" or "Sample at Hwy T bridge (3 miles south of Hwy 63 and T intersection); +00 00 00.0/-000 00 00.0".

DERIVATION AND DISCUSSION OF LIMITS

The "Derivation and Discussion of Limits" section of the WQAR describes the effluent limitations and monitoring requirements for each facility outfall. For each outfall, the rationale and statement of basis for the effluent limitations or monitoring requirement are presented with the appropriate regulatory citation. The permit writer will use these WQARs as part of the NPDES operating permit and public notice, so explanations of limitations are important. Where TBEL or WQBEL exist for a given parameter, a discussion of how the final effluent limitations were determined is required.

Regulatory Citations

The regulatory citations (for effluent limitations and effluent monitoring requirements considered federal/state requirements under the outfall table above) for discharges to waters of the state (see 10 CSR 20-2.010(82) for definition) are as follows:

- Missouri and Mississippi Rivers – 10 CSR 20-7.015(2)
- Lakes and Reservoirs – 10 CSR 20-7.015(3). Releases to lakes and reservoirs includes discharges into streams one-half (1/2) stream mile (0.80 km) before the stream enters the lake as measured to its normal full pool.
- Losing Streams – 10 CSR 20-7.015(4). Releases to losing streams include discharges that occur within two (2) miles upstream of the losing stream section. Sources of losing stream information include geohydrologic surveys conducted by Geology and Land Survey and the department GIS.
- Metropolitan No-Discharge Streams – 10 CSR 20-7.015(5). Releases to metropolitan no-discharge streams are prohibited except as specifically permitted under the water quality standards. Water quality reviews for discharges to Metro No-Discharge streams should be

coordinated with the central office. The no-discharge segments for these streams are an important consideration and, in the past, has led to confusion on the application of this rules. The reviewer needs to pay close attention to the no-discharge segments defined in the water quality standards 10 CSR 20-7.031(6) which will define the watershed that excludes new discharges.

- Special Streams – Outstanding State and National Resources Waters – 10 CSR 20-7.015(6). Releases to high quality waters (OSRW & ONRW, 10 CSR 20-7.031(7) and (8)) require special consideration and coordination. Water quality reviews for discharges to OSRW or ONRW should be coordinated with the central office.

- Subsurface waters – 10 CSR 20-7.015(7). Releases to subsurface waters should be avoided, unless the discharge meets appropriate groundwater protection criteria found in 10 CSR 20-7.031.

- All Waters, except those mentioned above – 10 CSR 20-7.015(8). All other discharges to waters of the state are covered by this section of the effluent regulation.

These citations may not apply to MDEL, NDEL or PEL effluent limitation, but the monitoring requirements will apply. These citations are important reference points for secondary treatment limitations.

Program Policy

Program policy can be an important reference when constructing effluent limitations. See the Table of Contents of the *Guidance for WQRA* for policies listed under the guidelines. Reference to these policies should be made to document the decision process.

Effluent Limit Determination Method

The processes described in the Guidance for WQRA, the EPA Permit Manual, the Technical Support Guidance Document for Water Quality-Based Toxics Control, and the Water Pollution Control Branch Permit Manual determine effluent limitations. The *Guidance for WQRA* contains similar information as these primary documents and should be the primary reference document. The central tenet of the Clean Water Act is the comparison of the TBELs (as PEL or FSR) to the WQBELs. The goals of each are slightly different, thus we must ensure that the State's water quality standards are protected. For each effluent parameter, a comparison of TBEL and WQBEL must be performed and the more stringent limit selected. The discussion of the distinction between and derivation process of the TBEL and the WQBEL are provided in the *Guidance for WQRA*. Effluent limits that are less stringent than those found in the previous MSOP must be justified. Justification must include a discussion that one or more of the "antibacksliding" provisions of Section 402(o) of the Clean Water Act have been met.

WQBEL, MDEL, PEL, and NDEL development is also documented in the "Derivation and Discussion" section of the WQAR. The derivation methods are outlined for the type of effluent limitation at the beginning of each section (see template WQARs).

