Water Quality Assessment
Cucharas River
City of Walsenburg, Walsenburg WWTF

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I. Water Quality Assessment Summary

Table A-1 includes summary information related to this WQA. This summary table includes key regulatory starting points used in development of the WQA such as: receiving stream information; threatened and endangered species; 303(d) and Monitoring and Evaluation listings; low flow and facility flow summaries; and a list of parameters evaluated.

Table A-1
WQA Summary

Facility Information			
Facility Name	**Permit Number**	**Design Flow (max 30-day ave, MGD)**	**Design Flow (max 30-day ave, CFS)**
Walsenburg	CO0020745	0.75	1.2

Receiving Stream Information			
Receiving Stream Name	**Segment ID**	**Designation**	**Classification(s)**
Cucharas River	COARMA14	Undesignated	Aquatic Life Warm 1 Recreation Class E Agriculture

Low Flows (cfs)				
Receiving Stream Name	**1E3 (1-day)**	**7E3 (7-day)**	**30E3 (30-day)**	**Ratio of 30E3 to the Design Flow (cfs)**
Cucharas River	0	0	0	0:1

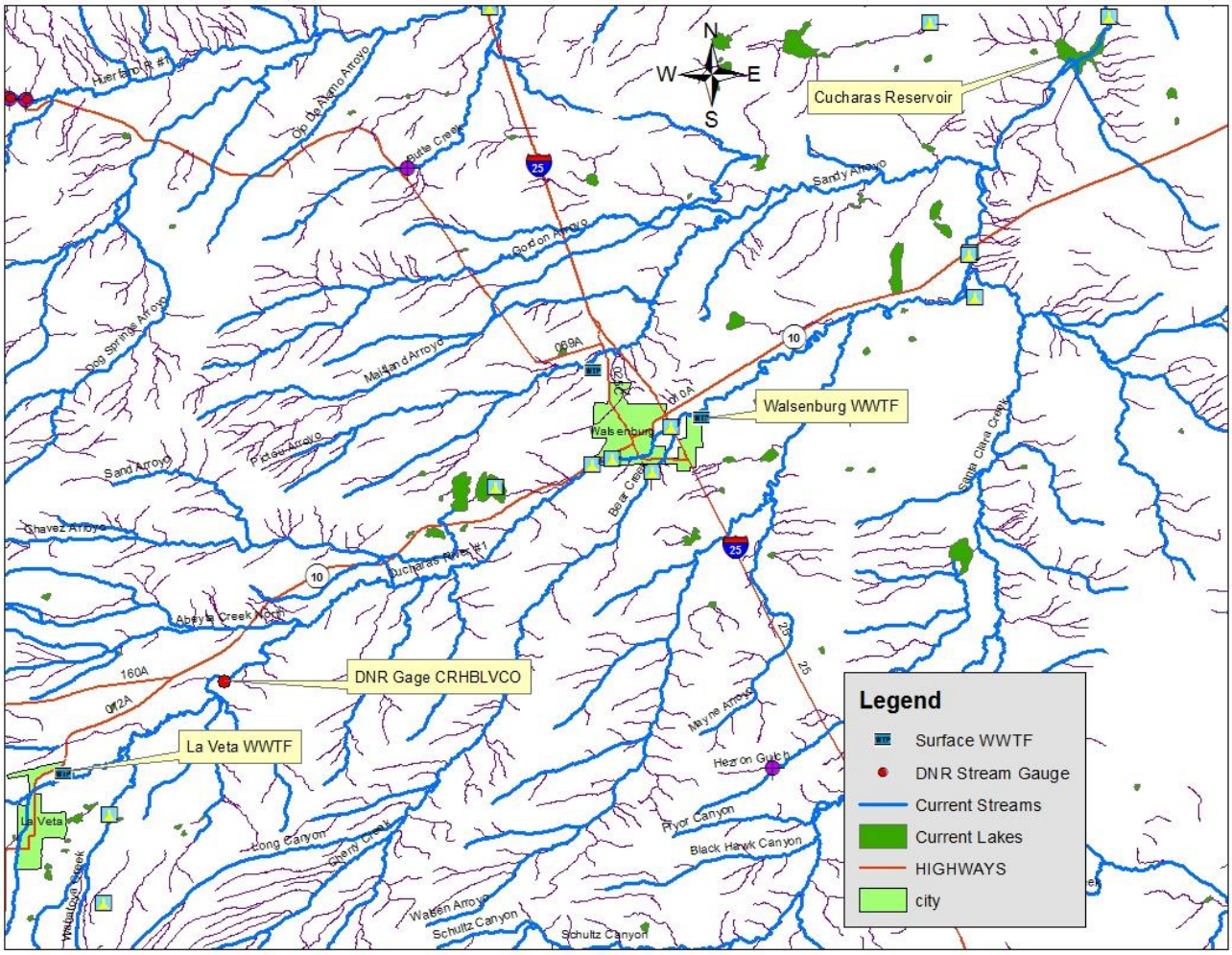
Regulatory Information					
T&E Species	**303(d) (Reg 93)**	**Monitor and Eval (Reg 93)**	**Existing TMDL**	**Temporary Modification(s)**	**Control Regulation**
No	Selenium	None	No	None	None

