



BW WATER

Cyclic Sequencing Activated Sludge (CSAS)

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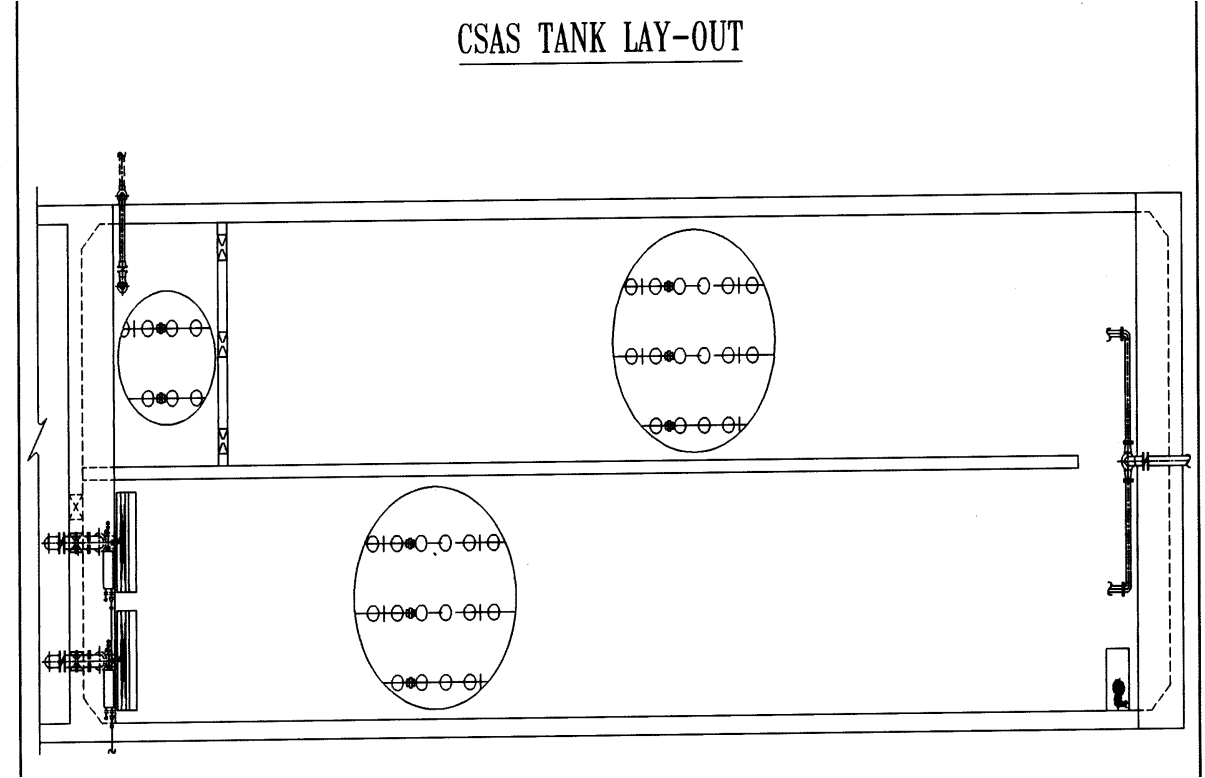
What is Cyclic Sequencing Activated Sludge (CSAS)?