- WQBEL — These limits are developed using methods and procedures outlined in USEPA's *Technical Support Document For Water Quality-based Toxics Control* (EPA/505/2-90-001) are to be used to protect instream water quality criteria. Details on using the TSD procedures for

effluent limit development can be found in Appendix B with specific examples for POCs in Appendix C and D. The *Total Ammonia Nitrogen Criteria Implementation Guidance* allows ammonia decay in unclassified stream provided the applicant could provide adequate time of travel information. Dye tracing is the most accurate methodology for estimating travel time from the outfall to the first classified stream. The Division of Geology and Land Survey (see http://dnr.mo.gov/geology/geosrv/envgeo/wtmeth.htm) has developed a water tracing methodology. However, for most unclassified streams, low-flow conditions are dry conditions. The alternative is a desktop evaluation using stream cross-sectional area. These evaluations are not as accurate as the dye-tracing methodology but with no water in the stream, we have few options. Manning's Equation for surface water evaluations can be used to estimate average flow velocity. **Average flow velocity should be determined for the low-flow elevation of the stream cross-sectional area or 7-day Q10 flow**. Manning's N Equation for this is:

$$V = 1.49 / n (R)^{2/3} (s)^{1/2}$$

Where:

V = average velocity, in feet per second
n = Manning's roughness coefficient (see Table 1)
s = slope of the hydraulic grade line, in feet per foot
R = hydraulic radius, in feet and is defined by the equation

$$R = a/p_w$$

a = cross sectional flow area, in square feet
p_w = wetted perimeter, in feet

After average velocity is computed using above equation, travel time (Tt) for the channel segment can be estimated by dividing the flow length by the velocity. A worksheet and brief guidance are available for distribution to applicant.

- MDEL — These limits are developed using methods and procedures outlined in Part 3, Section 4.3.4 of *Guidance for WQRA*. Minimally-degrading effluent limits or MDELs have been based on the authority included in Section III. Permit Consideration of the AIP. Details on developing these limitations can be found in Appendix E, Example #1.

- PEL — These limits are developed using methods and procedures outlined in Part 3, Section 3.3.2.4 of *Guidance for WQRA*. Significantly-degrading effluent limits or PELs have been based on the authority included in Section III. Permit Consideration of the AIP. Details on developing these limits can be found in Appendix E, Example #2.

- NDEL — These limits are developed using common permit writing methods and procedures. These limits are applicable to maintenance of loading for Tier 1 POCs, or Tier 2 POCs to demonstrate insignificance of loading. Details on developing these limits can be found in Appendix E, Example #3.

POC by POC:
The reviewer will incrementally treat each POC according to AIP approach that is required for Tier 1 and Tier 2 reviews. When assigning effluent limitations, the reviewer needs to determine the downstream

distance to the first classified water body and the designated uses of the receiving water body. This information determines the minimum level of treatment for certain POCs that are required by regulation. Secondary treatment will be the minimum level of treatment required in most cases; however, when discharges are permitted to or within two (2) miles of a stream designated as losing, advanced treatment will be required. Effluent limitations for BOD and TSS that are less stringent than the secondary treatment limitations require justification for the alternate limitations (e.g. equivalent-to-secondary treatment).

Wasteload Allocations and Limitation Calculations:
Wasteload allocation development and limitation calculations must be documented in the "Derivation and Discussion" section. All calculations should follow the EPA's *Rules for Significant Figures and Rounding for the NPDES Permit Writer's Course*. A discussion of the General Water Quality Standards Application to Permitting Process and Water Quality Models can be found in the *Guidance for WQRA*. Starting with the more general information and working to more specifics with examples by POC, wasteload allocation and limitations for MDELs and WQBELs are explained in Part 3 and 4 of *Guidance for WQRA*. Where WQBELs are required because of a reasonable potential analysis, Appendix B through Appendix D should be consulted. The wasteload allocations may be developed through water quality modeling or a mass-balance approach. The development of MDEL, PELs, and NDEL should also be documented. A single table for BOD, TSS, ammonia may used to demonstrate MDEL limitations or, if required, maintenance of loading and development of the NDELs.

Instream dilution and mixing must be considered and reflect the volumes of flow determined under "Mixing Considerations," that was discussed above. Wasteload allocation development must also account for load contributions from upstream sources, i.e., ambient or background concentrations. For ammonia, site-specific pH and temperature is preferred to assumed values (see Guideline 2 in *Guidance for WQRA*).

If a TMDL or WLA study has been completed for the receiving water body, the approved TMDL or WLA must be referenced and addressed in the WQAR. WQBELs developed as the result of a TMDL or WLA study must be compared with applicable TBELs and the more restrictive limit chosen.

