

RATIONALE

CDPS GENERAL PERMIT - DOMESTIC WASTEWATER TREATMENT FACILITIES
DISCHARGE TO RECEIVING WATERS THAT ARE
UNCLASSIFIED; OR USE PROTECTED; OR ARE DESIGNATED
AS THREATENED AND ENDANGERED SPECIES HABITAT

AUTHORIZATION TO DISCHARGE UNDER THE
COLORADO DISCHARGE PERMIT SYSTEM (CDPS)
PERMIT NUMBER COG-589000

This is an amendment to the general permit for domestic wastewater treatment facilities which discharge to receiving waters that are unclassified, or have a “Use Protected” designation, or are listed as threatened and endangered species habitat (including the 100 year flood plain). The most significant changes in this renewal are as follows:

A. Coverage Changes

This permit has been amended to allow for discharges to state waters designated as threatened and endangered species habitat, which includes the 100 year flood plains. Also, the previous permit contained a clause that limited discharges to Use Protected stream segments with Class 2 Aquatic Life classifications. This permit has been amended to include Class 1 Aquatic Life segments as well as the Class 2 segments.

B. Formatting and Boilerplate Permit Requirements

The formatting, including numbering, has been modified for consistency, and to allow for easier reading. Additionally, the language in Part I, Part II and Part III of the permit were updated to include the most recently available boilerplate language for domestic permits.

C. Total Suspended Solids Monitoring

Influent Total Suspended Solids (TSS) monitoring has been deleted for lagoon systems in accordance with Regulation 62.4(3) of the Regulations for Effluent Limitations. Note that influent TSS monitoring requirements are maintained for mechanical plants as the TSS percent removal requirements apply for mechanical plants.

D. Discharges to 303(d) Listed Waters (Regulation No. 93)

The original general permit included certification requirements under Part I.A.3.e. that specifically excluded discharges with the reasonable potential to cause new or increased loadings for pollutants limited in the permit that discharged to streams included in Regulation 93 (Colorado’s 303(d) list of impaired waters). Under this amendment, the permit has been reworked to: (1) clarify that facilities discharging to 303(d) listed waters may still qualify under this permit; (2) to allow for new or increased loadings to be included as limits as long as they are based on an approved total maximum daily load, where established, or the water quality standard; and (3) to allow for reporting only to be established for pollutants from those facilities not included in the TMDL or where it is not known if the pollutant is of concern for the particular facility.

For facilities that discharge to 303(d) listed streams without an approved TMDL where pollutants are limited in this permit, the facility may still qualify for coverage under this permit. For 303(d) listed streams for pH, fecal coliform or Escherichia Coli (E. Coli), and total inorganic nitrogen/nitrate where a TMDL has not yet been approved, the Division will include the water quality standard as the limit. For facilities discharging to streams on the 303(d) list for ammonia without the benefit of an approved TMDL, limitations will be determined based on a zero low flow condition, and the appropriate table in the permit as discussed later in this rationale.

E. Mixing Zones

Although the original general permit (Part I.A.3.g) included certification requirements that presumed an extreme dilution ratio, the Division had no intent of excluding facilities from coverage under the permit based on dilution ratios. Thus, the permit has been revised to reflect no presumption of mixing zone. The permit writer will be required to evaluate dilution ratios and determine appropriate mixing zone requirements consistent with Section 31.10 of The Basic Standards and Methodologies for Surface Water.

Exclusion from further mixing zone determinations, based on Extreme Mixing Ratios, may be granted if the ratio of the design flow to the chronic low flow (30E3) is greater than 2:1 or if the ratio of the chronic low flow to the design flow is greater than 20:1. The certification will specify whether the extreme mixing ratio has been met based on the calculated dilution ratio.

If the Extreme Mixing Ratio has been met, no additional requirements will be prescribed in the certification. If the Extreme Mixing Zone Ratio has not been met, a compliance schedule will be prescribed in Part I.B.6 of the permit to obtain the necessary information, which will be used to complete the testing of exclusion thresholds, and if applicable, to determine any available dilution.