Pollutants Evaluated
Ammonia, *E. Coli*, TRC, Selenium, Temp, Nutrients

II. Introduction

The water quality assessment (WQA) of Cucharas River near the City of Walsenburg Wastewater Treatment Facility (WWTF), located in Huerfano County, is intended to determine the assimilative capacities available for pollutants found to be of concern. This WQA describes how the water quality based effluent limits (WQBELs) are developed. These parameters may or may not appear in the permit with limitations or monitoring requirements, subject to other determinations such as reasonable potential analysis, evaluation of federal effluent limitation guidelines, implementation of state-based technology based limits, mixing zone analyses, 303(d) listings, threatened and endangered species listing, or other requirements as discussed in the permit factsheet. Figure A-1 contains a map of the study area evaluated as part of this WQA.

FIGURE A-1



The City of Walsenburg WWTF discharges to the Cucharas River, within Stream Segment 14 of the Middle Arkansas Sub-basin, Arkansas River Basin, found in the Classifications and Numeric Standards for the Arkansas River Basin (Regulation No. 32) (COARMA14).

This segment is composed of the "Mainstem of the Cucharas River from the point of diversion for the Walsenburg public water supply to the outlet of Cucharas Reservoir". Stream segment COARMA14 is classified for Aquatic Life Warm 1, Recreation Class E and Agriculture

Information used in this assessment includes data gathered from the City of Walsenburg WWTF, the Division, the Colorado Division of Water Resources (DWR), the U.S. Environmental Protection Agency (EPA), the U.S. Geological Survey (USGS) and communications with the local water commissioner. The data used in the assessment consist of the best information available at the time of preparation of this WQA analysis.

III. Water Quality Standards

Narrative Standards

Narrative Statewide Basic Standards have been developed in Section 31.11(1) of the regulations, and apply to any pollutant of concern, even where there is no numeric standard for that pollutant. Waters of the state shall be free from substances attributable to human-caused point source or nonpoint source discharges in amounts, concentrations or combinations which:

for all surface waters except wetlands;

(i) can settle to form bottom deposits detrimental to the beneficial uses. Depositions are stream bottom buildup of materials which include but are not limited to anaerobic sludge, mine slurry or tailings, silt, or mud; or (ii) form floating debris, scum, or other surface materials sufficient to harm existing beneficial uses; or (iii) produce color, odor, or other conditions in such a degree as to create a nuisance or harm existing beneficial uses or impart any undesirable taste to significant edible aquatic species or to the water; or (iv) are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life; or (v) produce a predominance of undesirable aquatic life; or (vi) cause a film on the surface or produce a deposit on shorelines; and

for surface waters in wetlands;

(i) produce color, odor, changes in pH, or other conditions in such a degree as to create a nuisance or harm water quality dependent functions or impart any undesirable taste to significant edible aquatic species of the wetland; or (ii) are toxic to humans, animals, plants, or aquatic life of the wetland.

In order to protect the Basic Standards in waters of the state, effluent limitations and/or monitoring requirements for any parameter of concern could be put in CDPS discharge permits.

Standards for Organic Parameters and Radionuclides

Radionuclides: Statewide Basic Standards have been developed in Section 31.11(2) and (3) of The Basic Standards and Methodologies for Surface Water to protect the waters of the state from radionuclides and organic chemicals.

In no case shall radioactive materials in surface waters be increased by any cause attributable to municipal, industrial, or agricultural practices or discharges to as to exceed the following levels, unless alternative site-specific standards have been adopted. Standards for radionuclides are shown in Table A-2.

Table A-2 Radionuclide Standards	
Parameter	**Picocuries per Liter**
Americium 241*	0.15
Cesium 134	80
Plutonium 239, and 240*	0.15
Radium 226 and 228*	5
Strontium 90*	8
Thorium 230 and 232*	60
Tritium	20,000

*Radionuclide samples for these materials should be analyzed using unfiltered (total) samples. These Human Health based standards are 30-day average values.

Organics: The organic pollutant standards contained in the Basic Standards for Organic Chemicals Table are applicable to all surface waters of the state for the corresponding use classifications, unless alternative site-specific standards have been adopted. These standards have been adopted as "interim standards" and will remain in effect until alternative permanent standards are adopted by the Commission. These interim standards shall not be considered final or permanent standards subject to antibacksliding or downgrading restrictions. Although not reproduced in this WQA, the specific standards for organic chemicals can be found in Regulation 31.11(3).

In order to protect the Basic Standards in waters of the state, effluent limitations and/or monitoring requirements for radionuclides, organics, or any other parameter of concern could be put in CDPS discharge permits.

The aquatic life standards for organics apply to all stream segments that are classified for aquatic life. The water supply standards apply only to those segments that are classified for water supply. The water + fish standards apply to those segments that have a Class 1 aquatic life and a water supply classification. The fish ingestion standards apply to Class 1 aquatic life segments that do not have a water supply designation. The water + fish and the fish ingestion standards may also apply to Class 2 aquatic life segments, where the Water Quality Control Commission has made such determination.

Because stream segment COARMA14 of the Cucharas River is classified for Aquatic Life Warm 1, without a water supply designation, the fish ingestion, and aquatic life standards apply to this discharge.

