

**WATER AND WASTEWATER FACILITY OPERATORS CERTIFICATION BOARD
STATE OF COLORADO**

**ADJUDICATORY HEARING STATEMENT
OF THE WATER QUALITY CONTROL DIVISION**

**APPEAL BY THE KREMMLING SANITATION DISTRICT (KREMMLING) OF THE WATER
QUALITY CONTROL DIVISION'S B CLASSIFICATION OF THE KREMMLING
WASTEWATER TREATMENT FACILITY CLASSIFICATION**

The Water Quality Control Division (Division), Engineering Section is responsible for classifying domestic wastewater treatment facilities, water treatment facilities, industrial wastewater treatment facilities, water distribution systems, and wastewater collections systems in accordance with Regulation No. 100, Water and Wastewater Facility Operators Certification Requirements (Regulation 100). While the Division has a broad range of classification responsibilities, this adjudicatory hearing is specific to Kremmling Sanitation District's request to reclassify their domestic wastewater treatment facility from a Class B to Class C. This statement outlines the Division's interpretation of Regulation 100 and the resulting classification for the Kremmling Sanitation District's domestic wastewater treatment facility as a Class B facility.

In addition to the summary in the Statement, the Division offers Exhibits A through C to support the facility classification for the Kremmling Sanitation District domestic wastewater treatment works. Exhibit A is a copy of the Colorado Discharger Permit System No. CO0048437 for the Kremmling Sanitation District. Exhibit B is a copy of the Notice of Authorization Number COE021000 for the Kremmling Sanitation District. Exhibit C is a copy of the 2012 ABC Wastewater Treatment Need-to-Know Criteria.



I. Background

The Kremmling Sanitation District has proposed that its domestic wastewater treatment facility to be rated as Class C instead of Class B. Kremmling's statement to the Board summarizes 5 specific items as grounds for appeal. These items are summarized as follows:

1. The existing stabilization pond treatment facility provides nitrification during summer and fall months and is currently rated as a Class C facility. The operator has experience with nitrification through the existing stabilization pond treatment system and the system has not had water quality violations while the current operator has overseen the stabilization pond treatment system.
2. Kremmling associates Class B facilities with more complicated mechanical wastewater treatment and believes the proposed treatment modifications at Kremmling will more closely resemble a stabilization lagoon and not a mechanical treatment plant.
3. Stabilization ponds have long detention times that buffer influent wastewater and seasonal variations which allows the operator time to make adjustments.
4. The Bio-Dome alternative treatment technology enables stabilization pond treatment systems to have the capability of providing reliable nitrification treatment year round. Hiring an overqualified operator (Class B or higher) does not further improve upon the alternative technology that can be properly operated by a Class C operator. Kremmling further believe that setting the precedent that the communities that implement innovative technologies like the Bio-Dome alternative treatment technology must locate and hire B level operators is counterproductive to the overall goal of environmental health and compliance.
5. Regulation 100 did not foresee treatment systems like Bio-Domes at the time of inception and the Board should provide reasonable judgment when considering facility classifications for emerging alternative technologies.

The Division considered Kremmling's request for the wastewater treatment plant to be classified as a Class C, but does not find that Kremmling's grounds for appeal consider the requirements and intent of Regulation 100. The Division's decision to rate Kremmling's wastewater treatment system as a Class B facility is proper based on the requirements of Regulation 100 as discussed through the following point by point response to Kremmling's grounds for appeal:

1. Facility classifications and operator classifications are independent requirements within Regulation 100. Section 100.5 of Regulation 100 outlines the key factors used to classify facilities. Examples of these elements include unit treatment processes, design flow, and characteristics of influent wastewater. The skill of the hired operator, whether current or future, is not listed as an element used to define the facility classification and should not be



a primary driver for classifying a facility. Operators may change throughout the life of a facility. The operator class cannot be based on the self-identified skill of an operator. The classification of the facility is tied to the facility treatment processes so that only operators having the appropriate minimum operator classification may operate the facility.

Similarly, the success and declared expertise of an operator does not define his/her skill level in accordance with Regulation 100. Regulation 100 requires operators to demonstrate their skill through experience and standardized testing requirements. While Kremmling's operator may have an understanding of incidental nitrification that occurs within a stabilization lagoon during warmer months without the requirement to meet a permitted effluent limit, this awareness does not equate to a tested knowledge level required to continuously compare, contrast, diagnose, examine, analyze, and relate nitrification to reliably achieve defined effluent limits. In addition, the understanding of Kremmling's operator has not been demonstrated through routine compliance with defined effluent limits.