F. Phosphorous Limits

This amendment provides the ability to include phosphorous limits, where such limit(s) have been established pursuant to the Division's watershed protection control regulations. Note that these limits only apply to dischargers, either directly, or indirectly (e.g., via tributary) to Dillon Reservoir, Cherry Creek Reservoir, Chatfield Reservoir, and the Bear Creek Watershed as contained in Regulation Nos. 71-74. These regulations set forth specific 30-day average phosphorous concentration limits as well as cumulative annual loading limits for phosphorous for specific dischargers. Where a specific facility is identified in these regulations and limits are assigned, the permit will incorporate such limitations and will require monitoring and reporting requirements for phosphorous.

G. Limits for Discharges to Unclassified Waters

The pH, BOD₅ (or CBOD₅), TSS, percent removal, total residual chlorine and oil & grease limits for dischargers to unclassified water are established based on the limits in the Regulations for Effluent Limitations. Note that according to Section 62.4(1) of the regulation, the total residual chlorine limit is waived if the discharge is to an irrigation ditch. Section 62.4(1) also indicates that numeric limitations for fecal coliform shall be determined. Available studies indicate that E. Coli, which is a subset of fecal coliform, is a better predictor of potential human health impacts from waterborne pathogens, and E Coli standards are replacing the dual standard for E. Coli and fecal coliform currently in the regulations. The pathogen limits will only be established for E. Coli.

The Division's Policy Concerning Escherichia coli versus Fecal Coliform establishes a maximum E. Coli 30-day geometric mean limit of 2000 colonies/100 ml and also establishes the 7-day geometric mean limit for E. Coli as two times the 30-day geometric mean limit; consequently, a 30-day geometric mean limit of 2000 colonies/100 ml and a 7-day geometric mean limit of 4000 colonies/100 ml have resulted.

Water quality standards do not apply to unclassified waters, however, Regulation 61.8(10)(a) explains that "a permit for a point source discharge to a ditch or other man-made conveyance structure shall include such provisions as are necessary to (i) protect agricultural, domestic, industrial, and municipal beneficial uses made of the waters, which use or uses were decreed and in existence prior to the inception of the discharge, and (ii) assure compliance with any applicable water quality standards for waters of the state that may be affected by the discharge." If a discharge will have no impact on existing uses of irrigation ditches or the downstream classified waters, the discharge is not subject to water quality standards and instead are subject solely to Regulation 62.

If the discharge is to an unclassified water that has the potential to reach a classified state water that is designated as Use Protected or is a T&E water, then the applicable limitations for those discharges may apply as outlined in the permit. If the discharge has the potential to reach a classified state water that is designated as Outstanding or Undesignated, then the discharge cannot be permitted under this general permit. If the discharge may reach the Colorado River basin, salinity monitoring and other salinity requirements, as discussed later in this rationale, may apply.

H. Discharge to Use Protected Waters

The previous permit limited discharges to Use Protected waters to those with only Class 2 Aquatic Life classifications. This has been changed to allow for discharges to use protected waters with both Class 1 and Class 2 Aquatic Life classifications.

The permit has been amended to allow for mixing zone considerations, and therefore, for the use of dilution in calculating the effluent limitations. The Division has calculated the Water Quality Based Effluent Limitations (WQBELs) that apply to TRC, E. Coli, and ammonia. These WQBELs were developed using the Division's mass balance approach and the Ammonia Toxicity Model (AMMTOX). A brief discussion of the mass balance calculation, the AMMTOX model, and the criteria used for these parameters follows.