Salinity and Nutrients

Salinity: Regulation 61.8(2)(l) contains requirements regarding salinity for any discharges to the Colorado River Watershed. The Division's policy, Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops, may be applied to discharges where an agricultural water intake exists downstream of a discharge point. Limitations for electrical conductivity and sodium absorption ratio may be applied in accordance with this policy.

Nutrients

Phosphorus: Regulations 71, 72, 73 and 74, for Dillon Reservoir Watershed, Cherry Creek Reservoir Watershed, Chatfield Reservoir Watershed and the Bear Creek Watershed, contain requirements for phosphorus concentrations and phosphorus annual loadings for point source dischargers. If a facility discharges to one of these watersheds, a phosphorus allocation may be necessary, and limitations and annual loadings may be added to a permit.

Phosphorus and Total Inorganic Nitrogen: Regulation 85, the *Nutrients Management Control Regulation* has been adopted by the Water Quality Control Commission and became effective September 30, 2012. This regulation contains requirements for phosphorus and Total Inorganic Nitrogen (TIN) concentrations for some point source dischargers. Limitations for phosphorus and TIN may be applied in accordance with this regulation.

Temperature

Temperature shall maintain a normal pattern of diurnal and seasonal fluctuations with no abrupt changes and shall have no increase in temperature of a magnitude, rate, and duration deemed deleterious to the resident aquatic life. This standard shall not be interpreted or applied in a manner inconsistent with section 25-8-104, C.R.S.

Segment Specific Numeric Standards

Numeric standards are developed on a basin-specific basis and are adopted for particular stream segments by the Water Quality Control Commission. The standards in Table A-3 have been assigned to stream segment COARMA14 in accordance with the *Classifications and Numeric Standards for Arkansas River Basin*.

Table A-3 In-stream Standards for Stream Segment COARMA14
Physical and Biological
Dissolved Oxygen (DO) = 5 mg/l, minimum
pH = 6.5 - 9 su
E. coli chronic = 126 colonies/100 ml
Temperature March-Nov = 27.5° C MWAT and 28.6° C DM
Temperature Dec-Feb = 13.8° C MWAT and 14.3° C DM
Chlorophyll a = 150 mg/m^2
Inorganic
Total Ammonia acute and chronic = TVS
Chlorine acute = 0.019 mg/l
Chlorine chronic = 0.011 mg/l
Free Cyanide acute = 0.005 mg/l
Sulfide chronic = 0.002 mg/l
Boron chronic = 0.75 mg/l
Nitrite acute = 0.5 mg/l
Nitrate acute = 100 mg/l
Phosphorus = 170 µg/l (tot)*
Metals
Dissolved Arsenic acute = 340 µg/l
Total Recoverable Arsenic chronic = 7.6 µg/l
Dissolved Cadmium acute and chronic = TVS
Total Recoverable Trivalent Chromium chronic = 100 µg/l
Dissolved Trivalent Chromium acute and chronic = TVS
Dissolved Hexavalent Chromium acute and chronic = TVS
Dissolved Copper acute and chronic = TVS
Total Recoverable Iron chronic = 1000 µg/l
Dissolved Lead acute and chronic = TVS
Dissolved Manganese acute and chronic = TVS
Total Recoverable Molybdenum chronic = 160 µg/l
Total Mercury chronic = 0.01 µg/l
Dissolved Nickel acute and chronic = TVS
Dissolved Selenium acute and chronic = TVS
Dissolved Silver acute and chronic = TVS
Dissolved Zinc acute and chronic = TVS

*Note that total phosphorus and chlorophyll *a* standards apply only upstream of the facilities listed in Regulation 32.5(4); therefore, these standards do not apply to the Walsenburg WWTF at this time.

Table Value Standards and Hardness Calculations

As metals with standards specified as TVS are not included as parameters of concern for this facility, the hardness value of the receiving water and the subsequent calculation of the TVS equations is inconsequential and is therefore omitted from this WQA.

Total Maximum Daily Loads and Regulation 93 – Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List

This stream segment is on the 303(d) list of water quality impacted streams for selenium.

For a receiving water placed on this list, the Restoration and Protection Unit is tasked with developing the Total Maximum Daily Loads (TMDLs) and the Waste Load Allocation (WLAs) to be distributed to the affected facilities. WLAs for selenium have not yet been established and the allowable concentration calculated in the following sections may change upon further evaluation by the Division.

IV. Receiving Stream Information

Low Flow Analysis

The Colorado Regulations specify the use of low flow conditions when establishing water quality based effluent limitations, specifically the acute and chronic low flows. The acute low flow, referred to as 1E3, represents the one-day low flow recurring in a three-year interval, and is used in developing limitations based on an acute standard. The 7-day average low flow, 7E3, represents the seven-day average low flow recurring in a 3 year interval, and is used in developing limitations based on a Maximum Weekly Average Temperature standard (MWAT). The chronic low flow, 30E3, represents the 30-day average low flow recurring in a three-year interval, and is used in developing limitations based on a chronic standard.