2. The Water Quality Control Commission Regulation 62, Regulation for Effluent Limitations (Regulation 62) distinguishes between stabilization ponds and mechanical treatment systems. Under item 62.5(3) of Regulation 62, stabilization ponds may receive relaxed total suspended solids effluent limits. A wastewater treatment system is a stabilization pond if (1) the waste stabilization ponds are the principle process used for secondary treatment; and (2) the facility is designed to achieve the best solids removal possible with waste stabilization pond technology. According to these requirements, a treatment system does not have to be complicated to be classified as a mechanical facility. For example, a stabilization pond with a conventional clarifier does not qualify as a stabilization treatment system; therefore, the system must be a mechanical treatment plant. Similarly, a stabilization lagoon equipped with Bio-Domes for secondary treatment may not qualify as a stabilization lagoon and may be a mechanical plant. Likewise, trickling filters, rotating biological contactors, stabilization ponds equipped with floating media (moving bed bioreactors), and other like technologies are all considered mechanical treatment if used for secondary treatment.

The concept of mechanical treatment facilities being very different and more complicated than stabilization pond systems is not true in all circumstances and the concept cannot be used broadly to establish a facility classification. While Kremmling's wastewater treatment facility still has characteristics of a stabilization pond, the Bio-Dome technology, the reuse treatment systems, and the chemical addition components result in a more complicated system to meet cold weather ammonia effluent limits that will not perform if not properly operated.

3. Stabilization ponds have inherently long detention times which provide attenuation and buffering capacity. When used solely for secondary treatment, operators may have the luxury of simply adjusting the air content for mixing and biological processes. With Bio-Domes for cold weather nitrification, operations become more complicated. For example, if Kremmling discovers that low alkalinity is inhibiting nitrification within the Bio-Domes, the correction



cannot be made reactively without repercussions. As designed and constructed, Kremmling's soda ash addition is located at the influent to the first stabilization pond. This location places the soda ash correction about 15 days from the biofilm nitrification process. During this 15 day delay, the facility may exceed the ammonia effluent limits and the biology in the biofilm could experience die-off. If in the winter, the biofilm component may not be regrown effectively until the next warm season unlike a suspended growth system that may be re-seeded. To complicate the operations further, the operator cannot visually inspect the biofilm with or without a microscope, like with a rotating biological contactor, and must have a higher understanding to operate the system through surrogate parameter sampling and analyses. These issues are complicated by the long detention time and are not like a stabilization lagoon designed for only achieving secondary effluent limits.

The proposed treatment facility has significant complexities that if not properly operated could result in a very long period of noncompliance with effluent limits. Proactive and not reactive operations will be critical to the success of the Kremmling stabilization lagoon equipped with Bio-Domes.

4. The Division agrees that requiring an over qualified operator does not benefit the effectiveness of the enhanced stabilization lagoon. At the same time, an adequately qualified operator can be critical to the effectiveness of a facility's treatment and under-classifying a facility can thus be detrimental to the health of the environment. The Division has worked with municipalities, vendors, and suppliers to accept alternative technologies within Colorado to provide more cost effective solutions to achieve more stringent effluent limits. While the overall treatment upgrade cost may be more reasonable, hiring of qualified operators should not be sacrificed to keep pace. In fact, the operator is a critical component of continuous, long term success of the treatment facility. Qualified operators can do more with less, whereas, unqualified operators may do less with more.
5. While Regulation 100 did not specifically contemplate all current and future alternative technologies such as Bio-Domes, Regulation gave the Division broad authority to interpret the regulation and appropriately define facility classifications based on the requirements outlined within item 100.5.1 of Regulation 100. The Division has carefully considered the criteria within Regulation 100 to define the Kremmling wastewater treatment facility as a Class B.

While Kremmling provided a broad description of its domestic wastewater treatment works, the information in the appeal appeared to omit information relevant to the facility classification decision. According to 100.5.1 of Regulation 100, the Division must consider flow conditions, use classification and/or water quality standards assigned to the waters receiving the treated effluent that require an unusually high degree of operational control in order to meet permit conditions. Similarly, item 100.5.4 requires that the facility classification be the highest level of treatment utilized when a facility uses a combination of two or more of the treatment processes described in section 100.5.2. Kremmling has two potential outfalls: Muddy Creek or reuse. The appeal described the effluent limits for Muddy Creek, but did not include the effluent limits for reuse. The reuse



limits require operation of a physical process providing a high degree of treatment other than a polishing pond for turbidity effluent limits and the operation of UV disinfection to meet low E. coli effluent limits. These more stringent effluent requirements were not discussed as part of the evaluation, but are relevant to the facility classification. Kremmling's current facility classification should be Class B considering all treatment and complexities necessary to meet current effluent requirements. Kremmling's future facility classification should also be Class B considering all treatment processes and complexities required to meet future effluent requirements.

These individual points only represent a direct response to Kremmling's appeal. To provide a more well-rounded explanation of how the Division arrived at a Class B facility classification, the Division developed a summary of Facility Classification Factors and Drivers, a Recommendation, and supporting Exhibits.