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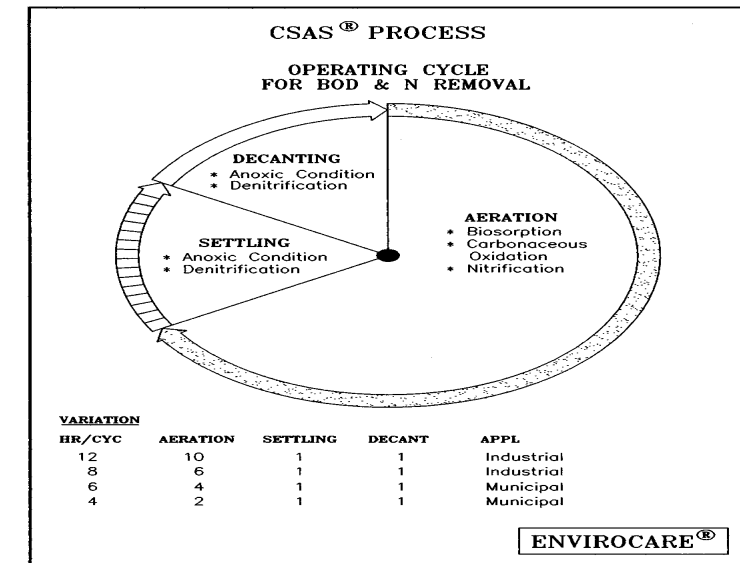


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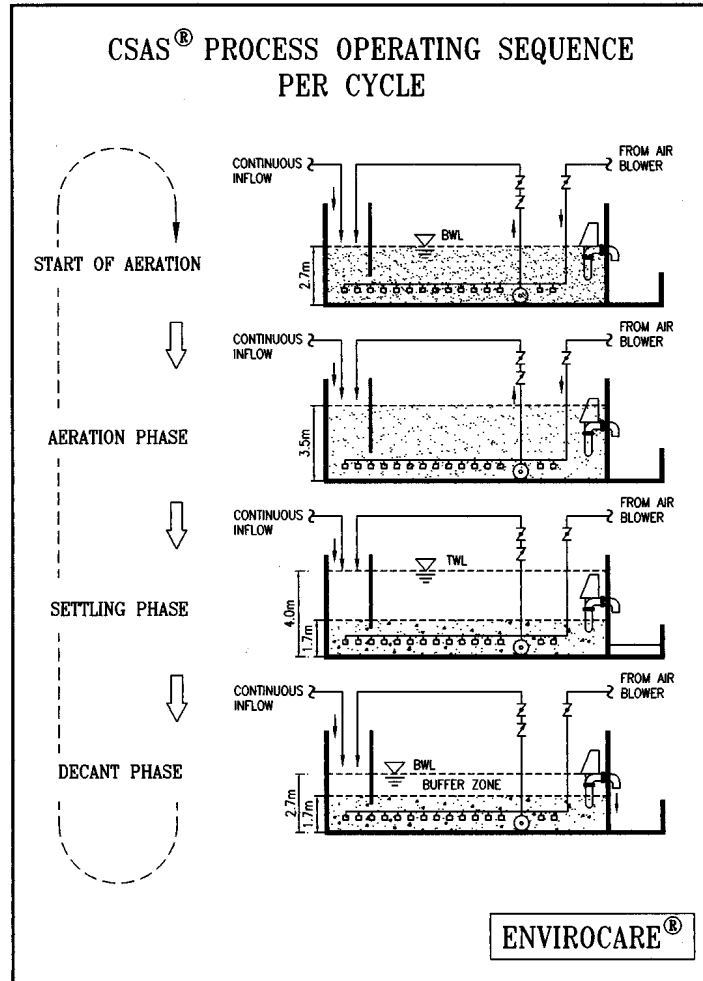
What is Cyclic Sequencing Activated Sludge (CSAS)?

- Advanced version of Sequencing Batch Reactor
 - Continuous in – Batching out (unlike SBR's Batching in – batching out)
- Operates in cycles:
 1. Aeration
 2. Sedimentation
 3. Effluent Draw (Decanting)
- Flexible Cycle Duration (4, 6, 8, 12, 24 hours)



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CSAS – How it works?