As flow data for the receiving stream is not available, the local water commissioner was contacted to obtain an estimate of the low flow for this receiving water. According to discussions with the local water commissioner on 08/07/14, the Cucharas River upstream of the Walsenburg WWTF has a low flow of zero. According to the water commissioner, senior water rights dry up the river, upstream of the Walsenburg WWTF, during the irrigation season. Also DFLOW calculations (CO0032409-La Veta WQA, 03/07/14), show that the nearest gage station, CRHBLVCO (Cucharas River at Harrison Bridge near La Veta) located approximately 12 miles upstream of the Walsenburg WWTF has low flow of zero.

Table A-4

Low Flows for Cucharas River at the Walsenburg WWTF

Low Flow (cfs)	*Annual*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
1E3 Acute	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7E3 Chronic	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30E3 Chronic	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The ratio of the low flow of Cucharas River to the Walsenburg WWTF design flow is 0:1.

Note that since the low flow has been determined to be zero, the ambient water quality discussion is unnecessary and has therefore been deleted in this WQA. This is explained in more detail under the Technical Information discussion in Section VI.

Mixing Zones

The amount of the available assimilative capacity (dilution) that may be used by the permittee for the purposes of calculating the WQBELs may be limited in a permitting action based upon a mixing zone analysis or other factor. These other factors that may reduce the amount of assimilative capacity available in a permit are: presence of other dischargers in the vicinity; the presence of a water diversion downstream of the discharge (in the mixing zone); the need to provide a zone of passage for aquatic life; the likelihood of bioaccumulation of toxins in fish or wildlife; habitat considerations such as fish spawning or nursery areas; the presence of threatened and endangered species; potential for human exposure through drinking water or recreation; the possibility that aquatic life will be attracted to the effluent plume; the potential for adverse effects on groundwater; and the toxicity or persistence of the substance discharged.

Unless a facility has performed a mixing zone study during the course of the previous permit, and a decision has been made regarding the amount of the assimilative capacity that can be used by the facility, the Division assumes that the full assimilative capacity can be allocated. Note that the review of mixing study considerations, exemptions and perhaps performing a new mixing study (due to changes in low flow, change in facility design flow, channel geomorphology or other reason) is evaluated in every permit and permit renewal.

If a mixing zone study has been performed and a decision regarding the amount of available assimilative capacity has been made, the Division may calculate the water quality based effluent limitations (WQBELs) based on this available capacity. In addition, the amount of assimilative capacity may be reduced by T&E implications.

Since the receiving stream has a zero low flow as calculated above, the WQBELs would be equal to the WQS, and therefore consideration of full or reduced assimilative capacity is inconsequential.

Ambient Water Quality

The Division evaluates ambient water quality based on a variety of statistical methods as prescribed in Section 31.8(2)(a)(i) and 31.8(2)(b)(i)(B) of the *Colorado Department of Public Health and Environment Water Quality Control Commission Regulation No. 31*, and as outlined in the Division's Policy for Characterizing Ambient Water Quality for Use in Determining Water Quality Standards Based Effluent Limits (WQP-19). The ambient water quality was not assessed for Cucharas River because the background in-stream low flow condition is zero.

V. Facility Information and Pollutants Evaluated

Facility Information

The Walsenburg WWTF is located at NW ¼ of S2, T28S, R66W, 6th PM; East of the City and just east of the State prison on the south side of the Cucharas River, at 37° 37.84' latitude North and 104° 45.29" longitude West in Huerfano County. The current design capacity of the facility is 0.75 MGD (1.2 cfs). Wastewater treatment is accomplished using a mechanical wastewater treatment process. The technical analyses that follow include assessments of the assimilative capacity based on this design capacity.

An assessment of Division records indicate that there are three facilities with individual permit discharging to the same stream segment or other stream segments immediately upstream or downstream from this facility. Several other facilities discharging to the same stream segment or other stream segments immediately upstream or downstream from this facility are covered by general permits and have limitations set at the water quality standards. These facilities were not modeled in this WQA as they have a minimal impact on the ambient water quality. Other facilities were located more than ten miles from the Walsenburg WWTF and thus were not considered. The nearest discharger is:

- Town of La Veta WWTF (CO0032409), which discharges to the Cucharas River, at approximately 17 miles upstream from the Walsenburg WWTF.

Due to the in-stream low flow of zero, the assimilative capacities during times of low flow are not affected by nearby contributions. Therefore, modeling nearby facilities in conjunction with this facility was not necessary.

Pollutants of Concern

Pollutants of concern may be determined by one or more of the following: facility type; effluent characteristics and chemistry; effluent water quality data; receiving water quality; presence of federal effluent limitation guidelines; or other information. Parameters evaluated in this WQA may or may not appear in a permit with limitations or monitoring requirements, subject to other determinations such as a reasonable potential analysis, mixing zone analyses, 303(d) listings, threatened and endangered species listings or other requirement as discussed in a permit factsheet.

There are no site-specific in-stream water quality standards for BOD_5 or $CBOD_5$, TSS, percent removal, and oil and grease for this receiving stream. Thus, assimilative capacities were not determined for these parameters. The applicable limitations for these pollutants can be found in Regulation No. 62 and will be applied in the permit for the WWTF.

