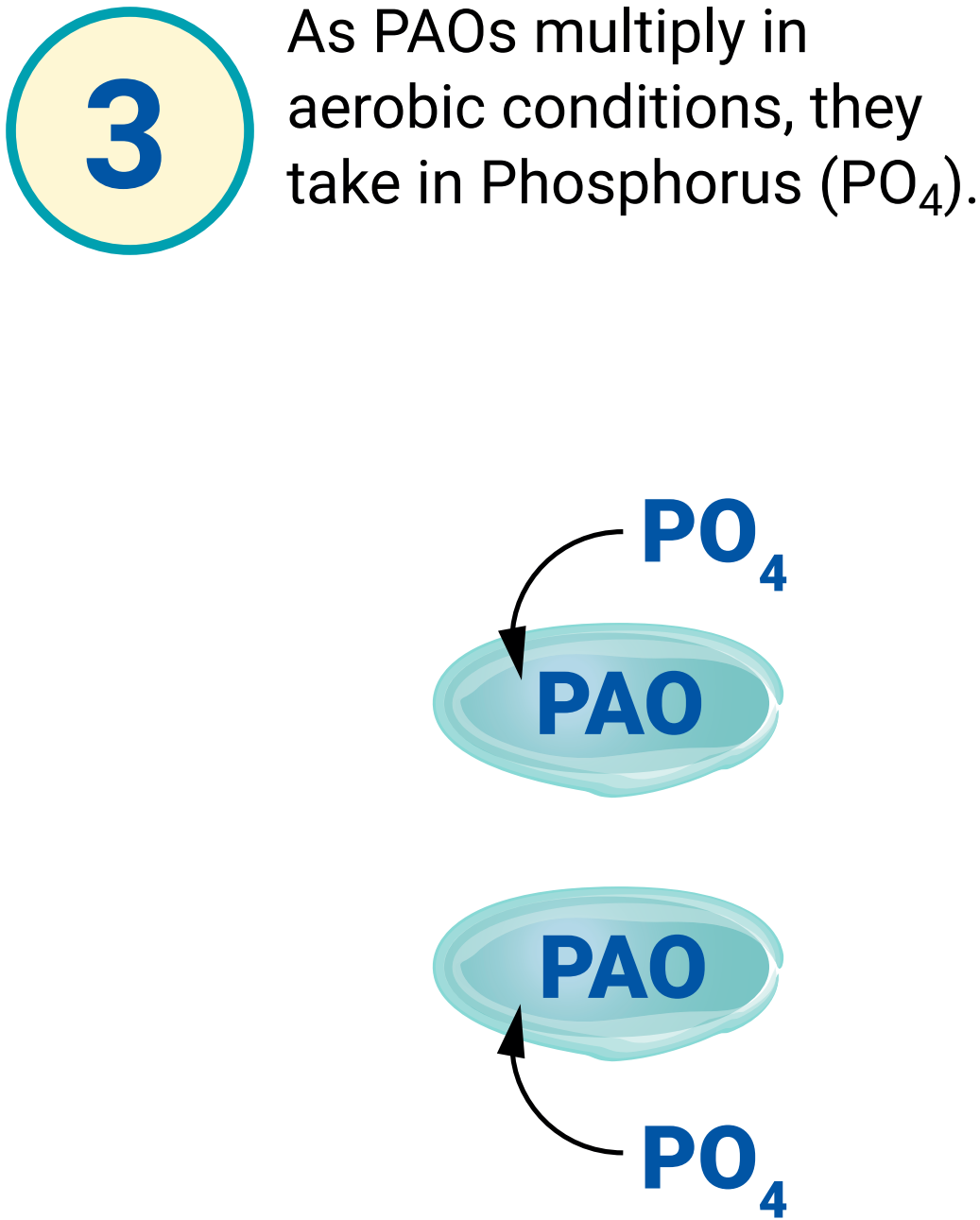
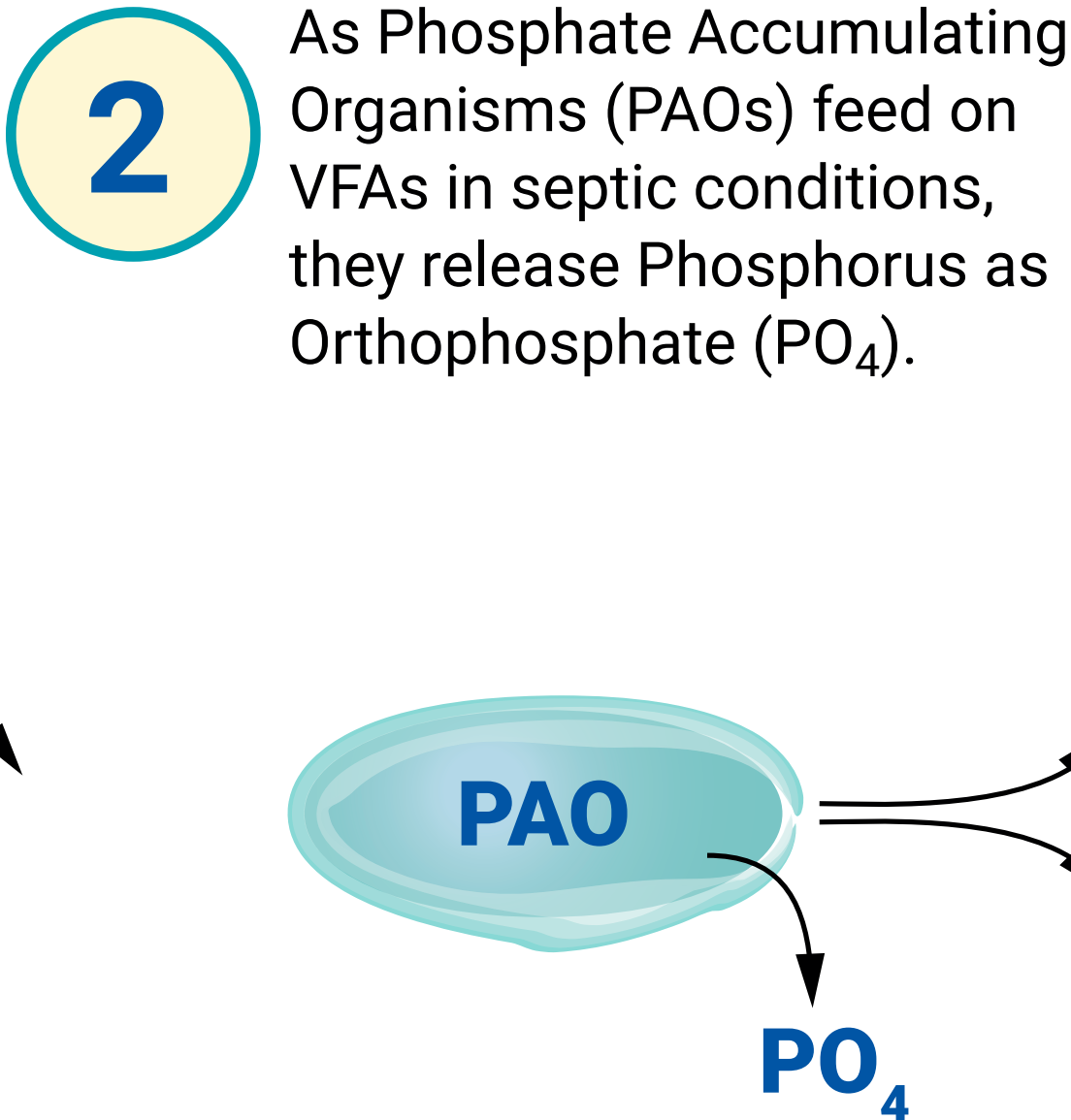
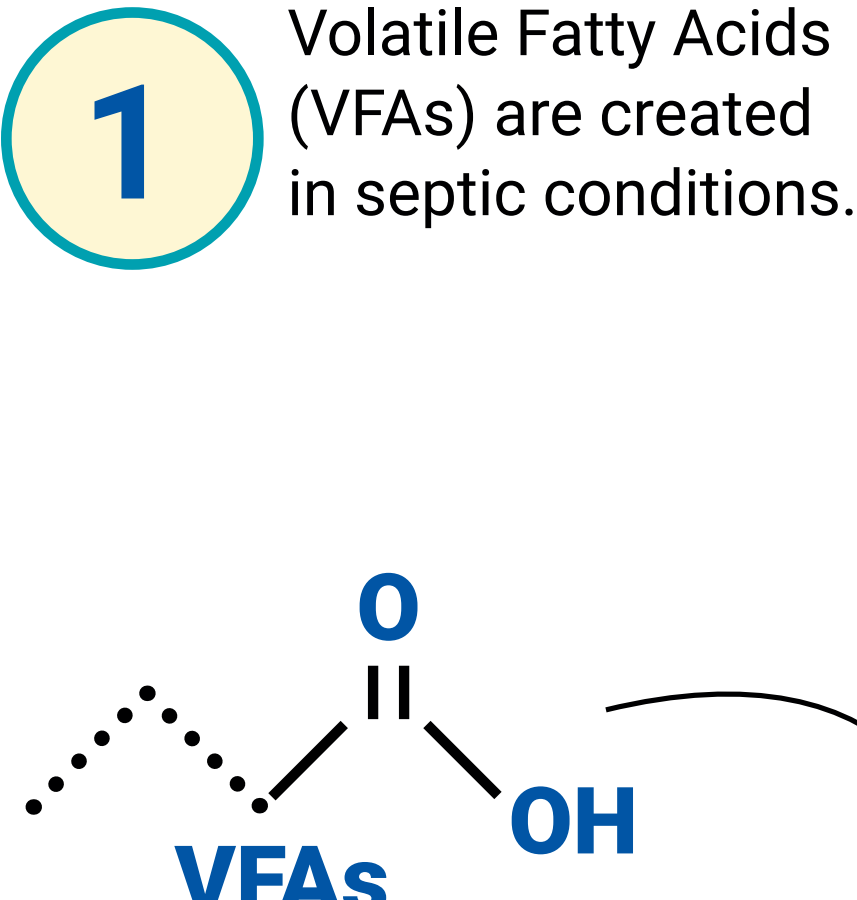