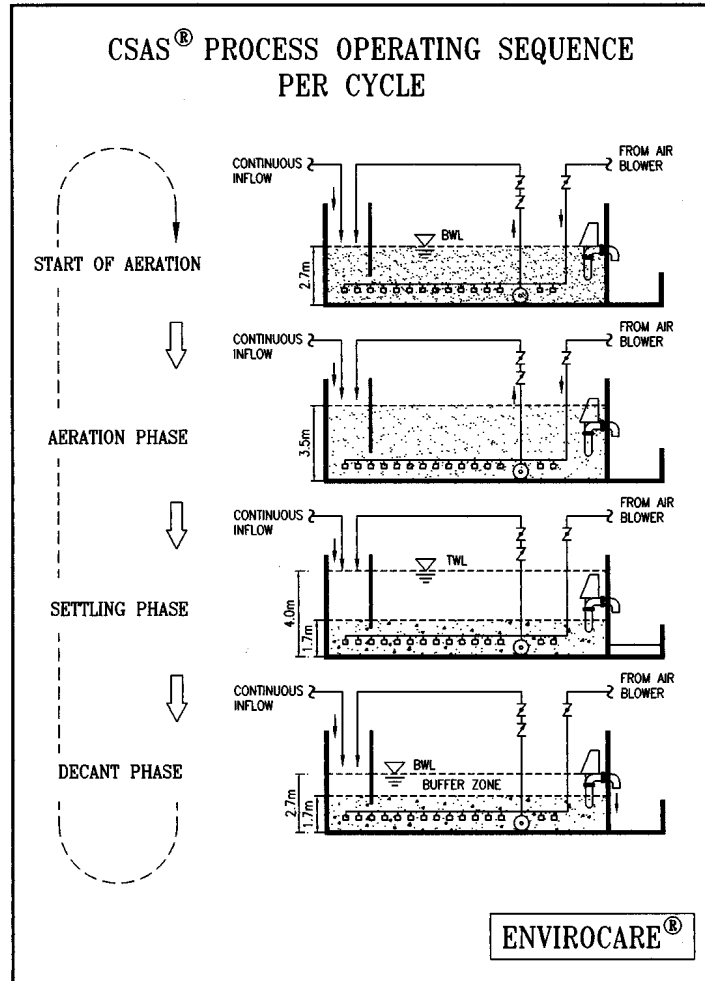


Aeration Phase:

- Continuous influent wastewater
- Filling from Bottom Water Level (BWL) to Top Water Level (TWL)
- Oxygen provided via Tubular Fine Bubble Diffusers (TFBD)
- Extended aeration for high BOD removal

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CSAS – How it works?