II. Facility Classification Factors and Drivers

Over the past 10 years to better protect the environment by meeting water quality standards, effluent limits have become increasingly stringent beyond secondary requirements resulting in the need to upgrade or modify existing domestic wastewater treatment works. The increasingly stringent effluent limits beyond secondary treatment have also motivated the advent of alternative treatment options being accepted through the Division's review of domestic wastewater treatment works. With these changes, 100.5.2 Table - Criteria for Domestic Wastewater Treatment Facility Classes A, B, C, and D (Table 100.5.2) in Regulation 100 does not always provide a direct classification of the treatment process being evaluated. To reconcile these imperfect matches of treatment processes to the requirements, the Division relies on additional resources to help make interpretations of Regulation 100 consistent with section 100.5, which gives the Division the authority and discretion to make changes in classification in accordance with the needs created by particular complexities of any specific domestic wastewater treatment facility. 5 CCR 1003-2, Reg. 100.5.1, Reg. 100.5.3.

Kremmling's recently approved site location and design review applications exemplify this approach. The Division classified Kremmling's domestic wastewater treatment facility as a Class B based on the current Regulation 100 requirements supported by information from the following resources: the statement of basis and purpose within Regulation 100; the ABC Need-to-Know Criteria for Wastewater Treatment Operators; alternative technology acceptance; and the state of technology and implementation at the time of table 100.5.2 adoption. To fully understand the Division's reasoning, the Division has outlined its decision process through the following topic headings:

- A. Kremmling's Existing Domestic Wastewater Treatment Works
- B. Kremmling's Proposed Treatment Works
- C. Application of the Regulatory Criteria to Kremmling's Proposed Treatment Works
- D. Additional Information Regarding Special Circumstances Requiring Special Consideration
- E. ABC Need-to-Know Criteria for Wastewater Treatment Operators



A. Kremmling's Existing Domestic Wastewater Treatment Works

The Kremmling Sanitation District is in the process of upgrading their domestic wastewater treatment works to incorporate ammonia treatment processes. The most recent permit renewal, Colorado Discharge Permit System (CDPS) No. CO0048437, compelled these upgrades with the inclusion of upcoming ammonia effluent limits and a permit compliance schedule to allow time to address any required upgrades. While the entire discharge permit is included with this document as Appendix A, the following excerpts detail the upcoming ammonia limits and the related permit compliance schedule related to the addition of ammonia treatment processes.



Permit Effluent Limits

ICIS Code	Effluent Parameter	Effluent Limitations Maximum Concentrations				Monitoring Requirements	
		30-Day Average	7-Day Average	Daily Maximum	2-Year Average	Frequency	Sample Type
50050	Effluent Flow (MGD)	0.3		Report		Continuous	Recorder
00400	pH (su)			6.5-9		Weekly	Grab
51040	E. coli (#/100 ml)	1088	2176			Monthly	Grab
50060	TRC (mg/l)	0.37		0.5	0.057	Weekly	Grab
00610	NH3, Tot (mg/l) Jan, until June 30, 2017	Report		Report		Monthly	Grab
	Beginning July 1, 2017	9.86		Report		Monthly	Grab
	NH3, Tot (mg/l) Feb, until June 30, 2017	Report		Report		Monthly	Grab
	Beginning July 1, 2017	18.7		Report		Monthly	Grab
	NH3, Tot (mg/l) Mar, until June 30, 2017	Report		Report		Monthly	Grab
	Beginning July 1, 2017	18.7		Report		Monthly	Grab
	NH3, Tot (mg/l) Apr, until June 30, 2017	Report		Report		Monthly	Grab
	Beginning July 1, 2017	18.7		Report		Monthly	Grab
	NH3, Tot (mg/l) May, until June 30, 2017	Report		Report		Monthly	Grab
	Beginning July 1, 2017	18.7		Report		Monthly	Grab
	NH3, Tot (mg/l) Jun, until June 30, 2017	Report		Report		Monthly	Grab
	Beginning July 1, 2017	18.7		Report		Monthly	Grab
	NH3, Tot (mg/l) Jul, until June 30, 2017	Report		Report		Monthly	Grab
	Beginning July 1, 2017	18.7		Report		Monthly	Grab
	NH3, Tot (mg/l) Aug, until June 30, 2017	Report		Report		Monthly	Grab
	Beginning July 1, 2017	18.7		Report		Monthly	Grab
	NH3, Tot (mg/l) Sep, until September 30, 2016	Report		Report		Monthly	Grab
	Beginning July 1, 2017	15.1		Report		Monthly	Grab
	NH3, Tot (mg/l) Oct, until June 30, 2017	Report		Report		Monthly	Grab
	Beginning July 1, 2017	18.7		Report		Monthly	Grab
NH3, Tot (mg/l) Nov, until June 30, 2017	Report		Report	Report	Monthly	Grab	
Beginning July 1, 2017	49		59	7.9	Monthly	Grab	
NH3, Tot (mg/l) Dec, until June 30, 2017	Report		Report	Report	Monthly	Grab	
Beginning July 1, 2017	56		86	7.4	Monthly	Grab	
00310	BOD5, effluent (mg/l)	30	45			Monthly	Grab
81010	BOD5 (% removal)	85 (min)				Monthly	Calculated
00530	TSS, effluent (mg/l)	75	110			Monthly	Grab



Permit Compliance Schedule

Activities to Meet Total Ammonia- In order to meet Total Ammonia final limits, the following schedule for construction (if deemed necessary by the permittee) will be included in the permit.

