COLORADO
Department of Public Health & Environment

Dedicated to protecting and improving the health and environment of the people of Colorado

Mr. Tim Craft
Craft Bandera Acquisition Company, LLC
1645 Grant Street, Suite 200
Denver, CO 80203

TO: Mr. Tim Craft

FROM: WQCD Contact: Andrea Stucky, 303-692-3627, andrea.stucky@state.co.us

DATE: August 25, 2016

Re: PEL 200452, Bandera Water Reclamation Facility wastewater treatment facility (WWTF) Preliminary Effluent Limit

---

The Water Quality Control Division (Division) of the Colorado Department of Public Health and Environment has prepared, per your request, the Preliminary Effluent Limits (PELs) for the proposed Bandera Water Reclamation Facility wastewater treatment facility (WWTF). These effluent limits were developed as detailed in the attached document, for use as one of the submittals in your application for Site Approval.

With a hydraulic design capacity of 0.15 million gallons per day (MGD) and discharge into Henderson Gulch, which is identified as stream segment COSPMS03a, the Bandera WRF WWTF will require an individual permit.

PELs developed for this facility are based on the water quality standards for the receiving stream identified in the PEL application, and/or on technology based limitations established in the *Regulations for Effluent Limitations* (Regulation No. 62). The water quality standard based limitations presented in this PEL may be incorporated into a CDPS permit contingent on analyses conducted during permit development. The technology based limitations will also be incorporated into the permit unless a more stringent limitation is applied.

As explained in the attached document, these limitations have been developed based on the current and/or next effective water quality standards for the receiving stream, the ambient water quality of the receiving stream, the calculated low flows, the stated design flow of the facility, technology based limitations established in the *Regulations for Effluent Limitations* (Regulation No. 62), applicable federal Effluent Limitation Guidelines (ELGs), and where necessary the antidegradation regulations, mixing zone policies, and any designation of a receiving stream by the US Fish and Wildlife Service as habitat for federally listed threatened and endangered (T&E) fish. A determination of which PELs ultimately apply in a permit will be dependent on decisions made by the permittee regarding treatment facilities, discharge type, industrial contributions, receiving streams, design flows, or other information presented to the Division at the time of permit application.

Table 1 contains a summary of the limitations that have been developed in this PEL, for which the proposed treatment facility will be evaluated against, under the Site Approval Process. This evaluation will include a determination of whether the proposed treatment facility as designed, can meet these limitations. A new wastewater treatment facility will be expected to meet the limitations for these parameters upon commencement of discharge.

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

Table 1 Preliminary Effluent Limits for Evaluation under the Site Approval Process Discharge to Henderson Gulch at a Design Flow of 0.15 MGD	
BOD_5 (mg/l)	45 (7-day average), 30 (30-day average)
BOD_5 (% removal)	85 (30-day average)
TSS, mechanical plant (mg/l)	45 (7-day average), 30 (30-day average)
TSS, mechanical plant (% removal)	85 (30-day average)
Oil and Grease (mg/l)	10 (maximum)
pH (s.u.)	6.5-9.0 (minimum-maximum)
E. coli (#/100 ml)	252 (7-day geomean), 126 (30-day geomean)
TRC (mg/l)	(daily maximum), 0.011 (30-day average)
Total Inorganic Nitrogen as N (mg/l)	10 (daily maximum), 7 (annual median)
Total Phosphorus (mg/l)	0.7 (annual median), 1.75 (annual 95th%)
Total Ammonia	WQBELs
NH3 as N, Tot (mg/l) Jan	15 (daily maximum), 3.7 (30-day average)
NH3 as N, Tot (mg/l) Feb	12 (daily maximum), 3.4 (30-day average)
NH3 as N, Tot (mg/l) Mar	14 (daily maximum), 3.4 (30-day average)
NH3 as N, Tot (mg/l) Apr	14 (daily maximum), 3.1 (30-day average)
NH3 as N, Tot (mg/l) May	13 (daily maximum), 2.7 (30-day average)
NH3 as N, Tot (mg/l) Jun	16 (daily maximum), 2.5 (30-day average)
NH3 as N, Tot (mg/l) Jul	16 (daily maximum), 2.2 (30-day average)
NH3 as N, Tot (mg/l) Aug	13 (daily maximum), 1.9 (30-day average)
NH3 as N, Tot (mg/l) Sep	14 (daily maximum), 2.1 (30-day average)
NH3 as N, Tot (mg/l) Oct	12 (daily maximum), 2.2 (30-day average)
NH3 as N, Tot (mg/l) Nov	14 (daily maximum), 3.0 (30-day average)
NH3 as N, Tot (mg/l) Dec	13 (daily maximum), 3.2 (30-day average)

