



COLORADO
Department of Public
Health & Environment

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January 29, 2016

Tim Canter
Process Specialist
Environmental Dynamics International
5601 Paris Road
Columbia, MO 65202

Subject: Acceptance of the IDEAL™ Process as an Alternative Technology for Use in Domestic Wastewater Treatment Works in Colorado

Dear Mr. Canter:

The Water Quality Control Division (the Division) has received and reviewed information for Environmental Dynamics International's (EDI) Intermittently Decanted Extended Aeration Lagoon (IDEAL™) process in accordance with section 1.8.0 of *Design Criteria for Domestic Wastewater Treatment Works Policy WPC-DR-1* (wastewater design criteria). The IDEAL™ process design is accepted for use as an alternative technology subject to the design criteria in Table 1. This acceptance is not intended as a third-party certification of the technology.

This acceptance addresses the following item:

- IDEAL™ process for continuous inflow with intermittent discharge, continual flow batch reactor using aeration/mixing equipment, two submerged attached-growth media curtains (BioReef™ BioCurtain™), supernatant withdrawal, and process control.

This acceptance applies only to the IDEAL™ process and does not constitute construction approval for installation in domestic wastewater treatment facilities. **Review and approval for the design of any domestic wastewater facility proposing to use this technology will be further reviewed on a site-specific basis by the Division as required by Section 22.11(1) of the *Site Location and Design Approval Regulations for Domestic Wastewater Treatment Works 5CCR 1002-22* (Regulation 22) and the Colorado Water Quality Control Act (Act), Section 25-8-702, C.R.S. which states in part that: "No person shall commence the construction of any domestic wastewater treatment works or the enlargement of the capacity of an existing domestic wastewater treatment works, unless the site location and the design for the construction or expansion have been approved by the division."**

Any modifications to the physical attributes or characteristics of this treatment technology must be submitted to this office for review and acceptance by the Division prior to sale in Colorado. For any changes to the process or equipment following the issuance of this letter, the Division will review any additional third party verification reports and issue a revised acceptance letter, or denial, as appropriate.



Table 1. IDEAL™ Design Criteria:

Design Criteria
<ol style="list-style-type: none">1. The approved facility design capacity must be based on the maximum month average flow and loading. During the site-specific design review, calculations must be submitted in the Process Design Report (PDR) to justify the basis of design for the biological process including, but not limited to, basins/lagoons, aeration, mixing, settling, decanting, cycle times, temperature adjustments, solids retention and sludge wasting.2. Unit process sizing must be established in accordance with the Division's current wastewater design criteria (e.g., activated sludge sequencing batch reactors for secondary treatment and nitrification) with the accepted deviations identified in this letter. The IDEAL™ process is intended to select for autotrophic bacteria and designs are characterized by low F:M ratio, long sludge age, long mean cell retention time, and long hydraulic residence time.3. Although treatment capacity of the BioReef™ BioCurtain™ assemblies is not typically quantified, biofilm capacity may be considered on a case-by-case basis using biofilm criteria in the wastewater design criteria, considering safety factors relative to the existing criteria that assume even distribution of media throughout treatment units.4. Preliminary screening must precede the IDEAL™ treatment lagoons (e.g., 3/8-inch opening). Flow equalization must be provided when the design peak daily flow is greater than five times the maximum month average daily flow.5. If multiple trains are included in parallel, adequate flow splitting devices must be provided to ensure appropriate flow to each unit.6. Designs must include an influent pipe/manifold arrangement to release influent to the flat floor zone of the reactor lagoon in a manner that encourages distribution upstream of the influent BioReef™ BioCurtain™ assembly and minimizes turbulence.7. If the IDEAL™ reactor lagoons have a flat floor length to width dimension ratio of less than 2:1 in the flow direction, baffling other than the two BioReef™ BioCurtain™ assemblies must be included to minimize short circuiting.8. The IDEAL™ process design includes the following acknowledged deviations from the wastewater design criteria for sequencing batch reactors and decanters based on the design requirements of the IDEAL™ process:<ol style="list-style-type: none">A. Fixed decanter design includes: intake holes on underneath side of pipe with low inlet velocity and design low water level at top of pipe to prevent scum intake, air purge/block during non-decant cycles to prevent solids into decanter, BioReef™ BioCurtain™ assemblies to provide influent flow baffling and inhibit influent impact on decanter [criteria 7.6.0(e)(3), (5), (7), (8), and 7.6.0(f)(2)].B. Reactor depth may be limited for lagoons receiving retrofit designs and design calculations (e.g., aeration) must account for the shallower design [criteria 7.6.0(f)(1)].C. Scum removal method must be justified in the PDR, but manual method(s) may be considered as scum impact is typically low due to long sludge age and hydraulic residence time [criteria 7.6.0(f)(5)].