The following parameters were identified by the Division as pollutants to be evaluated for this facility:

- Total Residual Chlorine
- *E. coli*

- Ammonia
- Temperature
- Selenium (due to 303(d) listing)

Based upon the size of the discharge, the lack of industrial contributors, and the fact that no unusually high metals concentrations are expected to be found in the wastewater effluent, metals are not evaluated further in this water quality assessment.

During assessment of the facility, nearby facilities, and receiving stream water quality, no additional parameters were identified as pollutants of concern.

VI. Determination of Water Quality Based Effluent Limitations (WQBELs)

Technical Information

Note that the WQBELs developed in the following paragraphs, are calculations of what an effluent limitation may be in a permit. The WQBELs for any given parameter, will be compared to other potential limitations (federal effluent limitations guidelines, state effluent limitations, or other applicable limitation) and typically the more stringent limit is incorporated into a permit. If the WQBEL is the more stringent limitation, incorporation into a permit is dependent upon a reasonable potential analysis.

In-stream background data and low flows evaluated in Sections II and III are used to determine the assimilative capacity of Cucharas River near the Walsenburg WWTF for pollutants of concern, and to calculate the WQBELs. For all parameters except ammonia, it is the Division's approach to calculate the WQBELs using the lowest of the monthly low flows (referred to as the annual low flow) as determined in the low flow analysis. For ammonia, it is the standard procedure of the Division to determine monthly WQBELs using the monthly low flows, as the regulations allow the use of seasonal flows.

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 WQBELs, and accounts for the upstream concentration of a pollutant at the existing quality, critical low flow (minimal dilution), effluent flow and the water quality standard. The mass-balance equation is expressed as:

$$M_2 = \frac{M_3 Q_3 - M_1 Q_1}{Q_2}$$

Where,

Q_1 = Upstream low flow (1E3 or 30E3)
Q_2 = Average daily effluent flow (design capacity)
Q_3 = Downstream flow ($Q_1 + Q_2$)
M_1 = In-stream background pollutant concentrations at the existing quality
M_2 = Calculated WQBEL
M_3 = Water Quality Standard, or other maximum allowable pollutant concentration

When Q_1 equals zero, Q_2 equals Q_3, and the following results:

$$M_2 = M_3$$

Because the low flow (Q_1) for Cucharas River is zero, the WQBELs for Cucharas River for the pollutants of concern are equal to the in-stream water quality standards.

A more detailed discussion of the technical analysis is provided in the pages that follow.

Calculation of WQBELs

Using the mass-balance equation provided in the beginning of Section VI, the acute and chronic low flows set out in Section IV, ambient water quality as discussed in Section IV, and the in-stream standards shown in Section III, the WQBELs for were calculated. The data used and the resulting WQBELs, M_2, are set forth in Table A-5a for the chronic WQBELs and A-5b for the acute WQBELs.

***E. coli*:** For *E. coli*, the Division establishes the 7-day geometric mean limit as two times the 30-day geometric mean WQBEL and also includes maximum limits of 2,000 colonies per 100 ml (30-day geometric mean) and 4,000 colonies per 100 ml (7-day geometric mean). This 2000 colony limitation also applies to discharges to ditches.

Temperature:
The 7E3 low flow is 0, and the discharge is to effluent dependent (ephemeral stream without the presence of wastewater) water, therefore in accordance with Regulation 31.14(14), no temperature limitations are required.

Table A-5a
Chronic WQBELs

Parameter	Q_1 (cfs)	Q_2 (cfs)	Q_3 (cfs)	M_1	M_3	M_2
E. coli (#/100 ml)	0	1.2	1.2	1	126	***126***
TRC (mg/l)	0	1.2	1.2	0	0.011	***0.011***
Se, Dis (µg/l)	0	1.2	1.2	0	4.6	***4.6***

Table A-5b
Acute WQBELs

Parameter	Q_1 (cfs)	Q_2 (cfs)	Q_3 (cfs)	M_1	M_3	M_2
E. coli (#/100 ml)	0	1.2	1.2	1	252	***252***

TRC (mg/l)	0	1.2	1.2	0	0.019	***0.019***
Se, Dis (µg/l)	0	1.2	1.2	0	18.4	***18.4***

Ammonia: The Ammonia Toxicity Model (AMMTOX) is a software program designed to project the downstream effects of ammonia and the ammonia assimilative capacities available to each discharger based on upstream water quality and effluent discharges. To develop data for the AMMTOX model, an in-stream water quality study should be conducted of the upstream receiving water conditions, particularly the pH and corresponding temperature, over a period of at least one year.

Temperature and corresponding pH data sets reflecting upstream ambient receiving water conditions were available for the Cucharas River based on a study conducted by the Town of La Veta (La Veta WQA, 03/07/14), upstream of the Town of La Veta WWTF. The data, reflecting a period of record from January 2012 through December 2013, were used to establish the setpoint and average headwater conditions in the AMMTOX model.

Effluent pH data were also available from the Walsenburg discharge monitoring report and were used to establish the average facility contributions in the AMMTOX model. There were no temperature data available for the Walsenburg WWTF that could be used as adequate input data for the AMMTOX model. Therefore, the Division standard procedure is to rely on statistically-based, regionalized data for temperature compiled from similar facilities.