Code	Event	Description	Due Date
73905	Engineering Plan	Based on outcome of pilot test, permittee will apply for site approval either for the BioDome <i>OR</i> to submit a PEL to construct a lift station and outfall to the Colorado River. Note that a Site Application and a preliminary design must be submitted and approved by the Division prior to final plans and specifications.	June 30, 2015
CS010	Status/Progress Report	Submit a construction progress report summarizing the progress in construction or other activities. This will include sampling into and out of Bio-Domes.	March 1, 2016
CS010	Status/Progress Report	Submit a construction progress report summarizing the progress in construction or other activities. This report will include a summary of approval and design process.	December 31, 2016
CS016	Complete Required Work or On-Site Construction	Complete construction of facilities or other appropriate actions, which will allow the permittee to meet the final limitations.	June 30, 2017

In addition to the discharge permit, Kremmling also has a notice of authorization, No. COE021000, for reuse. Like the discharge permit, the notice of authorization details specific effluent limits. While not ammonia driven, these effluent limits compel the facility to have and operate unit treatment processes that would not be necessary otherwise. While the entire notice of authorization is included with this document as Appendix B, the following excerpt details the effluent limits.

Table I.B.3 - Limitations and Monitoring Requirements for all *Category 2* Reclaimed Water Produced and Delivered

Parameter	Monthly Average	Daily Maximum	Annual	No Exceedance in 95% of 1 Samples	Monitoring Frequency	Sample Type
Flow, MGD	---	0.3	---	---	Continuous	Recorder
Flow, total	---	---	Report	---	Continuous	Recorder
<i>E. coli</i> /100 ml	126	235	---	---	2x/Week	Grab
Turbidity, NTU	3	---	---	5	1x/12 hours of delivery	Grab for analysis on bench top turbidimeter or



						In-line turbidity meter
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i) Current Unit Processes

Kremmling’s existing treatment facility includes an influent flume, a comminutor, one automatic bar screen and one manual bar screen, one complete mix stabilization pond with a cover and diffused aeration (Pond A), two partial mix stabilization ponds with covers, baffles, and diffused aeration (Ponds B and C), one covered settling pond (Pond D), a tertiary cloth filter, and ultraviolet light disinfection. The discharge can be directed to a reuse storage pond or rapid infiltration beds hydrologically connected to Muddy Creek.

ii) Current Capacity

Excluding the proposed upgrades, the stabilization pond system is designed to meet secondary treatment standards (i.e. biochemical oxygen demand (BOD) and total suspended solids (TSS)) at a maximum month design loading capacity of 600 lbs BOD₅/day and 0.3 million gallons per day (MGD). While the existing facility may be able to provide incidental nitrification while under loaded or during warmer seasonal temperatures, the facility loaded at the permitted facility design capacity is not designed to provide nitrification.

iii) Current Operating Load

The domestic wastewater treatment works currently receives an average hydraulic loading of 0.14 MGD and an average organic loading of 263 lbs. BOD₅. Compared to the design and permitted hydraulic and organic capacities of 0.3 MGD and 600 lbs. BOD₅, the domestic wastewater treatment facility is approximately 50% loaded. The current hydraulic loading provides about 31 days of detention time in the aerated treatment cells which is approximately double that for secondary treatment in a stabilization lagoon. The excess hydraulic detention time enables the stabilization ponds to provide incidental nitrification with warmer wastewater temperatures. Lagoons can nitrify under natural conditions without special operations. Incidental nitrification does not interfere with the organic removal capacity in a stabilization lagoon and does not require operator comprehension or analytical skills.

iv) Current Facility Classification

A few years ago, the Engineering Section became the responsible section within the Division for developing and assigning facility classifications for drinking water and clean water treatment facilities, distribution systems, and collection systems. The Engineering



Section became aware of inconsistent classifications and approached the Board about initiating a project to revisit all classifications. With the Board's support, the Engineering Section hired a part time engineer, equally funded by clean water and drinking water, to work solely on this effort. Due to clean water budget constraints, the part time position's funding required a switch to drinking water classification reviews only. Many drinking water and clean water facilities have not yet been reviewed through this effort. Kremmling Sanitation District's facility had not been reviewed through this special effort until this appeal process. Treatment facility, collection system, and distribution system classifications are always evaluated with engineering review applications. Kremmling's domestic wastewater treatment works' most recent proposed upgrades and associated review application triggered a facility classification review.