1. WQBELs

a. Mass Balance Approach

The Division's standard analysis consists of steady-state, mass-balance calculations for most pollutants and modeling for pollutants such as ammonia. The mass-balance equation is used by the Division to calculate the acute (daily maximum) and chronic (30-day average) WQBELs. The mass-balance equation accounts for the upstream concentration of a pollutant at the existing quality, annual low flow, effluent flow and the water quality standard. The mass-balance equation is expressed as:

$$M_2 = \frac{M_3Q_3 - M_1Q_1}{Q_2}$$

Where,

Q_1	= Upstream low flow (acute or chronic)
Q_2	= Average daily effluent flow (design hydraulic capacity)
Q_3	= Downstream flow ($Q_1 + Q_2$)
M_1	= In-stream background pollutant concentrations at the existing quality (ambient water quality)
M_2	= Calculated acute and chronic WQBELs
M_3	= Maximum allowable in-stream pollutant concentration (water quality standards)

b. Low Flows

Chronic and acute in-stream low flows for each month will be determined based on at least the most recent ten-year period of record of available data. Where only limited data are available over the past 10 years or where an extended period of data would be more representative, a more extended period of record of data may be used. Use of daily in-stream flow data obtained from the United States Geological Survey, the Colorado Division of Water Resources, or other local or regional organizations is the preferred method.

Where daily data are available and meet the criteria for the U. S. Environmental Protection DFLOW program, this software will be used to calculate monthly acute and chronic low flows. However, in the absence of daily data from these sources, the Division may rely on estimates from other professionals familiar with the location and other generally accepted methods of estimating flows including but not limited to watershed ratios, visual observations, and other such procedures.

Except for ammonia, where monthly low flows are incorporated into state-approved models, the lowest of the monthly chronic low flows will be used in the calculation of water quality-based effluent limits (WQBELs).

c. Ambient Water Quality

Ambient water quality (a.k.a., "existing quality") shall normally be determined based on the data from the most recent five-year period of record. Where limited data are available, a more extended period of record of data may be used. For most pollutants, existing quality is determined to be the 85th percentile. For pathogens such as E. Coli, existing quality is determined to be the geometric mean. For ammonia, the mean concentration is the value used for headwater conditions for ammonia modeling. Note that in the absence of data immediately upstream of the facility, surrogate data from further upstream locations or downstream locations may be used as representative when establishing existing ambient water quality.

2. Discussion of Limitations

a. Total Residual Chlorine

Tables A and B of the permit contain the modeled conditions for different dilution ratios and ambient water quality concentrations. These tables show relative dilution on the upper axis and approximate upstream concentration on the left hand axis. The values in the tables were calculated using the appropriate stream standards in a simple mass balance equation to establish the maximum allowed effluent limit. To look up the appropriate chronic TRC limit the chronic relative dilution is calculated by comparing the chronic low flow (30E3) to the design flow, and then use the upstream TRC concentration (85th% of appropriate data). To look up the appropriate acute TRC limit the chronic relative dilution is calculated by comparing the acute low flow (1E3) to the design flow, and then using the upstream TRC concentration (85th% of appropriate data). In many cases the upstream water quality will be 0 because of the volatility of TRC in the environment. All axis values should be rounded to the nearest whole number on either axis. The value indicated by using these two values will be the required effluent limits. The TRC values in the tables are capped at the maximum value of 0.5 mg/l allowed by Regulation No. 62. If the discharger wishes to have a more site-specific limit calculated this will need to be done in an individual permit for the WWTF.

b. E. Coli

Tables G, H, and I of the permit contain the modeled conditions for different dilution ratios and ambient water quality concentrations. The tables show relative dilution on the upper axis and approximate upstream concentration on the left hand axis. The values in the tables were calculated using the appropriate stream standard in a simple mass balance equation to establish the maximum allowed effluent limit. To look up the appropriate chronic E. coli limit the relative dilution is calculated by comparing the chronic low flow (30E3) to the design flow, and then use the upstream E. coli concentration (geometric mean of appropriate data). All values should be rounded to the nearest whole number on either axis. The value indicated by using these two values will be the required effluent limit. The E. coli values in the tables are capped at the maximum value of 2,000 #/100 ml, per Division procedure. To establish the appropriate 7-day average E. coli limit, the chronic limit should be multiplied by 2. If the discharger wishes to have a more site-specific limit calculated this will need to be done in an individual permit for the WWTF.

c. Ammonia

The Ammonia Toxicity Model (AMMTOX) requires input of pH and temperature water quality data to establish setpoint and headwater conditions, as well as the mean ambient water quality concentration for ammonia for use in establishing ammonia headwater conditions. Additionally, the model requires input of pH and temperature data to represent facility contributions. The model calculates acute and chronic monthly values of maximum allowable in-stream total ammonia that will protect the in-stream ammonia standard and locates the point on the stream where such values are at a minimum - which is referred to as the "critical point".