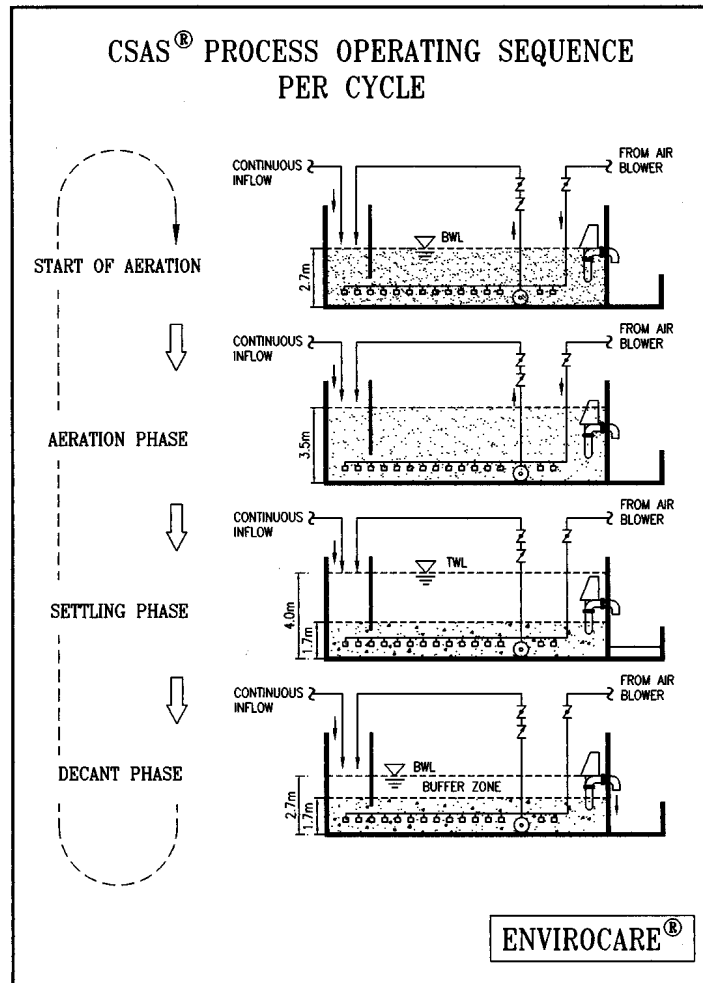


Sedimentation Phase:

- Lasts approximately for an hour
- Sediments settle below the Bottom Water Level (BWL)
- Separation of clean water and sediments

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CSAS – How it works?