PELs for Landscape Irrigation

The PELs for the use of reclaimed domestic wastewater for landscape irrigation at parks, on open spaces, and on residential property are outlined in Table 2, and are based on the requirements in Regulation No. 84, *Reclaimed Domestic Wastewater Control Regulation*.

As part of the site approval process, the Bandera WRF will need to determine if the reclaimed domestic wastewater will be used in areas with restricted access to where such water is used (Category 1 Standards), or in areas with unrestricted access to where such water is used (Category 2 Standards). The Category 1, Category 2, and Category 3 standards are listed in Table 2. In addition, the secondary treatment requirements outlined in Regulation No. 62 will also apply, and these are noted in Table 2.

The effluent quality from the WWTF will be expected to meet the appropriate Category Standards at the WWTF reclaimed domestic wastewater Point of Compliance. The location of the Point of Compliance will be determined in the Notice of Authorization, which is issued by the Reuse Program.

The Bandera WRF will be required to obtain a Notice of Authorization from the Reuse Program in the Permits Section prior to the start of landscape irrigation at parks, open space and private

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

residences. To expedite the Reuse permitting process, the Bandera WWTF may submit a Letter of Intent to the Division's Reuse Program during the WWTF site approval process. The Notice of Authorization for landscape irrigation at parks, open space and private residences will not be issued until the site approval process is complete for the WWTF.

In addition to meeting the appropriate Category Standards, the Bandera WRF must control the rate of irrigation to ensure the application of effluent is at or below agronomic rates for nutrients and/or evapotranspiration rates. Additional information about the reuse program is available in Regulation No. 84 and from the Reuse Program.

In addition to the effluent limits, the treatment facility and the end user (e.g., golf course) will be required to meet additional monitoring, reporting and management practices. These are further described in Regulation No. 84.

Table 2
Proposed Bandera WWTF
Preliminary Effluent Limits (PELs) for Landscape Irrigation

Parameter	****Category 1 Limits Applied at Point of Compliance from WWTF***
E. coli (#/100 ml)	235 (single sample maximum per month), 126 (30-day geometric mean)
TSS (mg/l)	30 (daily maximum)
***Note**: Point of Compliance is defined in Regulation No. 84 as: a point identified by the treater in the reclaimed domestic wastewater treatment or transmission system after all treatment has been completed and prior to dilution and blending. Category 1 Standards also require, at a minimum, secondary treatment with disinfection.	
Parameter	*****Category 2 Limits Applied at Point of Compliance from WWTF***
E. coli (#/100 ml)	235 (single sample maximum per month), 126 (30-day geometric mean)
Turbidity (NTU)	3 NTU (monthly avg.) not to exceed 5 NTU in more than 5% of individual samples
****Note:** Point of Compliance is defined in Regulation No. 84 as: a point identified by the treater in the reclaimed domestic wastewater treatment or transmission system after all treatment has been completed and prior to dilution and blending. Category 2 Standards require, at a minimum, secondary treatment with *filtration* and disinfection.	
Parameter	******Category 3 Limits Applied at Point of Compliance from WWTF***
E. coli (#/100 ml)	None detected in at least 75% of samples in a calendar month and 126/100 ml single sample maximum.
Turbidity (NTU)	3 NTU (monthly avg.) not to exceed 5 NTU in more than 5% of individual samples
***Note: Point of Compliance is defined in Regulation No. 84 as: a point identified by the treater in the reclaimed domestic wastewater treatment or transmission system after all treatment has been completed and prior to dilution and blending. Category 3 Standards require, at a minimum, secondary treatment with filtration and disinfection.	

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

Preliminary Effluent Limitations
Henderson Gulch
Craft Bandera Acquisition Company, LLC Bandera Water Reclamation Facility WWTF
Andrea Stucky
August 25, 2016
Table of Contents

I. Preliminary Effluent Limitations Summary

Table A-1 includes summary information related to this PEL. This summary table includes key regulatory starting points used in development of the PEL 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.