The Division evaluates facility classifications based on the requirements of Regulation 100. According to item 100.5.1 of Regulation 100, facilities are classified as A, B, C, or D based on facility specific factors including but not limited to:

- a) Design features or other characteristics that make the facility more difficult to operate than usual
- b) Facility design flow
- c) Character and volume of wastes to be treated
- d) Facility's design being approved under the Department's variance procedure
- e) Waste unusually difficult to treat
- f) Flow conditions, use classifications and/or water quality standards assigned to the waters receiving the treated effluent that require an unusually high degree of plant operational control in order to meet permit conditions
- g) Combinations of such conditions or circumstances

In addition to this list of criteria, Regulation 100 includes a few additional requirements for classifying wastewater treatment facilities. First, table 100.5.2 includes the type of treatment as a means to distinguish classification levels. Second, any time a domestic wastewater treatment works uses a combination of two or more of the treatment processes described in table 100.5.2, the treatment facility shall be classified in accordance with the highest level of treatment process utilized, consistent with section 100.5.4. Finally, the Division may modify the facility classification by any change in conditions or circumstance on which the classification was predicated, consistent with section 100.5.3.

According to historical Division records, the Division classified Kremmling Sanitation District's existing (i.e. no ammonia upgrades) domestic wastewater treatment facility as Class C. Since the existing facility classification was not reviewed by the temporary staff employed to review all facility classifications until now, the Division reconsidered the current system's classification to verify that the system is well represented by a Class C in accordance with the requirements of Regulation 100. The following table summarizes the criteria evaluation.



Criteria	Kremmling's Evaluation
Type of Treatment per table 100.5.2	<p>The treatment processes utilized for secondary effluent limits within the existing permit (i.e. no ammonia effluent limits) qualify for row (a) waste stabilization ponds, including aerated and non-aerated types (Class D);</p> <p>The treatment process utilized for reuse effluent limits within the notice of authorization qualify for a portion of row (d) chemical and/or physical processes providing a high degree of treatment other than polishing ponds (Class B).</p>
Facility Design Flow	0.3 MGD (design capacity and permitted capacity) for discharge to Muddy Creek or to the reuse system
Unique Design Features Making Operation Unusual or Difficult	Not relevant
Character and volume of wastes	The character of the influent wastewater is typical domestic; 220 mg/L BOD.
Facility's design being approved under the Department's variance procedure	Not relevant
Waste unusually difficult to treat	Not relevant
Flow conditions, use classifications and/or water quality standards assigned to the waters receiving the treated effluent that require an unusually high degree of plant operational control in order to meet permit conditions	<p>Current discharge permit is based entirely on secondary standards.</p> <p>Notice of authorization includes stricter E. coli compared to discharge permit and a turbidity requirement. E. coli in the discharge permit is 1088 #/100ml on a 30 day average and 2176 #/100ml on a 7 day average; E. coli in the notice of authorization is 126 #/100ml on a monthly average and 235 #/ml on a daily maximum. Total suspended solids in the discharge permit is 75 mg/L on a 30 day average and 110 mg/L on a 7 day average. In contrast, the reuse notice of authorization includes a turbidity requirements of 3 NTU on a monthly average and 5 NTU on 95% of samples, similar to a daily maximum.</p>
Combination of Requirements	Kremmling Sanitation District holds a discharge permit and a notice of authorization. These two requirements result in two levels of treatment. The discharge permit requires secondary treatment. The reuse authorization requires tertiary treatment and improved disinfection practices.
Highest Level of Treatment	<p>A stabilization pond with a design capacity below 0.5 MGD results in a Class D facility.</p> <p>Chemical and/or physical processes providing a high degree of treatment other than polishing ponds with a design capacity below 0.5 MGD results in a Class B facility.</p> <p>The highest level of treatment results in a Class B facility.</p>
Special Circumstances Requiring Special Consideration	Not Relevant



With a design capacity of 0.3 MGD, Kremmling's existing domestic wastewater treatment facility is most correctly rated Class B for the existing situation with discharge permit and reuse notice of authorization. This facility classification would remain a Class B whether a mechanical facility or stabilization lagoon.

B. Kremmling's Proposed Domestic Wastewater Treatment Works

The existing stabilization lagoons cannot meet the upcoming ammonia effluent limits even at their currently under-loaded conditions. To provide sufficient nitrification at current conditions and at the design capacity of the treatment facility, Kremmling has decided to incorporate a biofilm treatment system called Bio-Domes into Ponds B and C. These improvements are being installed presently. In general, Bio-Domes may be inserted within wastewater treatment lagoons for biofilm treatment of organic matter or ammonia. The Bio-Domes operate by creating a hydraulic gradient using an air lift. The hydraulic gradient directs partially treated wastewater through many individual Bio-Dome structures. Each structure provides a significant surface area and environment to grow a biofilm colony of microorganisms. Depending on the contents of the wastewater, either heterotrophic or autotrophic organisms will dominate the biofilm environment.