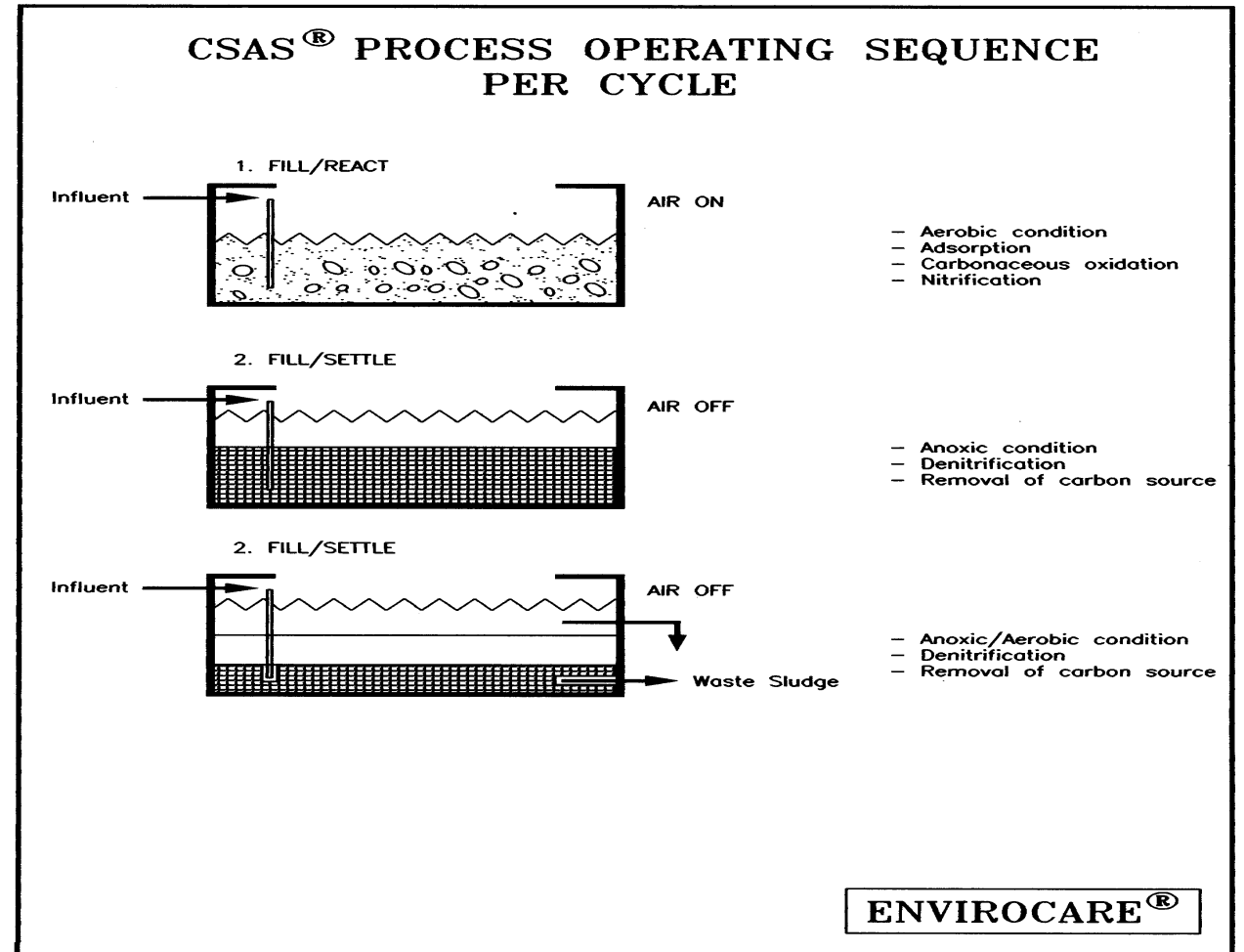
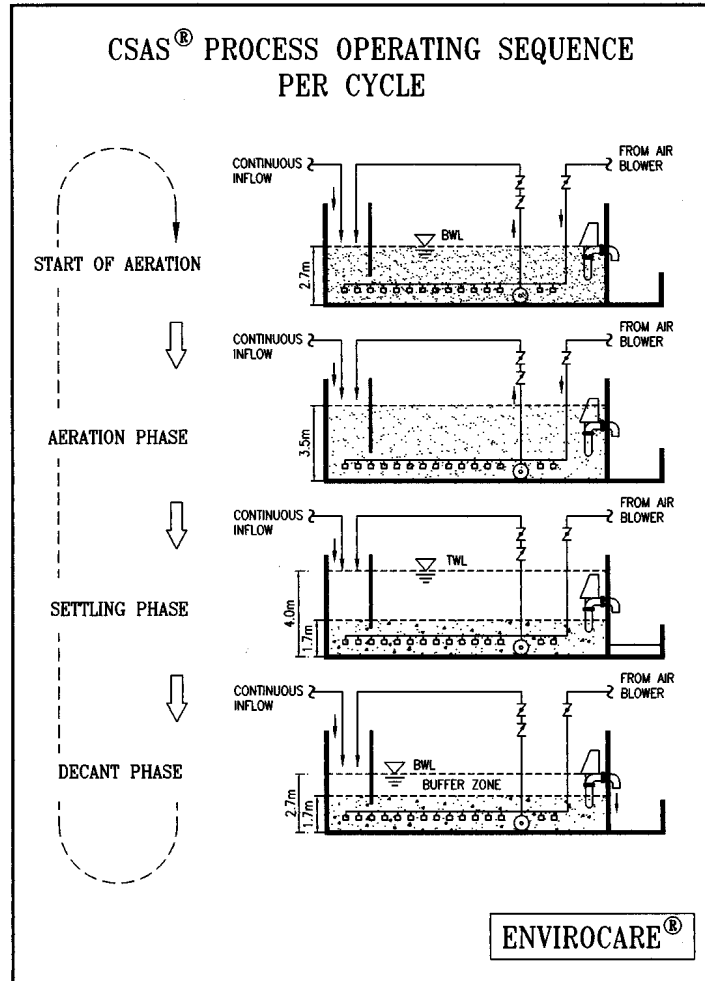


Decant Phase:

- Also known as the Effluent Draw
- Siphoning decanter draws treated effluent
- Effluent discharged from TWL to BWL
- Lasts approximately for an hour