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

Table A-1 PEL Summary			
Facility Information			
Facility Name	**PEL Number**	**Design Flow (max 30-day ave, MGD)**	**Design Flow (max 30-day ave, CFS)**
Bandera Water Reclamation Facility WWTF	PEL 200452	0.15	0.23

Receiving Stream Information			
Receiving Stream Name	**Segment ID**	**Designation**	**Classification(s)**
Henderson Gulch	COSPMS03a	Use-Protected	Agriculture Aquatic Life Warm 2 Recreation E Water Supply

Low Flows (cfs)				
Receiving Stream Name	**1E3 (1-day)**	**7E3 (7-day)**	**30E3 (30-day)**	**Ratio of 30E3 to the Design Flow (cfs)**
Henderson Gulch	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	None	None	No	Arsenic (ch) = hybrid; expiration date of 12/31/2021 Chlorophyll a (mg/m^2)(chronic) = applies only above the facilities listed at 38.5(4). Phosphorus (chronic) = applies only above the facilities listed at 38.5(4).	None

Pollutants Evaluated
Ammonia, *E. coli*, TRC, Nitrate, Nutrients

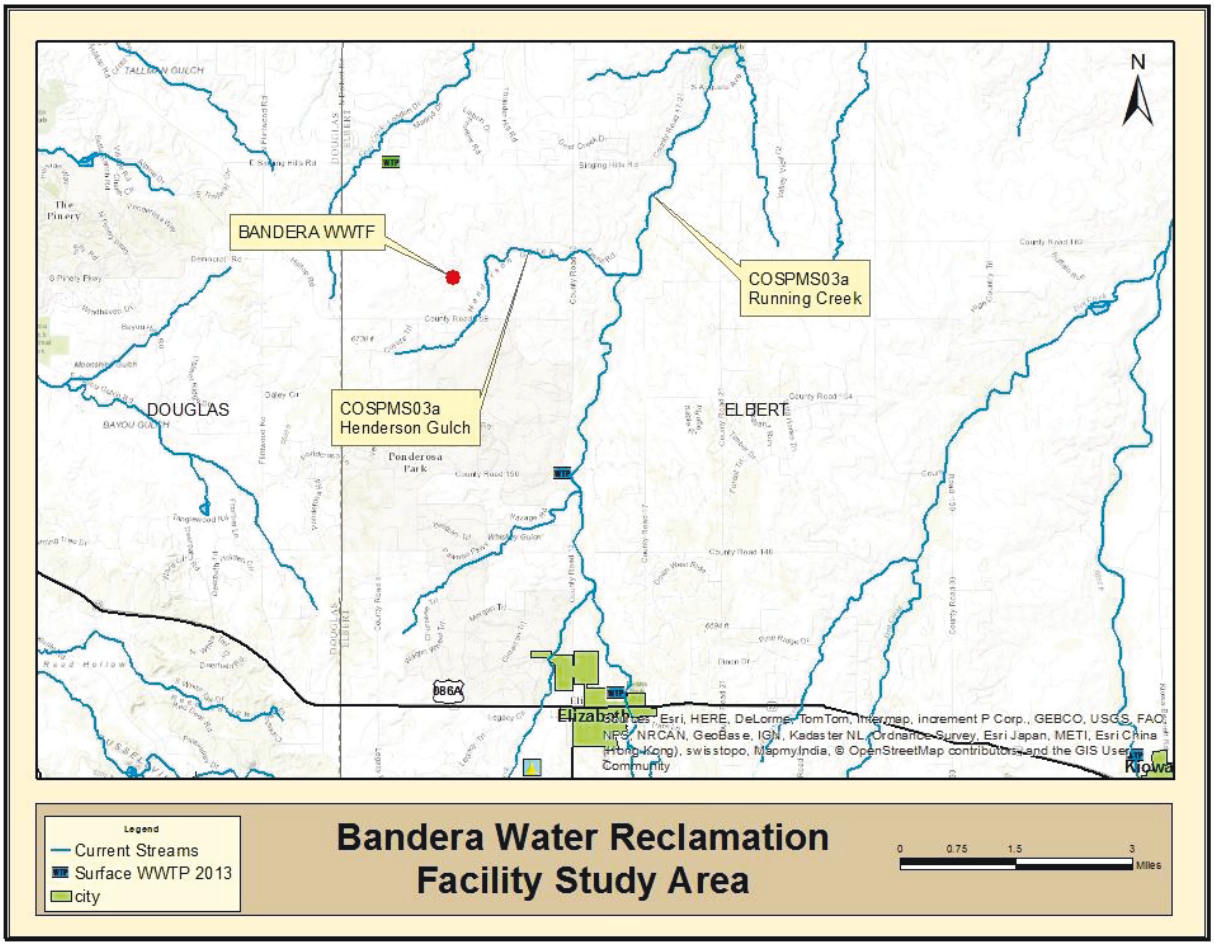
II. Introduction

The Preliminary Effluent Limitations (PEL) of Henderson Gulch near the Bandera Water Reclamation Facility wastewater treatment facility (WWTF), located in Elbert County, is intended to determine the assimilative capacities available for pollutants found to be of concern. This PEL describes how the water quality based effluent limits (WQBELs) are developed. These

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

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 rationale. Figure A-1 contains a map of the study area evaluated as part of this PEL.

FIGURE A-1



The Bandera WWTF proposes to discharge to Henderson Gulch, which is stream segment COSPMS03a. This means the South Platte River Basin, Middle South Platte Sub-basin, Stream Segment 03a. This segment is composed of "all tributaries to the South Platte River, including all wetlands, from a point immediately below the confluence with Big Dry Creek to the Weld/Morgan County line, except for specific listings in the subbasins of the South Platte River, and in Segments 3b, 5a, 5b, 5c, and 6." Stream segment COSPMS03a is classified for Aquatic Life warm 2, Recreation E, Water Supply and Agriculture.

Information used in this assessment includes data gathered from the Bandera 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 PEL analysis.

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

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

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

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

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 PEL, 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 Henderson Gulch is classified for aquatic life warm 2, with a water supply designation the water + fish and aquatic life standards apply to this discharge.