Specifically for Kremmling, Bio-Domes will be installed for organic treatment and nitrification. Since the concentration of suspended growth microorganisms are not managed by the operator, faster growing heterotrophic bacteria dominate initially and consume the organic matter. Over time, the slower growing autotrophic bacteria become sufficient in number to metabolize the inorganic material such as ammonia. Since Kremmling is not adding volume to the stabilization lagoon originally sized for only treating organic material, organic material is not expected to be fully metabolized prior to reaching the Bio-Domes. The biofilm in the approximate first third of Bio-Domes are expected to be dominated by heterotrophic bacteria and reduce organic material. After the organic material is reduced, the remainder of the Bio-Domes are expected to be dominated by autotrophic bacteria and reduce ammonia.

The treatment processes that occur within the biofilm environment of the Bio-Domes are the same that occur within a suspended growth environment except that the health of the system cannot be easily observed or sampled for microscopic analysis. Unlike other biofilm technologies that are designed for organic or ammonia treatment (e.g. trickling filters and rotating biological contactors), the health of the biofilm within the Bio-Domes can only be measured through surrogates such as pH, alkalinity, and sampling the efficiency of the organic and ammonia removal processes. This type of system requires a more advanced understanding of organic and nitrification removal systems since a visual evaluation, including visual examination and microscopic observation, cannot easily be performed. While Bio-Domes are intended as a simple retrofit enhancement, the operator must have keen comprehensive and analytical skills due to the inaccessibility of the biofilm treatment.



These challenges were fully examined and discussed in item 3 of the Division’s point by point response to Kremmling’s 5 specific items listed as grounds for appeal. Overall, the lagoon system operation may be complicated by the long detention time and is not like a stabilization lagoon only designed for achieving secondary effluent limits. The proposed treatment facility has significant complexities that if not properly operated could result in a very long period of noncompliance with effluent limits. Proactive and not reactive operations will be critical to the success of the Kremmling stabilization lagoon equipped with Bio-Domes.

Once construction is complete, the Kremmling domestic wastewater treatment works will include the following unit processes: an influent flume, a comminutor, one automatic bar screen and one manual bar screen, dry chemical feed system for adjusting pH with sodium hydroxide, one complete mix stabilization pond with a cover and diffused aeration (Pond A), two partial mix stabilization ponds with covers, baffles, diffused aeration, and Bio-Domes for organic and ammonia treatment (Ponds B and C), one covered settling pond (Pond D), a tertiary cloth filter, and ultraviolet light disinfection. The discharge can be directed to a reuse storage pond or rapid infiltration beds.

C. Application of Regulatory Criteria to Proposed Facility Classification

Regulation 100 defines facility classifications by relating the complexity of the treatment process(es), the design capacity of the domestic wastewater treatment works, and any special considerations. Due to the existing treatment processes and the proposed upgrades, the Division classified Kremmling Sanitation District’s domestic wastewater treatment facility as Class B. The following table summarizes the criteria evaluation.

Criteria	Kremmling’s Evaluation
Type of Treatment per table 100.5.2	<p>The treatment processes utilized for secondary effluent limits within the existing permit (i.e. no ammonia effluent limits) qualify for row (a) waste stabilization ponds, including aerated and non-aerated types (Class D);</p> <p>The treatment processes utilized for ammonia effluent limits within the existing permit are not easily associated with any specific treatment process listed in table 100.5.2 but nitrification is specifically identified in row (d) regarding processes beyond secondary treatment (Class B);</p> <p>The treatment process utilized for reuse effluent limits within the notice of authorization qualify for a portion of row (d) chemical and/or physical processes providing a high degree of treatment other than polishing ponds (Class B).</p>
Facility Design Flow	0.3 MGD (design capacity and permitted capacity) for discharge to Muddy Creek or to the reuse system.