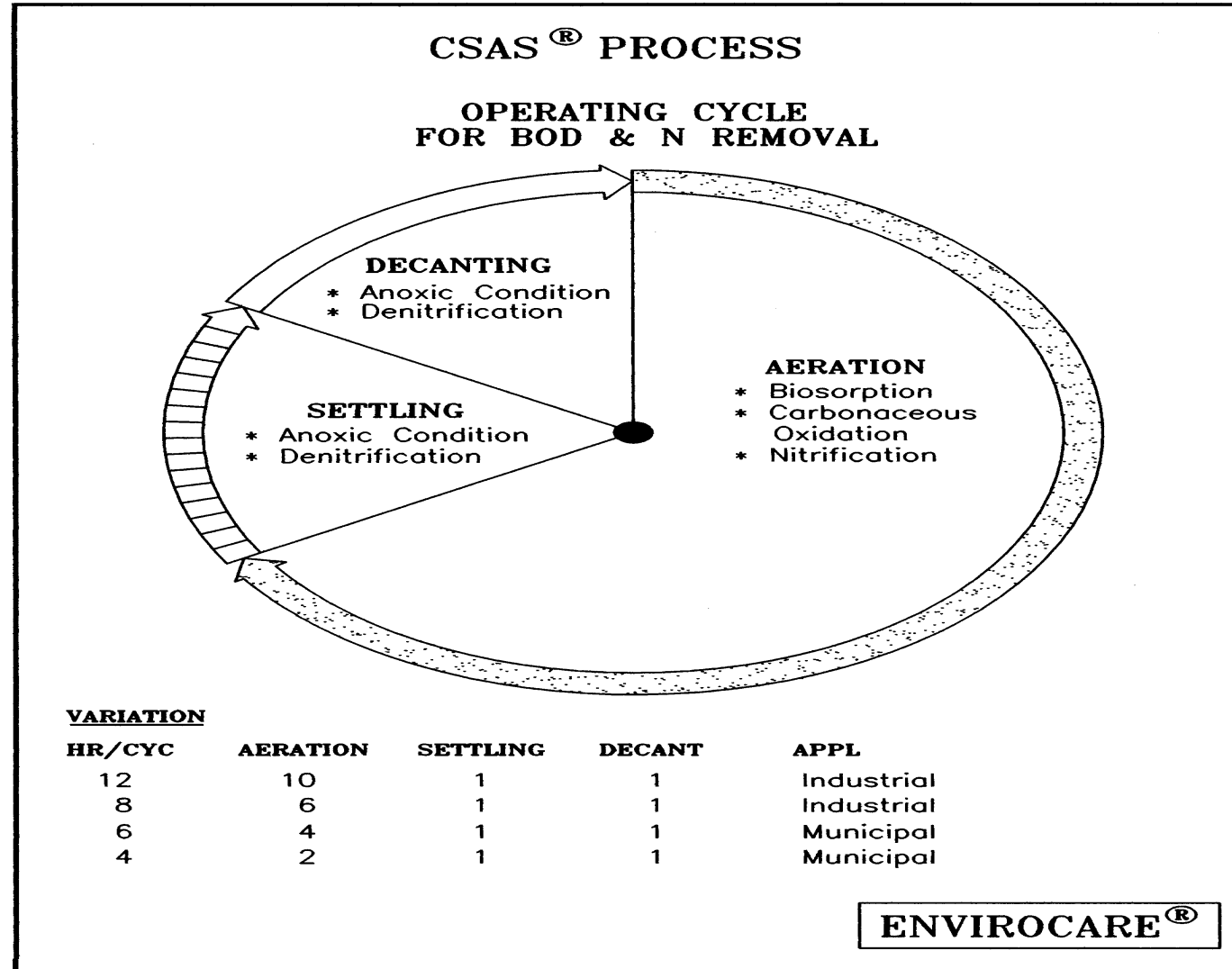
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CSAS – How it works?



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CSAS – How it works?