The AMMTOX may be calibrated for a number of variables in addition to the data discussed above. The values used for the other variables in the model are listed below:

- 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 su per mile
- Temperature rebound was set at the default value of 0.7 degrees C per mile.

The results of the ammonia analyses for the Walsenburg WWTF are presented in Table A-6.

Table A-6
AMMTOX Results for Cucharas River
at the Walsenburg WWTF

Design of 0.75 MGD (1.2 cfs)

Month	*Total Ammonia Chronic (mg/l)*	*Total Ammonia Acute (mg/l)*
January	5.4	22
February	6.8	29
March	4.1	14
April	3.5	14

May	3.6	17
June	3.5	22
July	3.0	26
August	3.1	22
September	3.2	19
October	3.7	19
November	3.9	19
December	4.9	19

VII. Antidegradation Evaluation

As set out in *The Basic Standards and Methodologies for Surface Water*, Section 31.8(2)(b), an antidegradation analysis is required except in cases where the receiving water is designated as "Use Protected." Note that "Use Protected" waters are waters "that the Commission has determined do not warrant the special protection provided by the outstanding waters designation or the antidegradation review process" as set out in Section 31.8(2)(b). The antidegradation section of the regulation became effective in December 2000, and therefore antidegradation considerations are applicable to this WQA analysis.

According to the *Classifications and Numeric Standards for Arkansas River Basin*, stream segment COARMA14 is Undesignated. Thus, an antidegradation review is required for this segment if new or increased impacts are found to occur.

Introduction to the Antidegradation Process

The antidegradation process conducted as part of this water quality assessment is designed to determine if an antidegradation review is necessary and if necessary, to complete the required calculations to determine the limits that can be selected as the antidegradation-based effluent limit (ADBEL), absent further analyses that must be conducted by the facility.

As outlined in the *Antidegradation Significance Determination for New or Increased Water Quality Impacts, Procedural Guidance* (AD Guidance), the first consideration of an antidegradation evaluation is to determine if new or increased impacts are expected to occur. This is determined by a comparison of the newly calculated WQBELs verses the existing permit limitations in place as of September 30, 2000, and is described in more detail in the analysis. Note that the AD Guidance refers to the permit limitations as of September 30, 2000 as the existing limits.

If a new or increased impact is found to occur, then the next step of the antidegradation process is to go through the significance determination tests. These tests include: 1) bioaccumulative toxic pollutant test; 2) temporary impacts test; 3) dilution test (100:1 dilution at low flow) and; 4) a concentration test.

As the determination of new or increased impacts, and the bioaccumulative and concentration significance determination tests require more extensive calculations, the Division will begin the

antidegradation evaluation with the dilution and temporary impact significance determination tests. These two significance tests may exempt a facility from further AD review without the additional calculations.

Note that the antidegradation requirements outlined in *The Basic Standards and Methodologies for Surface Water* specify that chronic numeric standards should be used in the antidegradation review; however, where there is only an acute standard, the acute standard should be used. The appropriate standards are used in the following antidegradation analysis.

Significance Tests for Temporary Impacts and Dilution

This is not a temporary discharge and therefore exclusion based on a temporary discharge cannot be granted and the AD evaluation must continue.

The ratio of the chronic (30E3) low flow to the design flow is 0:1, and is less than the 100:1 significance criteria. Therefore this facility is not exempt from an AD evaluation based on the dilution significance determination test, and the AD evaluation must continue.

For the determination of a new or increased impact and for the remaining significance determination tests, additional calculations are necessary. Therefore, at this point in the antidegradation evaluation, the Division will go back to the new or increased impacts test. If there is a new or increased impact, the last two significance tests will be evaluated.

New or Increased Impact and Non Impact Limitations (NILs)

To determine if there is a new or increased impact to the receiving water, a comparison of the new WQBEL concentrations and loadings verses the concentrations and loadings as of September 30, 2000, needs to occur. If either the new concentration or loading is greater than the September 2000 concentration or loading, then a new or increased impact is determined. If this is a new facility (commencement of discharge after September 30, 2000) it is automatically considered a new or increased impact.

Note that the AD Guidance document includes a step in the New or Increased Impact Test that calculates the Non-Impact Limit (NIL). The permittee may choose to retain a NIL if certain conditions are met, and therefore the AD evaluation for that parameter would be complete. As the NIL is typically greater than the ADBAC, and is therefore the chosen limit, the Division will typically conclude the AD evaluation after determining the NIL. Where the NILs are very stringent, or upon request of a permittee, the Division will calculate both the NIL and the AD limitation so that the limitations can be compared and the permittee can determine which of the two limits they would prefer, one which does not allow any increased impact (NIL), or the other which allows an insignificant impact (AD limit).

The non impact limit (NIL) is defined as the limit which results in no increased water quality impact (no increase in load or limit over the September 2000 load or limit). The NIL is calculated as the September 2000 loading, divided by the new design flow, and divided by a conversion factor of

8.34. If there is no change in design flow, then the NIL is equal to the September 2000 permit limitation.

If the facility was in place, but did not have a limitation for a particular parameter in the September 2000 permit, the Division may substitute an implicit limitation. Consistent with the First Update to the AD Guidance of April 2002, an implicit limit is determined based on the approach that specifies that the implicit limit is the maximum concentration of the effluent from October 1998 to September 2000, if such data is available. If this data is unavailable, the Division may substitute more recent representative data, if appropriate, on a case by case basis. Note that if there is a change in design flow, the implicit limit/loading is subject to recalculation based on the new design flow. For parameters that are undisclosed by the permittee, and unknown to the Division to be present, an implicit limitation may not be recognized.