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Unique Design Features Making Operation Unusual or Difficult	Bio-Domes are used for supplemental organic treatment and ammonia treatment. While Bio-Domes are intended as a simple retrofit enhancement, the operator must have keen comprehensive and analytical operator skills due to the inaccessibility of the biofilm treatment for observation including microscopic analysis; troubleshooting of system upsets must be performed through surrogate analyses.
Character and volume of wastes	The character of the influent wastewater is typical domestic; 220 mg/L BOD
Facility's design being approved under the Department's variance procedure	Not relevant
Waste unusually difficult to treat	Not relevant
Flow conditions, use classifications and/or water quality standards assigned to the waters receiving the treated effluent that require an unusually high degree of plant operational control in order to meet permit conditions	<p>Future discharge permit with expired permit compliance schedule is based on secondary standards and ammonia.</p> <p>Notice of authorization includes stricter E. coli compared to discharge permit and a turbidity requirement. E. coli in the discharge permit is 1088 #/100ml on a 30 day average and 2176 #/100ml on a 7 day average; E. coli in the notice of authorization is 126 #/100ml on a monthly average and 235 #/ml on a daily maximum. Total suspended solids in the discharge permit is 75 mg/L on a 30 day average and 110 mg/L on a 7 day average. In contrast, the reuse notice of authorization includes a turbidity requirements of 3 NTU on a monthly average and 5 NTU on 95% of samples, similar to a daily maximum.</p>
Combination of Requirements	Kremmling Sanitation District holds a discharge permit and a notice of authorization. These two requirements result in two levels of treatment. The discharge permit requires secondary treatment plus ammonia. The reuse authorization requires tertiary treatment and improved disinfection practices.
Highest Level of Treatment	<p>A stabilization pond for organic treatment with a design capacity below 0.5 MGD results in a Class D facility.</p> <p>The new permit requires significant cold weather nitrification. The treatment processes utilized for ammonia effluent limits within the existing permit are not easily associated with any specific treatment process listed in table 100.5.2 but nitrification is specifically identified in row (d) regarding processes beyond secondary treatment resulting in a Class B facility for a design capacity below 0.5 MGD.</p> <p>Chemical and/or physical processes providing a high degree of treatment other than polishing ponds with a design capacity below 0.5 MGD results in a Class B facility.</p> <p>The highest level of treatment results in a Class B facility.</p>



<p>Special Circumstances Requiring Special Consideration</p>	<p>The highest level of treatment based on table 100.5.2 does not include a suitable technology match for Bio-Domes. When Regulation 100 became effective around 2000, the technologies in rows (a), (b), and (e) were primarily intended for organic treatment and not nitrification based on permit implementation. While these treatment technology designs and operations may be adjusted for nitrification, the Division believes that the facility classifications in table 100.5.2 may not directly reflect facility classifications for nitrifying treatment. Given such an absence, the Division has used its authority under Regulation 100.5 to make decisions relating to site-specific classifications to find that the table should reflect a higher level facility classification if nitrification is needed to meet permit effluent limits.</p>
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With a design capacity of 0.3 MGD, Kremmling’s domestic wastewater treatment facility is rated a class B.

D. Additional Information Regarding Special Circumstances Requiring Special Consideration

v) Regulatory Context

As noted above, table 100.5.2 does not at this time include a suitable technology match for Bio-Domes, but the Division has used its authority under Regulation 100.5 to to interpret table 100.5.2 to require treatment systems that nitrify, like Kremmling’s, to have a minimum requirement of Class B. The reasons for this are explained below.

1. Regulation 100 Statement of Basis and Purpose

Current Board regulations include Basis and Purpose language to describe the Board’s intent when adopting new requirements or revising existing requirements. Basis and Purpose language begins with section 100.22 and continues to the end of Regulation 100. According to the Basis and Purpose language, table 100.5.2 within Regulation 100 was not updated when major changes were made to Regulation 100 that became effective on December 5, 2000. A regulation review shows the classification table for wastewater treatment plants has had minimal changes since 1978. While many regulatory requirements may not be impacted by new science, wastewater treatment unit processes and the approach to treatment has morphed within Colorado due to a number of implementation drivers since 2000. For example, nearly all Colorado permits now include ammonia effluent limits in addition to secondary standards and total inorganic nitrogen and total phosphorus limits are now included at many wastewater treatment facilities with design capacities greater than 2 MGD, and smaller facilities with groundwater discharge. In 2000, ammonia was considered in some permits, but secondary effluent limits still dominated.



The Division believes that table 100.5.2 reflects the state of thinking at the time of adoption and the Division has applied the requirement based on this assumption. Many of the technologies listed in table 100.5.2 are infrequently used today due to the need to meet more stringent effluent limits beyond secondary treatment. Technologies such as waste stabilization ponds, trickling filters, rotating biological contactors, and recirculating sand filters were generally constructed to only meet secondary effluent standards. Nitrification is only mentioned in row (d) of table 100.5.2 and gives the impression that all other rows in the table are intended for secondary treatment only. Considering that the state of technology at the time and the primary implementation of secondary standards in permits, the Division has interpreted table 100.5.2 to require treatment systems that nitrify to have a minimum requirement of Class B.

2. State of Technology and Implementation at Time of Adoption

While the Water and Wastewater Operator Certification Board has updated the Regulation 100 many times since 1978, revisions have not substantially updated table 100.5.2. Table 100.5.2 still reflects the prevalent technologies, treatment philosophies, and applied permit effluent limits that existed at that time of adoption. Even as late as 2000, surface water discharge permits primarily included secondary effluent requirements, including but not limited to, biochemical oxygen demand (BOD), total suspended solids (TSS), and fecal coliform.

Since 2000, the effluent limits in surface water discharge permits have become increasingly more stringent with the integration of inorganic nitrogen components and phosphorus. For current surface water permit applications, an applicant would anticipate secondary standards plus total inorganic nitrogen (i.e. ammonia and nitrate) effluent limits. Given these changes, the Division has used its authority under Regulation 100.5 to make decisions relating to site-specific classifications to apply the principles of table 100.5.2 to later technologies.