The AMMTOX model may be calibrated for a number of variables. However, it is the Division's approach to use the default assumptions for these variables when calculating ammonia chronic and acute WQBELs for general permits. The general default assumptions are:

- Stream velocity = $0.3Q^{0.4d}$
- Default ammonia loss rate = 6/day
- pH amplitude was assumed to be medium
- Default times for pH maximum, temperature maximum, and time of day of occurrence
- pH rebound was set at the default value of 0.2 s.u. per mile
- Temperature rebound was set at the default value of 0.7 degrees C per mile.

The AMMTOX model also includes provisions for designating salmonids, a fish species, as absent or present, and fish in early life stages as absent or present. Division procedures dictate that salmonids are present only in streams classified as Cold 1 or Cold 2, and absent in streams classified as Warm 1 or Warm 2. Division procedures also dictate that early life stages of fish are present all year round in Cold 1 or Cold 2 streams, and are present only from April through August in Warm 1 and Warm 2 streams. Note that these same default assumptions and Division procedures are used when developing ammonia chronic and acute WQBELs for individual permits. If site-specific assumptions are necessary, the Division will consider such only under an individual permit.

Tables C, D, E and F in the permit were developed by the Division to facilitate the calculations of monthly effluent limitations for total ammonia in COG-589000 General Permits. The tables show relative dilution on the upper axis and the month on the left hand axis. The values in the tables were calculated using the AMMTOX ammonia model to establish the maximum allowed total ammonia effluent limit. The AMMTOX model used conservative upstream ammonia, pH, and temperature, with conservative downstream set-point conditions. The effluent pH and temperature for the AMMTOX model were established from WWTF effluent data from across the state. To look up the appropriate monthly chronic total ammonia limit the relative dilution is calculated by comparing the chronic low flow (30E3) to the design flow, and then use the appropriate month. To look up the appropriate acute total ammonia limit the chronic relative dilution is calculated by comparing the acute low flow (1E3) to the design flow, and then use the appropriate month. All dilution values should be rounded to the nearest whole number. The value indicated by using the dilution and the corresponding month will be the required effluent limit. The total ammonia values in the tables are capped at the maximum value of 50 mg/l, because most domestic WWTF influent is less than 50 mg/l of total ammonia. If the discharger wishes to have a more site-specific limit calculated this will need to be done in an individual permit for the WWTF.

d. Total Inorganic Nitrogen

The Division has been incorporating a total inorganic nitrogen (T.I.N.) limit into individual domestic and industrial permits on a case-by-case basis, pursuant to determinations that nitrogen discharges can have the reasonable potential to cause or contribute to nitrate standard exceedances at the point of intake to a water supply. Because nitrite and ammonia can also form nitrate, compliance with the nitrate standard is achieved through imposition of a Total Inorganic Nitrogen (T.I.N.) limit. T.I.N. effectively measures nitrate and its precursors including nitrite and ammonia. Discharges to stream segments with a nitrate standard based on a water supply classification may be subject to a limitation for TIN. The limitation will typically be calculated based on the mass balance approach.

e. Metals Cyanide and Other Pollutants

Metals, cyanide and other pollutants (e.g., chloride, sulfate, sulfide, organics, etc.) are pollutants that are typically not evaluated for small domestic facilities. Consistent with individual minor domestic permits, the Division believes that based upon the size of the discharges regulated under this permit, the lack of industrial contributors, and the fact that no unusually high metals or other unusual pollutant concentrations are expected to be found in the wastewater effluent from small domestic facilities, metals, cyanide and other such pollutants need not be considered.