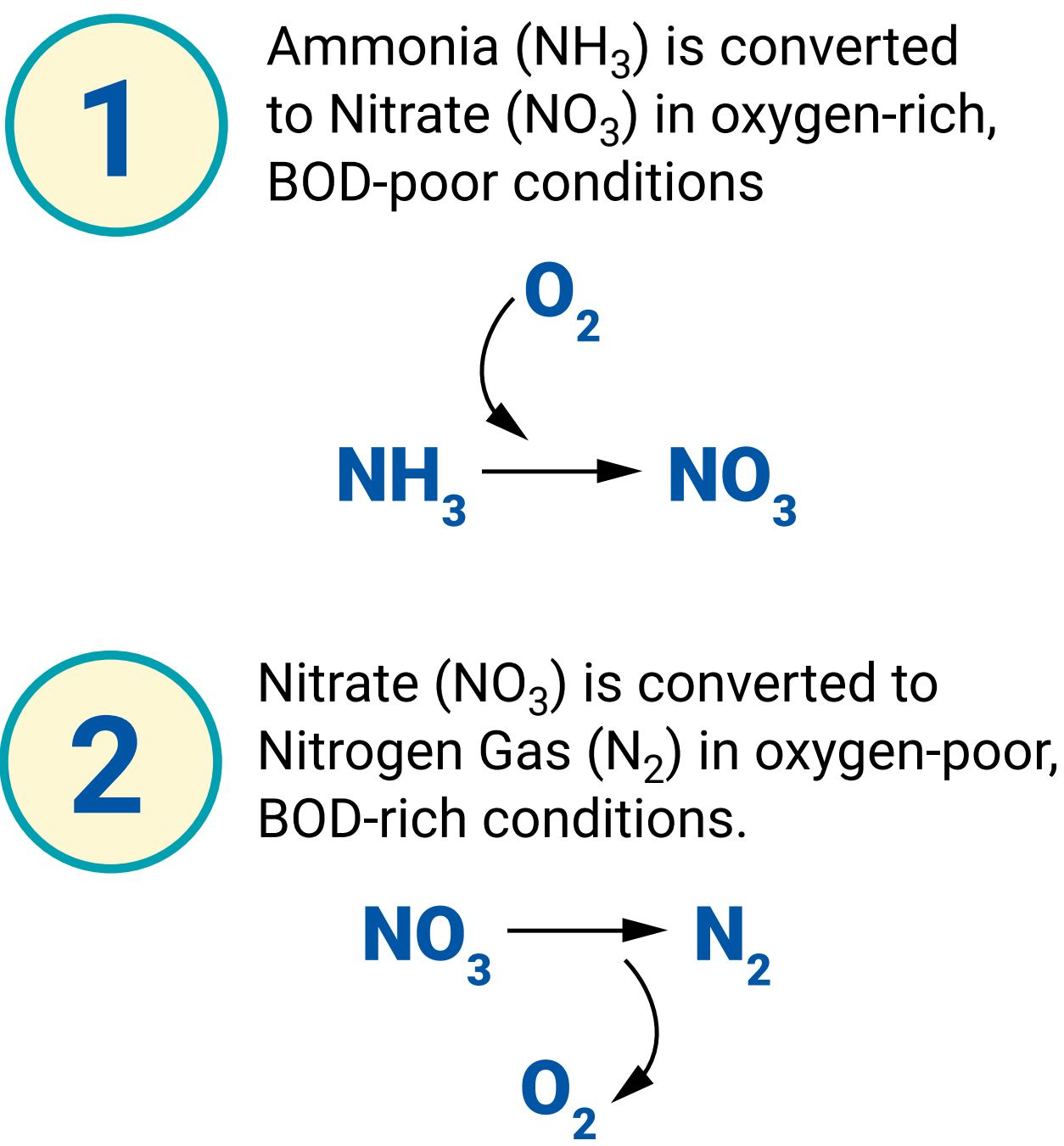


Biological Nutrient Removal in Oxidation Ditches

