



December 6, 2023

David Schneider, District Manager
Round Mountain Water and Sanitation District
59000 Hwy 69 N, PO Box 86
Westcliffe, CO 81252

Subject: Demonstration Project - Request for Information
Regulation 22 Site Location Approval No.: 3622
Powell Water Microalgae System (PWMAS)
Colorado Discharge Permit System (CDPS) No. COX632073
Custer County
ES Project No. ES.23.SA.08149

Dear David Schneider:

The Water Quality Control Division (Division) is in receipt of the Round Mountain Water and Sanitation District's (Round Mountain WSD) October 27, 2023 Demonstration Project submittal form regarding the proposed Powell Water Microalgae System demonstration project at the Round Mountain WSD wastewater treatment facility. Based on the Division's initial review, the site location application does not meet the requirements of the Water Quality Control Commission's **Site Location and Design Approval Regulations for Domestic Wastewater Treatment Works, 5 CCR 1002-22** (Regulation 22), Section 22.11, and cannot be approved at this time. This letter outlines the required items to be submitted for Division review and subsequent authorization determination of a demonstration project. For additional information, please refer to the Division's Implementation Policy for the Regulation 22, which is available at the following [link](#).

In order for the Division to evaluate the proposed demonstration project, section 22.11(1)(b)(i) requires submittal of a Demonstration Project Testing Plan (Testing Plan), signed and sealed by a professional engineer registered to practice in the State of Colorado. We did not receive a Testing Plan from a professional engineer and the drawings were also not sealed by a registered professional engineer. Please provide a Testing Plan and design plans signed and sealed by a professional engineer.

The submittal did include various new and historic documents. The documents received were reviewed for relevance to the proposed demonstration project to assess if the required content of a Testing Plan was provided. Although the 2017 through 2020 engineering reports, preliminary effluent limits, and approvals may have some historic information, the reports were related to a sequencing batch reactor design with discharge to surface water and are not directly relevant to the current proposal. The site location approval in 2020 has expired. Content in the other documents informed the comments below.

Section 22.11 requires that, at a minimum, the Testing Plan must include the following:

1. Project goal and description of the demonstration test technology, process, or chemical.

The response on the application form indicates, *"The project goal is to prove that the PWMAS (Powell Water Micro Algae System) is an effective and affordable wastewater treatment solution that merits CDPHE approval for the state of Colorado. In essence, it is the combining of optimized lagoon treatment (Bio-augmentation, serpentine skirting, fine bubble diffusion, etc.) with tertiary treatment using a Powell Water Systems Electrocoagulation unit."*

Please note that micro algae addition as a supplementary oxygen system and electrocoagulation are accepted technologies in Colorado. There was previous bench-scale testing of electro-coagulation for the site and those results were included in the recent submittal. The Division's previous concerns for the proposed approach are associated with the proposed plan for achieving total nitrogen reduction (i.e., nitrification and denitrification) in an aerated lagoon environment in all seasons. The reliance on continuous bio-augmentation of microorganisms for which there has been no identified full-scale projects



with data or compliance history is concerning to the Division. Please note that during a demonstration test, the permittee is responsible for continued compliance with the facility's discharge permit.

2. Description of the testing protocol including sampling plan with testing frequencies, locations, and methods. The planned sampling and testing parameters need to demonstrate unit-by-unit performance as a result of the demonstration project testing.

The proposed testing table includes parameters, sample locations (i.e., inflow, 1st lagoon, 2nd lagoon, 3rd lagoon, end of pipe), and monitoring frequency, but does not include sample types (e.g., composite, grab). The proposed testing table includes monitoring ammonia in the influent. The Division expects monitoring of TKN as representative of the nitrogen load for the influent wastewater. The permit currently includes monthly monitoring for various constituents at monitoring wells. The Division highly recommends some sampling prior to discharge to the infiltration areas to characterize effluent concentrations of chloride, sulfate, total dissolved solids in the effluent being delivered to the infiltration areas as these constituents could ultimately impact groundwater and samples from the monitoring wells. For awareness, please note that the proposed testing table indicates sampling for E.coli and the permit identifies total coliform at the monitoring wells. For performance of the electrocoagulation unit, there may need to be a sample location following the electrocoagulation process, at least for some parameters, but that sampling location is not specifically identified in the proposed testing table. For clarity to the Division and the operators, please provide an updated monitoring plan that includes sample types, TKN in influent, incorporates monitoring requirements in the Permit, and clarifies sampling after the electrocoagulation unit.

3. Site plan or process flow diagram (PFD), before and during proposed demonstration installation. As noted in the Regulation 22 Implementation Policy, the submittal must indicate how and where the demonstration project will be installed and incorporated into the existing treatment works. This includes showing all equipment, tanks, treatment processes, chemical additions and waste streams and describing the nature and extent of construction work that will be required to implement the demonstration project. Where construction will be required for the demonstration project, the submittal must include sufficient information to demonstrate compliance with the requirements of the design criteria. The plan must include identification of any waste streams that will be generated by the demonstration project and a description of the disposal method for each waste stream.

The submittal includes a set of 17 drawings for the proposed demonstration project that includes equipment, tanks, major treatment processes, and buildings. The Division identified the following observations regarding the site plan, PFD, and construction drawings.