This facility was in place as a discharger prior to September 30, 2000, and therefore the new or increased impacts test must be conducted. As the design flow of this facility has changed, the equations for the NIL calculations are shown below.

For total residual chlorine the limitations as of September 2000 were used in the evaluation of new or increased impacts. For *E. coli*, the fecal coliform limit of September 2000 was used. In accordance with the Division's practice regarding *E. coli*, an implicit limit for *E. coli* is determined as 0.32 times the permit limit for fecal coliform.

For total ammonia, the limits as of September 2000 was "report" therefore the effluent result during the AD period was used to determine the implicit NILs for ammonia.

For selenium, there are no effluent data available and therefore, the Division will include monitoring requirements in the permit so that data can be collected in order to make such a determination of an implicit limit.

Calculation of Loadings for New or Increased Impact Test

The equations for the loading calculations are given below. Note that the AD requirements outlined in *The Basic Standards and Methodologies for Surface Water* specify that chronic numeric standards should be used in the AD review; however, where there is only an acute standard, the acute standard should be used. Thus, the chronic low flows will be used later in this AD evaluation for all parameters with a chronic standard, and the acute low flows will be used for those parameters with only an acute standard.

$$\text{Previous permit load} = M_{permitted}\,(mg/l) \times Q_{permitted}\,(mgd) \times 8.34$$
$$\text{New WQBELs load} = M_2\,(mg/l) \times Q_2\,(mgd) \times 8.34$$

Where,

$M_{permitted}$ = September 2000 permit limit (or implicit limit) **(mg/l)**
$Q_{permitted}$ = design flow as of September 2000 **(mgd)**
Q_2 = current design flow (same as used in the WQBEL calculations)
M_2 = new WQBEL concentration **(mg/l)**
8.34 = unit conversion factor

Table A-7 shows the results of these calculations and the determination of a new or increased impact.

Calculation of Non-Impact Limitations

The design flow of this facility as of September 30, 2000 was 0.7 MGD. The new design flow of this facility is 0.75 MGD. To determine if new or increased impacts are to occur, the September 2000 permit concentrations need to be adjusted for this new design flow. The equations are shown below.

$$\textit{September 2000 permit load} = M_{permitted} \times Q_{permitted} \times 8.34$$
$$\textit{Non Impact Limit (NIL)} = \textit{September 2000 permitted load} \div \textit{New Design Flow} \div 8.34$$

Where,

$M_{permitted}$ = September 2000 permit limit or implicit limit **(mg/l)**
$Q_{permitted}$ = September 2000 design flow **(mgd)**
Q_2 = new or current design flow **(mgd)**
8.34 = Unit conversion factor

Table A-7 shows the results of these calculations and the determination of a new or increased impact.

Table A-7

Determination of New or Increased Impacts

Pollutant	*Sept 2000 Permit Limit*	*Sept 2000 Permit Load (lbs/day)*	*NIL*	*New WQBEL*	*New WQBEL Load (lbs/day)*	*New or Increased Impact*
E. coli (#/100 ml)	896	5231	836	126	788	No
TRC (mg/l)	0.004	0.023	0.0037	0.011	0.069	Yes
NH_3, Tot (mg/l) Jan	NA	NA	125	5.4	34	No
NH_3, Tot (mg/l) Feb	NA	NA	84	6.8	43	No
NH_3, Tot (mg/l) Mar	NA	NA	73	4.1	26	No
NH_3, Tot (mg/l) Apr	NA	NA	79	3.5	22	No
NH_3, Tot (mg/l) May	NA	NA	95	3.6	23	No
NH_3, Tot (mg/l) Jun	NA	NA	86	3.5	22	No
NH_3, Tot (mg/l) Jul	NA	NA	80	3	19	No
NH_3, Tot (mg/l) Aug	NA	NA	79	3.1	19	No
NH_3, Tot (mg/l) Sep	NA	NA	67	3.2	20	No
NH_3, Tot (mg/l) Oct	NA	NA	75	3.7	23	No
NH_3, Tot (mg/l) Nov	NA	NA	55	3.9	24	No
NH_3, Tot (mg/l) Dec	NA	NA	62	4.9	31	No
Se, Dis (µg/l)	NA	NA	NA	4.6	0.029	Yes

As shown in Table A-7, there are no new or increased impacts to the receiving stream based on the new WQBELS for ammonia and *E. coli*. For these parameters the AD evaluation is complete and the WQBELs are the final result of this WQA.

For TRC there are new or increased impacts and in accordance with regulation, the permittee has the option of choosing either the NIL's or ADBAC's. Because the ADBAC's are generally more stringent than NIL's, the Division assumes that the permittee will choose NIL's rather than ADBAC's, and therefore the Division will stop the AD evaluation at this point and assign the NILs to the permit. For selenium, where there is not a NIL (either implicit or explicit), the AD Guidance allows for the collection of data to determine an implicit limitation. Therefore, the permittee will be required to conduct "monitoring only" for selenium. The permittee may request ADBAC limits. If the permittee does request ADBAC limits, the Division will proceed with the completion of this Antidegradation Analysis.