ADDING APPENDICES

Items in the appendices may or may not be required for the WQAR but are intended to provide the permit writer and the administrative record of decisions needed information on the nature of the discharge. While other information may be pertinent to the review, the items below are candidates for appendices:

1. The location of each outfall clearly shown on map(s). A USGS topographic map can be obtained on the web at http://www.dnr.mo.gov/internetmapviewer/.
2. Applicant must check for rare and endangered aquatic species that may be affected by the discharge by using the following web link: http://mdcgis.mdc.mo.gov/heritage/. Heritage Reviews are informational in nature, and result in a document informing a requestor whether there are sites of conservation concern near a proposed project. In addition, potential concerns in the project area (e.g., endangered species may or may not be present, but the location seems to fit its habitat needs) are identified. There are two ways to get a Heritage Review:

- Send a project description, map and Township/ Range/ Section description to:
  Missouri Department of Conservation
  Attention Policy Coordination
  P.O. Box 180
  Jefferson City, MO 65102-0180.
- Or, the following website can provide a preliminary review (Heritage Review http://mdcgis.mdc.mo.gov/heritage/newheritage/establish_user.asp). Applicant will be required to register with the website to access survey information. This review provides some projects a letter saying the project is not near to any sites of concern. For others, it will send information entered to MDC and/ or the U.S. Fish and Wildlife Service so staff can review possible conflicts. The results of the survey must indicate whether there are known endangered species on the site. *The presence of endangered mussels may necessitate effluent limitations that are protective of these aquatic life or instream monitoring (see previous reviews for examples). Coordination with the USFWS may be necessary for some federally endangered species.*

3. The department-requested antidegradation review summary forms contain the major findings for each analysis. Attach these forms as outlines of the full antidegradation review information.
4. Dissolved oxygen (DO) analysis (i.e., using Missouri Department of Natural Resources (Department) approved models such as Streeter Phelps [http://www/ecy.wa.gov/programs/eap/pwspread/pwspread.html] or Qual2K/Qual2E (Q2K/Q2E) stream water quality study [http://www.epa.gov/athens/wwqtsc/index.html] indicating that the preferred alternative's BOD_5 effluent limitations from the alternative analysis or the technology-based/regulatory BOD_5 effluent limits are protective of Missouri's water quality standard for DO (See Guideline 1: *DO Modeling & BOD Effluent Limit Development Administrative Guidance*). *A plot of DO over distance and/or the model input summaries and model results should be include in the appendix.*
5. On some occasions, the reviewer may attach the Geohydrological Evaluation. In most cases, the reviewer should summarize the results of this evaluation rather than attach the evaluation.
6. If the reviewer developed new 7Q10, 1Q10 or 30Q10, a plot of these low-flow frequency analyses can be provided.

WQAR FINALIZATION PROCEDURE

Reviewer Information

The reviewer's name or initials, date completed, and unit chief's name or initials should be placed in last section of the WQAR. The signature or initials of the unit chief signify that he approves of the contents. If the WQAR needs to be revised, list the revised date next to the date completed.

Peer Review, Tracking Database, Letters, Mailing, and Filing

When a draft WQAR has been completed, the draft must be sent to other Central Office (CO) WPP and regional office staff for review and comment. The peer review and comment period must be a minimum of three business days, but can be longer depending on the complexity of the water quality review. Peer review of the draft version will enable staff to review and comment on effluent limits found in the WQAR and the derivation methodology used. Water Pollution Control Branch Permits & Engineering staff conducting water quality and antidegradation reviews should be included in the distribution list as well as other members of CO staff involved in the project (e.g. state revolving fund or TMDL personnel). In

addition, the following regional office staff must be copied for any water quality and antidegradation reviews developed for their region:

Southwest Region:
1. Kevin Hess
2. Kristen Pattinson

Southeast Region:
1. David Stinson
2. Bruce Vollner

St. Louis Region:
1. Tom Siegel
2. Jim Rhodes

Northeast Region:
1. Philip Wilson
2. Lantz Tipton

Kansas City Region:
1. Andrea Collier
2. Sunny Wellesley
3. Dorothy Franklin

During the peer review period, we provide the applicant a comment period of 10 working days. At the end of the peer review period, comments and suggestions for edits should be incorporated and a final copy of the WQAR presented to the Unit Chief for review. The original, approved and signed WQAR is sent to the requestor and copies sent to the region, CO file, and others involved WPP staff (state revolving fund or TMDL personnel).

The tracking database is an important communication tool and will be maintained by the reviewer and the clerical staff. Once the clerical staff have mailed the WQAR and the preliminary determination to the applicant, the reviewer will enter a "complete" for the project and the date completed. After the 30-day appeal period has expired, projects are final and can be filed in the file room (see the Attachment #3: *Water Quality and Antidegradation Review Administrative/Folder Process*). Finally, the tracking database entry in the "status" field should be marked as final.

Additional information:
http://www.dnr.mo.gov/env/wpp/permits/antideg-implementation.htm

Below is a list and brief description of revisions:

Version	Date Completed	Description
Version 1.0	unknown	Original version written by Mohsen Dkhili and John Hoke.
Version 1.1	January 2010	Revised outline and rewrites by Todd Blanc. Updated to include antidegradation rule, new procedures and information.