AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

SUCCESS STORIES

PLANT NAME AND LOCATION
IDAHO SPRINGS WASTEWATER TREATMENT PLANT - IDAHO SPRINGS, COLORADO

DESIGN DAILY FLOW / PEAK FLOW
1.0 MGD (3,785 m³/DAY) / 2.0 MGD (7,570 m³/DAY)

AQUA-AEROBIC SOLUTION
AQUANEREDA® AEROBIC GRANULAR SLUDGE TECHONOLOGY + AQUADISK® CLOTH MEDIA FILTRATION

AquaNereda® Aerobic Granular Sludge Technology Offers Nutrient Removal, Retrofitability, and Lowest Life-Cycle Cost for Idaho Springs WWTP

The Idaho Springs WWTP is located in the City of Idaho Springs, Colorado – a small mountain community an hour west of Denver, nestled within the Rocky Mountains. Founded during the 1890s Gold Rush, the town now benefits from the region's natural beauty and has transitioned to a tourism-based economy due to its proximity to relaxing hot springs and year-round outdoor activities. With continued growth, the City's existing treatment plant had exceeded 80% of its flows and loads prompting the need to upgrade.



AquaNereda® system at Idaho Springs WWTP

In conjunction with Aqua-Aerobic Systems, the City conducted a pilot in early 2018 to capture winter conditions. The pilot demonstrated that the AquaNereda® Aerobic Granular Sludge Technology (AGS) was capable of meeting increased flow and load demands in the same footprint of the existing Sequencing Batch Reactors (SBRs). An AquaDisk® Cloth Media Filter would provide polishing of effluent solids.



AquaNereda® pilot unit at Idaho Springs WWTP - Idaho Springs, CO

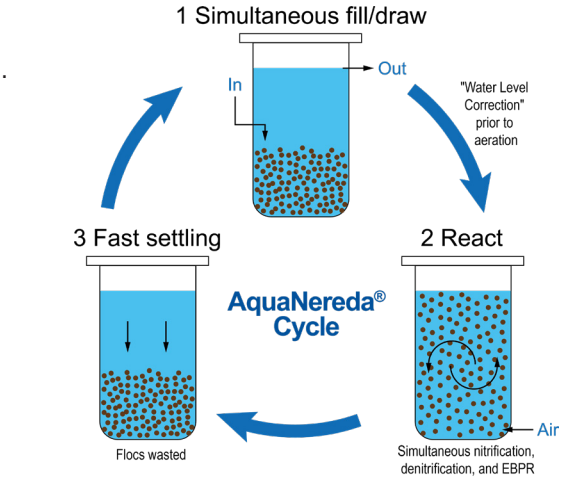
The plant's previous secondary treatment system consisted of two (2) sequencing batch reactors sized for 0.6 MGD (2,270 m³/day). The facility needed to both expand its treatment capacity, and account for the anticipated future Total Nitrogen (TN) and Total Phosphorus (TP) limits, while fitting the new process within the existing SBR tanks. An evaluation demonstrated that the AquaNereda and AquaDisk technologies offered the lowest life-cycle cost and less maintenance compared to a Membrane Bioreactor (MBR) system.

The City pursued a Construction Manager at Risk (CMAR) delivery method with JVA Engineers and Fischer Construction for improved collaboration and risk mitigation.

AquaNereda® SYSTEM PROCESS

Aerobic granular sludge is a microbial biomass that has grown into a granular shape as opposed to the flocculent nature of CAS due to the inherent nature of the technology's operation: the granules are forced to develop through hydraulic and biological selection mechanisms. Aerobic granules range in size from 200µm to 4mm in diameter allowing for a dissolved oxygen gradient to develop. This enables each granule to achieve simultaneous nitrification/ denitrification with strong biological phosphorus removal capabilities. The granule sizes also allow for a rapid settle phase of only 15 minutes.

The AquaNereda technology is a batch process that operates on optimized cycles with three distinct phases: 1) a simultaneous fill/draw phase under anaerobic conditions to initiate phosphorus release; 2) the react phase in which reduction of organics, nitrogen, and phosphorus occurs; and 3) solids separation which consists of rapid settling and sludge wasting to preferentially select for fast-settling sludge.



AquaDisk® FILTER PROCESS

Treated secondary effluent from the AquaNereda system enters the filter unit and flows via gravity through the cloth media disks. The filtrate exits to the effluent weir through the central hollow shaft which supports the individual disks. As solids accumulate on the media surface, the water level rises. Once a preset level is reached, the disks begin to rotate and the media surface is backwashed through a vacuum process. Heavier solids settle to the bottom of the tank and are then pumped to solids handling.

DESIGN CHARACTERISTICS

The AquaNereda system at the Idaho Springs WWTP consists of two aerobic granular sludge reactors retrofitted into two existing SBR tanks. The plant's existing aerobic digester was retrofitted into an influent buffer to store flow during non-filling periods of the AquaNereda reactors' cycles. An AquaDisk Cloth Media Filter is located downstream followed by disinfection. Waste sludge is sent to a new aerobic digester onsite then screw press for dewatering before being hauled offsite.

Construction and equipment installation were phased due to the retrofit approach. One SBR was taken offline and converted to an AquaNereda reactor then seeded with Conventional Activated Sludge (CAS) from the remaining online SBR. Once the AquaNereda operation stabilized, SBR #2 was taken offline and converted to the second AquaNereda reactor. This reactor was then seeded with AGS from the first retrofitted tank.

AVERAGE OPERATING DATA (Mar 2023 - Feb 2025)

Loading	Design Influent	Avg Influent	Design Effluent*	Avg Effluent*
Avg. Flow (MGD)	1.0	0.275	--	--
Max Flow (MGD)	2.0	0.475	--	--
(c)BOD_5, mg/L	361	260	10	4.3
TSS (mg/L)	356	225	10	4.2
TKN (mg/L)	52	29.7	-	0.5 (NH4-N)
TIN	--	--	10.0	2.5

*Following tertiary filtration

AquaNereda® ADVANTAGES

The AquaNereda system offered the city and plant staff the following advantages:

- Less mechanical equipment resulting in reduced maintenance demands
- Less chemical required for phosphorus removal
- A robust sludge to better handle conductivity swings when runoff from snow melt occurs
- Fully automated controls for ease of operation

Aqua-Aerobic Systems, Inc. is the exclusive North American provider of Nereda® technology developed by Haskoning.

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