Nutrients

Total 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.

Salinity: 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.

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.

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

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 COSPMS03a in accordance with the *Classifications and Numeric Standards for South Platte River Basin, Laramie River Basin, Republican River Basin, Smoky Hill River Basin*.

Table A-3 **In-stream Standards for Stream Segment COSPMS03a**
Physical and Biological
Dissolved Oxygen (DO) = 5 mg/l, minimum
pH 6.5- 9.0
E. coli chronic = 126 colonies/100 ml
Temperature March-Nov = 24.2° C MWAT and 29° C DM
Temperature Dec-Feb = 12.1° C MWAT and 14.5° C DM
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 = 10 mg/l
Chloride chronic = 250 mg/l
Sulfate chronic = For WS, the greater of ambient water quality as of January 1, 2000 or 250 mg/l
Metals
Total Recoverable Aluminum acute and chronic = TVS
Dissolved Arsenic acute = 340 µg/l
Total Recoverable Arsenic chronic = 0.02 µg/l
Dissolved Cadmium acute and chronic = TVS
Total Recoverable Trivalent Chromium acute = 50 µg/l
Dissolved Trivalent Chromium acute and chronic = TVS
Dissolved Hexavalent Chromium acute and chronic = TVS
Dissolved Copper acute and chronic = TVS
Dissolved Iron chronic = For WS, the greater of ambient water quality as of January 1, 2000, or 300 µg/l
Total Recoverable Iron chronic = 1000 µg/l
Dissolved Lead acute and chronic = TVS
Total Recoverable Lead acute = 50 µg/l
Dissolved Manganese chronic = For WS, the greater of ambient water quality as of January 1, 2000, or 50 µg/l
Dissolved Manganese acute and chronic = TVS
Total Recoverable Molybdenum chronic = 150 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

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

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 PEL.

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 not listed on the Division's 303(d) list of water quality impacted streams and is not on the monitoring and evaluation list.

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.

Although there is periodic flow in Henderson Gulch upstream of the Bandera WWTF, the 1E3 and 30E3 monthly low flows are set at zero based on information provided by the local Water Commissioner. For this analysis, low flows are summarized in **Error! Reference source not found.**4.

Table A-4
Low Flows for Henderson Gulch at the Bandera 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
7E3 Chronic	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

The ratio of the low flow of Henderson Gulch to the Bandera 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 PEL. This is explained in more detail under the Technical Information discussion in Section VI.