3. Alternative Technology Acceptance

The increasingly stringent effluent limit drivers have also changed the landscape of the treatment technologies within the state. Around 2000, a variety of technologies were available and utilized to meet the applied secondary treatment requirements in discharge permits. These technologies are heavily represented in table 100.5.2. Examples of these technologies include waste stabilization ponds, trickling filters, rotating biological contactors, and recirculating sand filters. While these treatment processes were prevalent in 2000 and have the capability to provide treatment beyond secondary standards, engineers, owners, and practitioners have moved toward activated sludge variants, creative biofilm technologies, and other alternative technologies more commonly used to meet more stringent limits that include inorganic nitrogen and phosphorus requirements. Table 100.5.2 does not well represent some of these more recent treatment options such as Bio-Domes.



Bio-Domes were accepted for incorporation into stabilization ponds in Colorado on August 3, 2015. The acceptance establishes minimum design criteria for Bio-Domes for secondary or nitrification treatment. As part of the acceptance, the Division identified that Bio-Domes require a Class C or Class B domestic wastewater treatment facility classification. The Division identified two classes based on the level of treatment and complexity of the system. The Class C was intended to be for Bio-Domes used for secondary treatment. The Class B was intended to be for Bio-Domes used for nitrification. Kremmling’s proposed domestic wastewater treatment works requires a Class B operator per the alternative technology acceptance.

E. ABC Need-to-Know Criteria for Wastewater Treatment Operators

While not a regulatory requirement, the Division uses the Association of Boards of Certification (ABC) Wastewater Treatment Need-to-Know Criteria as a reference to better understand the operator certification level needed to reach the analysis level in relation to classifying specific wastewater treatment unit processes, consistent with section 100.5.3. The 2012 ABC Wastewater Treatment Need-to-Know Criteria defines *Analysis* as the examinees ability to compare, contrast, diagnose, examine, analyze, and relate important concepts in addition to comprehending and applying. The Division finds that *Analysis* establishes the minimum knowledge level needed to be a fully functioning operator.

The following table relates the 2012 ABC Wastewater Treatment Need-to-Know Criteria facility classifications to Regulation 100. A copy of this document is included in Appendix C.

Regulation 100 Facility Classifications	2012 ABC Wastewater Treatment Need-to-Know Criteria Facility Classifications
Class D	Class I
Class C	Class II
Class B	Class III
Class A	Class IV

Based on these equivalents, the following table identifies the minimum level of Analysis for each treatment process that Kremmling will have once the proposed upgrades are complete.

Treatment Process	Regulation 100 Facility Classification Equivalent
Comminution	Class B
Screening	Class D
Dry Chemical Addition - dry chemical feed system for adjusting pH with sodium hydroxide	Class A
Secondary Treatment - Stabilization Ponds with Aeration	Class D
Secondary Treatment - Fixed-film Bioreactor	Class C
Tertiary Treatment - Biological Advanced Wastewater Treatment	Class C
Tertiary Treatment - Physical Advanced Wastewater Treatment following Secondary	Class B
Disinfection - Ultraviolet Irradiation	Class C



Based on the 2012 ABC Wastewater Treatment Need-to-Know Criteria, Kremmling's facility classification for the proposed improvements should be a Class A to ensure oversight by an operator with the ability to analyze all unit treatment processes. While the Division noted that the 2012 ABC Wastewater Treatment Need-to-Know Criteria recommends a Class A facility classification, a specific reference to a dry chemical feed system is not included within table 100.5.2 of Regulation 100. The Division attempts to interpret and implement the intent of Regulation 100 and did not believe that the 2012 ABC Wastewater Treatment Need-to-Know Criteria should override the requirements of Regulation 100 in this case. The Division did find that the 2012 ABC Wastewater Treatment Need-to-Know Criteria aligns with the Regulation 100 in requiring a Class B operator for physical advance wastewater treatment following secondary.

III. Recommendation

Regulation 100 defines facility classifications by relating the complexity of the treatment process(es), the design capacity of the domestic wastewater treatment works, and any special considerations. The domestic wastewater treatment works' unit treatment processes, design capacity, and uniquely challenging operating requirements all support the Class B requirement. The Division has exercised its authority under Regulation 100.5 to find that Kremmling Sanitation District's domestic wastewater treatment works deserves a Class B domestic wastewater treatment works facility classification.

IV. Exhibits

Exhibit A - Colorado Discharge Permit System (CDPS) No. CO0048437
Exhibit B - Notice of Authorization Number COE021000
Exhibit C - 2012 ABC Wastewater Treatment Need-to-Know Criteria

Respectfully submitted this 12th day of October, 2016,

FOR THE WATER QUALITY CONTROL DIVISION



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