Alternatives Analysis

If the permittee does not want to accept an effluent limitation that results in no increased impact (NIL) or in insignificant degradation (ADBAC), the applicant may conduct an alternatives analysis (AA). The AA examines alternatives that may result in no degradation or less degradation, and are economically, environmentally, and technologically reasonable. If the proposed activity is determined to be important economic or social development, a determination shall be made whether the degradation that would result from such regulated activity is necessary to accommodate that

development. The result of an AA may be an alternate limitation between the ADBEL and the WQBEL, and therefore the ADBEL would not being applied. This option can be further explored with the Division. See Regulation 31.8 (3)(d), and the Antidegradation Guidance for more information regarding an alternatives analysis.

VIII. Technology Based and Control Based Limitations

Federal Effluent Limitation Guidelines

The Federal Effluent Limitation Guidelines for domestic wastewater treatment facilities are the secondary treatment standards. These standards have been adopted into, and are applied out of, Regulation 62, the Regulations for Effluent Limitations.

Regulations for Effluent Limitations

Regulation No. 62, the Regulations for Effluent Limitations, includes effluent limitations that apply to all discharges of wastewater to State waters, with the exception of storm water and agricultural return flows. These regulations are applicable to the discharge from this facility.

Table A-8 contains a summary of the applicable limitations for pollutants of concern at this facility.

Table A-8

Regulation 62 Based Limitations

Parameter	*30-Day Average*	*7-Day Average*	*Instantaneous Maximum*
BOD_5	30 mg/l	45 mg/l	NA
BOD_5 Percent Removal	85%	NA	NA
TSS, mechanical plant	30 mg/l	45 mg/l	NA
TSS Percent Removal	85%	NA	NA
Total Residual Chlorine	NA	NA	0.5 mg/l
pH	NA	NA	6.0-9.0 s.u.
Oil and Grease	NA	NA	10 mg/l

Nutrient Effluent Limitation Considerations

WQCC Regulation No. 85, the new *Nutrients Management Control Regulation*, includes technology based effluent limitations for total inorganic nitrogen and total phosphorus that currently, or will in the future, apply to many domestic wastewater discharges to State surface waters. These effluent limits are being implemented in permitting actions, beginning July 1, 2013.

Based on Reg. 85, there are direct exemptions from these limitations for smaller domestic facilities that discharge less than 1 million gallons per day (MGD), or are a domestic facility owned by a disadvantaged community.

Since the design capacity of the Walsenburg WWTF is 0.75 MGD, the facility is not required to address the new technology based effluent limits for nutrient at this time.

Supplemental Reg. 85 Nutrient Monitoring

Reg. 85 also requires that some monitoring for nutrients in wastewater effluent and streams take place, independent of what nutrient effluent limits or monitoring requirements may be established in a discharge permit. The requirements for the type and frequency of this monitoring are set forth in Reg. 85 at 85.6. This nutrient monitoring is not currently required by a permitting action, but is still required to be done by the Reg. 85 nutrient control regulation. Nutrient monitoring for the Reg. 85 control regulation is currently required to be reported to the WQCD Environmental Data Unit.

IX. References

Regulations:

The Basic Standards and Methodologies for Surface Water, Regulation 31, Colorado Department Public Health and Environment, Water Quality Control Commission, effective January 31, 2013.

Classifications and Numeric Standards for Arkansas River Basin, Regulation No. 32, Colorado Department Public Health and Environment, Water Quality Control Commission, effective April 30, 2014.

Regulations for Effluent Limitations, Regulation 62, CDPHE, WQCC, July 30, 2012.

Nutrients Management Control Regulation, Regulation 85, Colorado Department Public Health and Environment, Water Quality Control Commission, effective September 30, 2012.

Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List, Regulation 93, Colorado Department Public Health and Environment, Water Quality Control Commission, effective March 30, 2012.

Policy and Guidance Documents:

Antidegradation Significance Determination for New or Increased Water Quality Impacts, Procedural Guidance, Colorado Department Public Health and Environment, Water Quality Control Division, December 2001.

Memorandum Re: First Update to (Antidegradation) Guidance Version 1.0, Colorado Department Public Health and Environment, Water Quality Control Division, April 23, 2002.

Rationale for Classifications, Standards and Designations of Segments of the Arkansas River, Colorado Department Public Health and Environment, Water Quality Control Division, Developed during the spring of 2013 to support development of the rulemaking process for regulation No 32.

Policy Concerning Escherichia coli versus Fecal Coliform, CDPHE, WQCD, July 20, 2005.

Colorado Mixing Zone Implementation Guidance, Colorado Department Public Health and Environment, Water Quality Control Division, effective April 2002.

Policy for Conducting Assessments for Implementation of Temperature Standards in Discharge Permits, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-23, effective July 3, 2008.

Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-24, effective March 10, 2008.

Policy for Characterizing Ambient Water Quality for Use in Determining Water Quality Standards Based Effluent Limits, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-19, effective May 2002.