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

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 Henderson Gulch because the background in-stream low flow condition is zero, and because no ambient water quality data are available for Henderson Gulch upstream of the Bandera WWTF discharge.

V. Facility Information and Pollutants Evaluated

Facility Information

The Bandera Water Reclamation Facility WWTF is located at 39.442015° N and 104.635375° W in Elbert County. The current design capacity of the facility is 0.15 MGD (0.23 cfs). Wastewater treatment is proposed to be accomplished using a mechanical wastewater treatment process. The technical analyses that follow include assessments of the assimilative capacity based on this design capacity.

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

An assessment of Division records indicate that there are 3 facilities discharging to the same stream segment or other stream segments immediately upstream or downstream from this facility. The nearest dischargers were:

- Town of Elizabeth Gold Creek WWTF (COG-589037), which discharges to Gold Creek, which then flows to the Running Creek approximately 5 miles upstream of the Bandera WWTF
- Spring Creek WWTF (CO0046965) discharges to Running Creek approximately 6 miles downstream of the Bandera WWTF.
- Town of Elizabeth WWTF (COG-589043) discharges to Running Creek approximately 8 miles upstream of the Bandera 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 PEL 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 rationale.

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*
- Nutrients
- Ammonia
- Temperature

Based upon the size of the discharge, the lack of industrial contributors, dilution provided by the receiving stream 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 Preliminary Effluent Limitations.

According to the ***Rationale for Classifications, Standards and Designations of the South Platte River***, stream segment COSPMS03a is classified for water supply use. An evaluation of the Division of Water Resources Colorado's Decision Support System indicates that there are alluvial

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

wells and/or surface intakes that are used for water supply located downgradient from the facility discharge location. Thus, the nitrate standard is further evaluated as part of this WQA.

Effective December 31, 2022, the nitrate water supply standard of 10 mg/l (as Total Inorganic Nitrogen) will be implemented in segment COSPMS03a, regardless of the location of domestic water supply wells within the segment. This is based on the results of the June 2016 Water Quality Control Commission (WQCC) hearing, during which the WQCC repealed footnote 4 to Table II (Inorganic Parameters) of Regulation 31 with an effective date of December 31, 2022. The removal of footnote 4 will result in a requirement to calculate permit limits to implement the nitrate water supply standard of 10 mg/l for any discharge to a segment designated as water supply, and to apply the standard either at the point of discharge or, where a mixing zone is allowable, at the end of the mixing zone. The WQCC chose the delayed effective date to allow time to thoroughly evaluate the receiving water below outfalls to determine whether there is an actual existing water supply use and to propose modifications of the segments or standards if warranted. Absent changes to the segments or standards, a nitrate water supply standard of 10 mg/l (as Total Inorganic Nitrogen) will be implemented in the segment.

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 Henderson Gulch near the Bandera 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)

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

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 Henderson Gulch is zero, the WQBELs for Henderson Gulch 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.

Where a WQBEL is calculated to be a negative number and interpreted to be zero the Division standard procedure is to allocate the water quality standard to prevent further degradation of the receiving waters.

Chlorine: There are no point sources discharging total residual chlorine within one mile of the Bandera WWTF. Because chlorine is rapidly oxidized, in-stream levels of residual chlorine are detected only for a short distance below a source. Ambient chlorine was therefore assumed to be zero.

***E. coli*:** There are no point sources discharging *E. coli* within one mile of the Bandera WWTF. Thus, WQBELs were evaluated separately. In the absence of *E. coli* ambient water quality data, fecal coliform ambient data are used as a conservative estimate of *E. coli* existing quality. For *E. coli*, the Division establishes the 7-day geometric mean limit as two times the 30-day geometric mean limit 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 in all twelve months, so the discharge is to an effluent dependent (ephemeral stream without the presence of wastewater) water; therefore in accordance with Regulation 31.14(14), no temperature limitations are required.

Nitrate / Total Inorganic Nitrogen (T.I.N.): An acute nitrate standard of 10 mg/l is assigned to this segment. 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.

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

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	0.23	0.23	1	126	***126***
TRC (mg/l)	0	0.23	0.23	0	0.011	***0.011***

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)	chronic X 2 = acute					***252***
TRC (mg/l)	0	0.23	0.23	0	0.019	***0.019***
Nitrate as N (mg/l)	0	0.23	0.23	0	10	***10***

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. Ammonia is present in the aqueous environment in both ionized and un-ionized forms. It is the un-ionized form which is most toxic, but the ionized for is also toxic. The proportion of total ammonia present in un-ionized form in the receiving stream is a function of the combined upstream and effluent ammonia concentrations, and the pH and temperature of the effluent and receiving stream, combined.