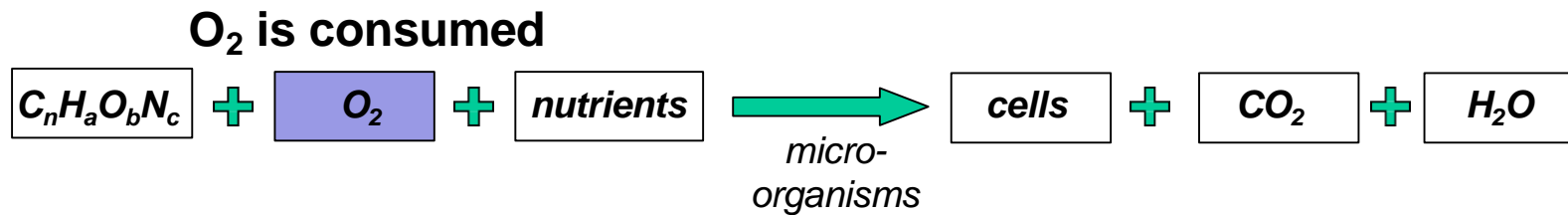
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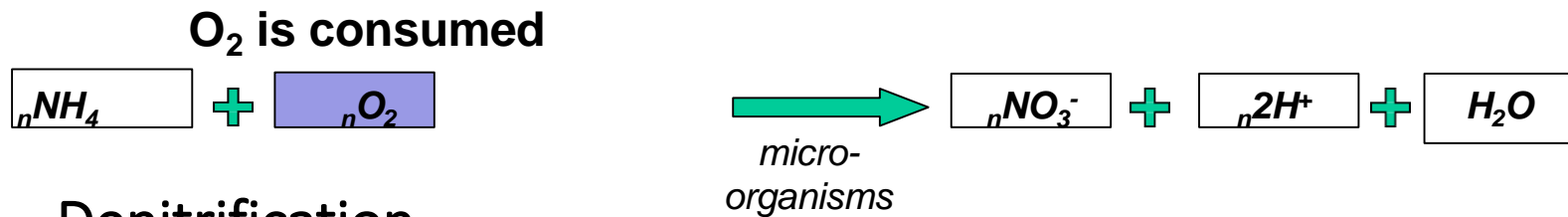
Key Features of the CSAS

- ✓ Continuous flow of influent 24/7
- ✓ Nitrogen removal through denitrification (3 process in 1)

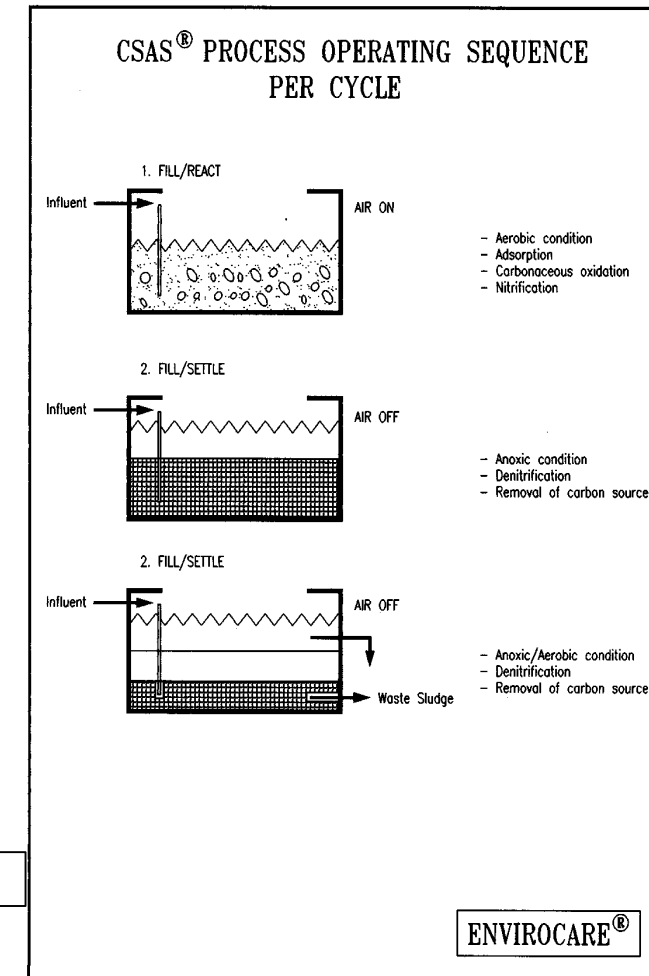
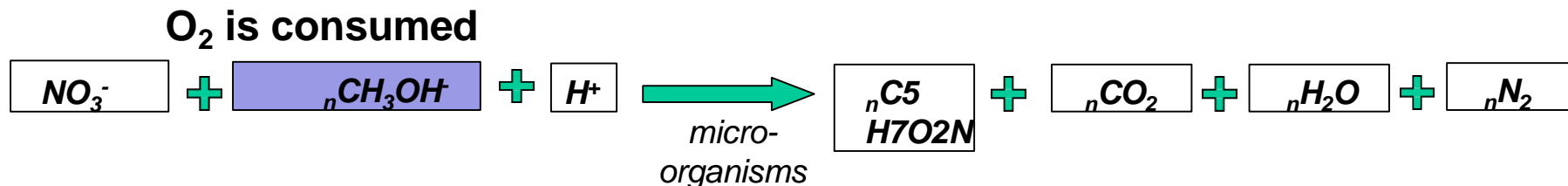
Oxidation