9. Designs must include a flow equalization unit process (e.g., quiescent lagoon, tank and pump to disinfection) following the final reactor lagoon.
10. Designs must include a separate sludge management basin. The PDR must justify solids removal and handling equipment design and capacity.
11. Treatment Credit. The domestic wastewater treatment plant must meet effluent discharge limits (e.g., Preliminary Effluent Limits or PELs, permitted discharge effluent limits). A facility with the treatment technology designed in accordance with the wastewater design criteria and these criteria is anticipated to provide treatment to below secondary effluent limits (i.e., BOD, TSS), and ammonia limits as justified in each design. Denitrification may be possible based on the configuration and operation. Total nitrogen removal credit may be possible when justified in the PDR. No phosphorus removal credit is granted for the treatment technology.
12. For facilities where ambient temperatures can be below freezing, the design must include adequate cold weather provisions (e.g., heat trace lines, insulated covers, installation in a temperature-controlled enclosure for above ground wet components).
13. Alarm. A blower malfunction alarm and high level alarm must be provided. The design must identify how the alarm signal will notify operators of alarm activations, when the facility is attended and unattended.
14. Design Redundancy. In addition to redundancy requirements in the wastewater design criteria, firm capacity (i.e., largest unit out of service) for equipment (e.g., aeration, pump capacity) shall be installed to provide design requirements (e.g., enable the design oxygen transfer). The design shall include at least two reactor trains, each with a design flow of at least 50 percent of the total design capacity.
15. Other Processes Required. Although the treatment technology has major unit process components of a treatment plant, it does not constitute a complete package treatment plant and the particular site-specific design must include other unit processes (e.g., influent and effluent flow metering, chemical addition, disinfection, phosphorus removal) to be a fully functioning wastewater treatment plant and meet effluent discharge limits. These other supporting unit processes will be evaluated during the site location and design reviews.
16. Maintenance Access. Design must include provisions that allow the operator to access, operate, and maintain the treatment technology.
17. Manufacturer Review. A review letter issued by the manufacturer indicating the installation was designed in accordance with manufacturer recommendations must be included with the site-specific design submittal. The manufacturer's review may not supersede criteria in this acceptance. The manufacturer's review may not be substituted for all required engineering documentation and calculations stamped and signed by a Colorado licensed Professional Engineer.
18. Design must include a residual management plan including a solids mass balance for the facility, an estimate of quantities and characteristics of solid residuals, and potential disposal or beneficial use options in accordance with applicable regulations [e.g., Federal 40 CFR 503, 40 CFR 258, Colorado Biosolids Regulation 5 CCR 1002-64 (Regulation 64), Colorado Regulations Pertaining to Solid Waste Sites and Facilities 6 CCR 1007-2].

Additional Operations and Maintenance Criteria

1. Design must include provision for operator training including, but not limited to: start-up operations, normal operations, hydraulic fluctuations, temperature impacts, sludge monitoring, removal, and residual management.
2. An Operations and Maintenance (O&M) Manual must be provided for all installations and be available for review by the Division during compliance inspections.
3. Facility Classification. This technology has a Class B Domestic Wastewater Treatment Facility Classification, in accordance with Regulation 100 Water and Wastewater Facility Operators Certification Requirements, for facility flows up to 4.0 MGD.

The owner of the domestic wastewater treatment works is responsible for proper design, operation, and maintenance of the facility to meet permit effluent requirements.

Please be aware that any point source discharges of water from treatment facilities are potentially subject to a discharge permit under Colorado's State Discharge Permit System. Any point source discharges to state waters without a permit are subject to civil or criminal enforcement action.

As part of this review, the Division has evaluated the following documents:

- May 4, 2015 Submittal from Environmental Dynamics International requesting alternative technology acceptance for IDEAL™ process.
- December 29, 2015 and January 7, 2016 submittals from Environmental Dynamics International providing additional information for the alternative technology review for the IDEAL™ process.

Please direct any further correspondence regarding this acceptance to:

David Kurz, P.E.
Colorado Department of Public Health and Environment
Water Quality Control Division
4300 Cherry Creek Drive South
Denver, CO 80246

If you have any questions or comments, please contact David Kurz at david.kurz@state.co.us or 303-692-3552.

Sincerely,

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

cc: Jesse Kuntz, Water Technology Group