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.

There were no pH or temperature data available for Henderson Gulch or the Bandera 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 pH and temperature compiled from similar facilities and receiving waters.

The AMMTOX model 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 Bandera WWTF are presented in Table A-6.

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

Table A-6 AMMTOX Results for Henderson Gulch at the Bandera WWTF		
Design of 0.15 MGD (0.23 cfs)		
Month	*Total Ammonia Chronic (mg/l)*	*Total Ammonia Acute (mg/l)*
January	3.7	15
February	3.4	12
March	3.4	14
April	3.1	14
May	2.7	13
June	2.5	16
July	2.2	16
August	1.9	13
September	2.1	14
October	2.2	12
November	3.0	14
December	3.2	13

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 PEL analysis.

According to the *Classifications and Numeric Standards for South Platte River Basin, Laramie River Basin, Republican River Basin, Smoky Hill River Basin*, stream segment COSPMS03a is use protected. Thus, an antidegradation review is not required for this segment.

VIII. Technology 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

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

agricultural return flows. These regulations are applicable to the discharge from the proposed discharge.

Table A-7 contains a summary of the applicable limitations for pollutants of concern at this facility.

Table A-7
Regulation 62 Based Limitations

Parameter	*30-Day Average*	*7-Day Average*	*Instantaneous Maximum*
BOD_5	30 mg/l	45 mg/l	NA
TSS, mechanical plant	30 mg/l	45 mg/l	NA
BOD_5 Percent Removal	85%	NA	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 for dischargers are to start being implemented in permitting actions as of July 1, 2013, and are shown in the two tables below:

Effluent Limitations Table at 85.5(1)(a)(iii)

For all Domestic Wastewater Treatment Works not identified in subsections (a)(i) or (ii) above(in Reg. 85) *and discharging prior to May 31, 2012 or for which a complete request for preliminary effluent limits has been submitted to the Division prior to May 31, 2012, the following numeric limits shall apply:*

Parameter	*Parameter Limitations*	
	Annual Median [1]	*95th Percentile [2]*
Total Phosphorus	*1.0 mg/l*	*2.5 mg/l*
Total Inorganic Nitrogen[3]	*15 mg/l*	*20 mg/l*

1 Running Annual Median: The median of all samples taken in the most recent 12 calendar months.
2 The 95th percentile of all samples taken in the most recent 12 calendar months.
3 Determined as the sum of nitrate as N, nitrite as N, and ammonia as N.

Effluent Limitations Table at 85.5(1)(b)

For New Domestic Wastewater Treatment Works which submit a complete request for preliminary effluent limits to the Division on or after May 31, 2012, the following numeric limits shall apply:

Parameter	*Parameter Limitations*	
	Annual Median [1]	*95th Percentile [2]*
Total Phosphorus	*0.7 mg/l*	*1.75 mg/l*
Total Inorganic Nitrogen[3]	*7 mg/l*	*14 mg/l*

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

1 Running Annual Median: The median of all samples taken in the most recent 12 calendar months.
2 The 95th percentile of all samples taken in the most recent 12 calendar months.
3 Determined as the sum of nitrate as N, nitrite as N, and ammonia as N.

All permit actions based on this PEL will occur after the July 1, 2013 permit implementation date of Reg. 85. Therefore, total inorganic nitrogen and total phosphorus effluent limitations imposed because of Reg. 85 must be considered. Since the Bandera WWTF is a new domestic wastewater treatment works, the limitations at 85.5(1)(b) will apply.

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 June 30, 2016.

Classifications and Numeric Standards for South Platte River Basin, Laramie River Basin, Republican River Basin, Smoky Hill River Basin, Regulation No. 38, Colorado Department Public Health and Environment, Water Quality Control Commission, effective June 30, 2016.

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 South Platte River, Colorado Department Public Health and Environment, Water Quality Control Division, effective June 2015.

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd

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.

4300 Cherry Creek Drive S., Denver, CO 80246-1530 P 303-692-2000 www.colorado.gov/cdphe/wqcd