Nitrification



Denitrification

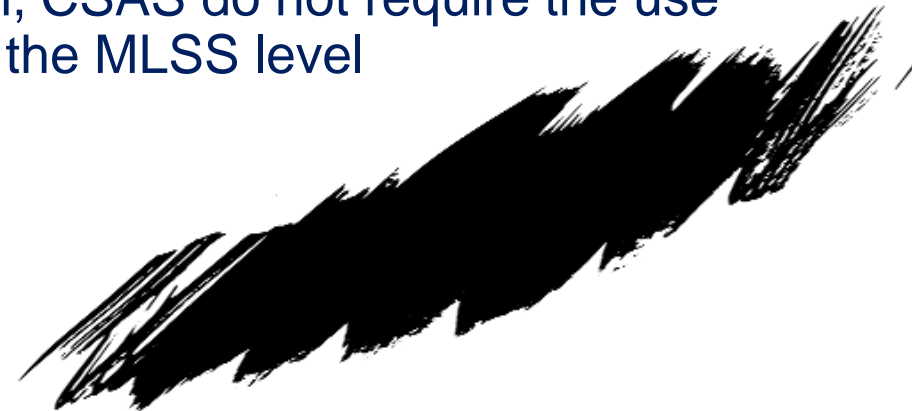


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Key Features of the CSAS



- ✓ Continuous flow of influent 24/7
- ✓ Nitrogen removal through denitrification (3 process in 1)
 - Oxidation, Nitrification, Denitrification
- ✓ No need for separate tertiary clarifier or settling tank
- ✓ Fully automated between cycles
- ✓ Operate at a higher Mixed Liquor Suspended Solid MLSS level (up to 6,000 mg/l)
 - Compared to the conventional activated sludge system, CSAS do not require the use of RAS (Returned Activated Sludge) pump to maintain the MLSS level

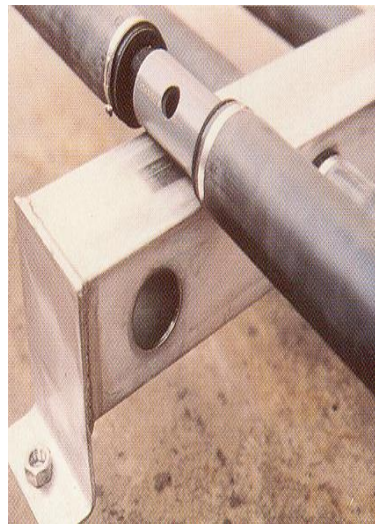


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Key Equipment to a successful implementation of the CSAS

- ✓ Efficient energy use with TFBD.
- ✓ Low-maintenance and reliable decanting system
- ✓ Highly efficient Air Blowers
- ✓ Customised design to calibrate the Denitrification Process



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CSAS: Industries & Application