- The cost estimate indicates grit removal, but the drawings and submittal do not identify how or where.
- The Division's acceptance criteria for microalgae addition requires preliminary screening to precede treatment lagoons including a 1-inch bar screen and an auger screw screen with a ¼-inch fine screen. It is unclear if the auger screen in the headworks (sheet 6) meets these criteria.
- On the drawings, the electro coagulation system is identified as disinfection. Based on earlier electrocoagulation testing for the site, the Division understands the electrocoagulation is intended to remove arsenic and phosphorus and the proposed testing table includes arsenic and phosphorus. Previous testing indicated the electrocoagulation process will also involve pre-screening at 1/32-inch, but it is unclear if this pre-screening will be at the auger screen in the headworks (sheet 6) or a screen immediately before the electrocoagulation process.
- The cost estimate says the liner material is 45 mil HDPE. The minimum liner thickness for HDPE is 60 mil in section 8.1.2 of the design criteria.
- The design criteria and the Division's acceptance criteria for microalgae addition requires appropriate air supply/distribution for removal of BOD, TSS, and other constituents as required to meet permit effluent limits. Redundant air supply must provide actual oxygen rate (AOR) for blower or aerator design of at least: $AOR = (TKN \text{ load lbs/day} \times 4.6 \text{ lb O}_2/\text{lb TKN}) + (BOD5 \text{ load lbs/day} \times 1.3 \text{ lb O}_2/\text{lb BOD5})$.
- Section 8 of the design criteria includes requirements for aerated pond systems including freeboard, inlet and outlet piping, level control, interconnecting piping suitable for bypassing any single pond while maintaining the remaining two ponds in operation. In the future, when the

existing ponds are lined and incorporated, multiple trains also need adequate flow splitting devices.

- The submittal notes an influent pump station, effluent pump station, force main, each of which must meet wastewater design criteria for permanent installation.
- Please note that permanent installations will require two trains and redundancy of equipment (e.g., pumps, blowers, screens, electrocoagulation, sludge removal/handling). The constructed structures/buildings should anticipate possible additional units necessary for redundancy in the permanent installation with two sets of ponds.
- The only chemical additions noted are for microalgae and bio-augmentation, however the Division understands the electrocoagulation steps will include dissolution of aluminum and iron plates, and other chemicals may be needed (e.g., alkalinity, disinfection). As noted at the end of this letter, the permittee must coordinate with the Division's Permits Section regarding permit requirements for chemical additions.

A demonstration project is a temporary action. Prior to permanent utilization of the process/technology involved in a demonstration project, the permittee must obtain site location and design approval. Permanent installations of treatment processes and equipment must meet the wastewater design criteria and the construction of unit processes for the demonstration test is completed "at risk" of the permittee, not only for ongoing permit compliance, but also if the constructed equipment is found to be non-conforming to the wastewater design criteria during the design review for permanent utilization. Although the Division does not conduct a design review for a demonstration testing plan, the Division encourages the permittee and design engineers to consider the design criteria and redundancy considerations (e.g., multiple trains, firm equipment capacity) to avoid non-conforming construction where the construction is expected to be permanent. Please include identification of any waste streams that will be generated by the demonstration project and a description of the handling and disposal method for each waste stream.

4. A description of how the proposed project will impact the performance of other parts of the treatment works and the impact on each unit treatment process's ability to meet effluent limitations (existing and proposed WQPTs).

The submittal seems to imply all flow will go through the newly lined ponds for the demonstration testing. However, the submittal does not describe what will be the condition or plan for the existing ponds or equipment. Please describe impacts or conditions of other treatment processes during the demonstration testing period.

5. Project schedule including proposed start and end dates. *Note, Demonstration projects have a limited time period during which testing may be conducted. As a general rule, demonstration projects must be completed as expeditiously as practical and cannot extend beyond two (2) years without receiving an extension from the Division.*

The project schedule indicates construction in 2024 with the operation beginning January 2025 and operating for two years. As noted above, prior to permanent utilization of the process/technology involved in a demonstration project, the permittee must obtain site location and design approval.

The submittal does not mention interim reporting to the Division or providing a final Demonstration Project Testing Report to the Division. The Division requires interim and final reporting for the project, including a summary of the testing activities, sampling and analyses results, and a discussion of findings and conclusions.

Please submit a Demonstration Project Testing Plan that includes the above identified components. Following receipt of your response submission, the Division will resume review work on the proposed demonstration project.

Demonstration projects require site location review and approval by the Division's Engineering Section prior to commencement of construction, operation, and testing. Any Division determination regarding whether a project is a demonstration project is separate from a Division determination of permit compliance and whether a permit modification is required. Please contact the Permits Section regarding permit status. In addition, as

indicated in section 22.11(1)(b)(ii), if the project involves the use of a chemical not currently identified in the discharge permit for the treatment plant, the applicant will be required to consult with the Permits Section to evaluate whether a Request for Chemical Evaluation form and/or a discharge permit amendment is required to be submitted to the Division for review and approval prior to starting/implementing the demonstration project.

Please be aware that the coordination and evaluation with the Permits Section may impact the testing plan.

Thank you for your time and cooperation in this matter. If you should have any questions, please contact me by phone at 303-692-3552 or by email at david.kurz@state.co.us.

Sincerely,

David Kurz, P.E.
Lead Wastewater Engineer
Engineering Section
Water Quality Control Division
Colorado Department of Public Health & Environment

cc: Andrea Keough, AES Group Inc.
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Colorado Discharge Permit System (CDPS) No. COX632073, Round Mountain Water and Sanitation District