However, Division procedures dictate monitoring in individual small domestic facility permits for 303(d) listed pollutants as found in Water-Quality-Limited Segments Requiring Total Maximum Daily Loads, Regulation 93, regardless of the previous determination that the small domestic facility shows no reasonable potential to cause or contribute to exceedances of the standard. Additionally, where the pollutant is being evaluated for potential addition to the 303(d) list as found on Colorado's Monitoring and Evaluation List, Regulation 94, monitoring will also been established. To be consistent, this permit will therefore establish monitoring for the pollutants listed in Regulations 93 and 94 for a facility's respective receiving stream, where such pollutants are not quantitatively limited in this permit.

Limitations for metals, cyanide and other parameters, which do not have a wasteload allocated in a TMDL, will typically be based on the mass balance approach to calculating WQBELs.

I. Discharges to Threatened and Endangered Species Designated Waters, Including the 100 Year Flood Plain

Discharges to T&E waters are subject to the Memorandum of Agreement between the Division and the U.S. Fish and Wildlife Service. In summary, a discharge to a T&E water must achieve one of 3 options: 1) The permit contains end of pipe limitations based on the water quality standards; 2) the permittee installs a diffuser, and is then granted a portion of the assimilative capacity of the receiving stream; or 3) the discharge is relocated to a segment that is not designated as T&E habitat.

This general permit assumes that the discharge will meet end of pipe limitations that are set out in Part I.B.7.c of the permit. Tables J, K and O outline the ammonia and E. Coli limitations that would be associated with the appropriate standards. Limitations for other parameters would be set at the more stringent of the applicable water quality standards or the standards set forth in Regulation 62.

If the facility determines that the installation of a diffuser would be desirable, limitations may be set in accordance with the limits for Use Protected waters in Part I.B.7.b of the permit. Note that the Division must approve, with the concurrence of the U.S. Fish and Wildlife Service, the installation plans for the diffuser, and will determine the appropriate allowable dilution that would be

used to determine the limitations under Part I.B.7.b of the permit.

J. Monitoring Requirements

Monitoring requirements in the original and all previous iterations of this general permit were based on the Division's Water Quality Permits Policies and Procedures: Sample Frequency and Sample Type Domestic Wastewater Treatment Facilities. Almost identical monitoring frequencies and sample types are again established in this amendment with several additions. First, for chlorine, monitoring is only required when in use consistent with Division procedures. Second, monitoring for ammonia, nitrate and phosphorous, are established consistent with the above mentioned policy. Note that for phosphorous, where applied, monitoring requirements are also based on the respective regulation (e.g., Regulation 71 through 74).

Reduced monitoring frequencies may be requested and can be accommodated under this permit in accordance with the procedures set out in the draft Baseline Monitoring Frequency, Sample Type, and Reduced Monitoring Frequency Policy for Industrial and Domestic Wastewater Treatment Facilities. Where the facility qualifies for reduced monitoring frequencies, such shall be noted in the certification.

K. Salinity Requirements

The general permit has been modified to indicate that the certification will discuss the applicability of salinity monitoring and other additional requirements, in conformance with Section 61.8(2)(l) of the Colorado Discharge Permit System Regulations. The average influent TDS concentration is subtracted from the average effluent TDS concentration to determine if the average annual incremental increase exceeds 400 mg/l. If not, monitoring can continue with no additional salinity requirements applied in the permit. If the average annual incremental increase is greater than 400 mg/l, the facility will only be subject to additional requirements if the discharged salinity loading is greater than 1 ton per day or 366 tons/year. The certification will indicate if additional salinity reporting requirements are waived and upon what basis. Where the additional requirements apply, which may include the imposition of a compliance schedule in Part I.B.6 of the permit, the certification will indicate such.

Andrew Ross
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No public comments were received during the Public Notice for this amendment. Minor editorial changes were made from the public notice version.

Andrew Ross
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