Science

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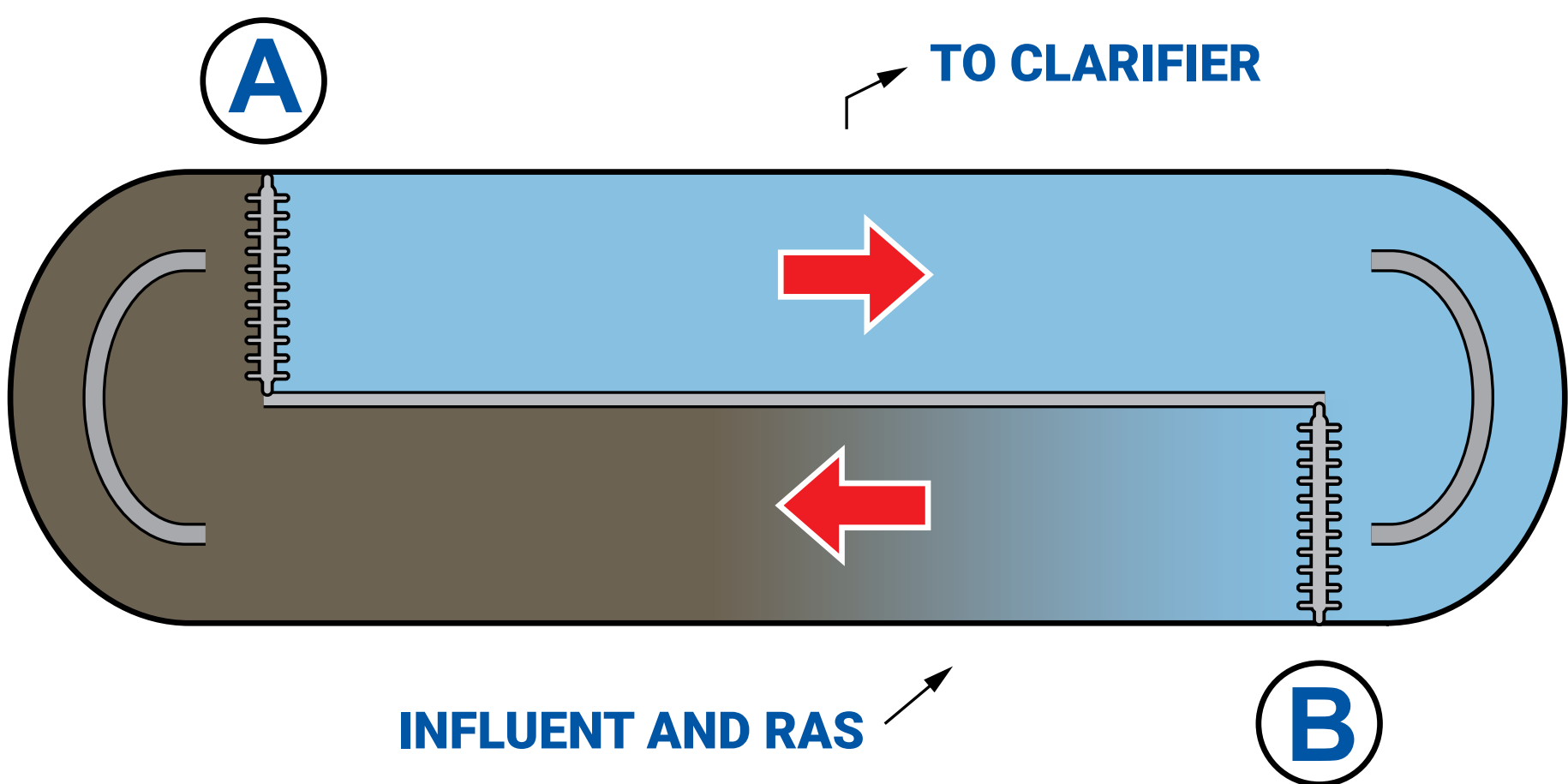
Optimization Strategies

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Oxygen-Rich & Oxygen-Poor Zones

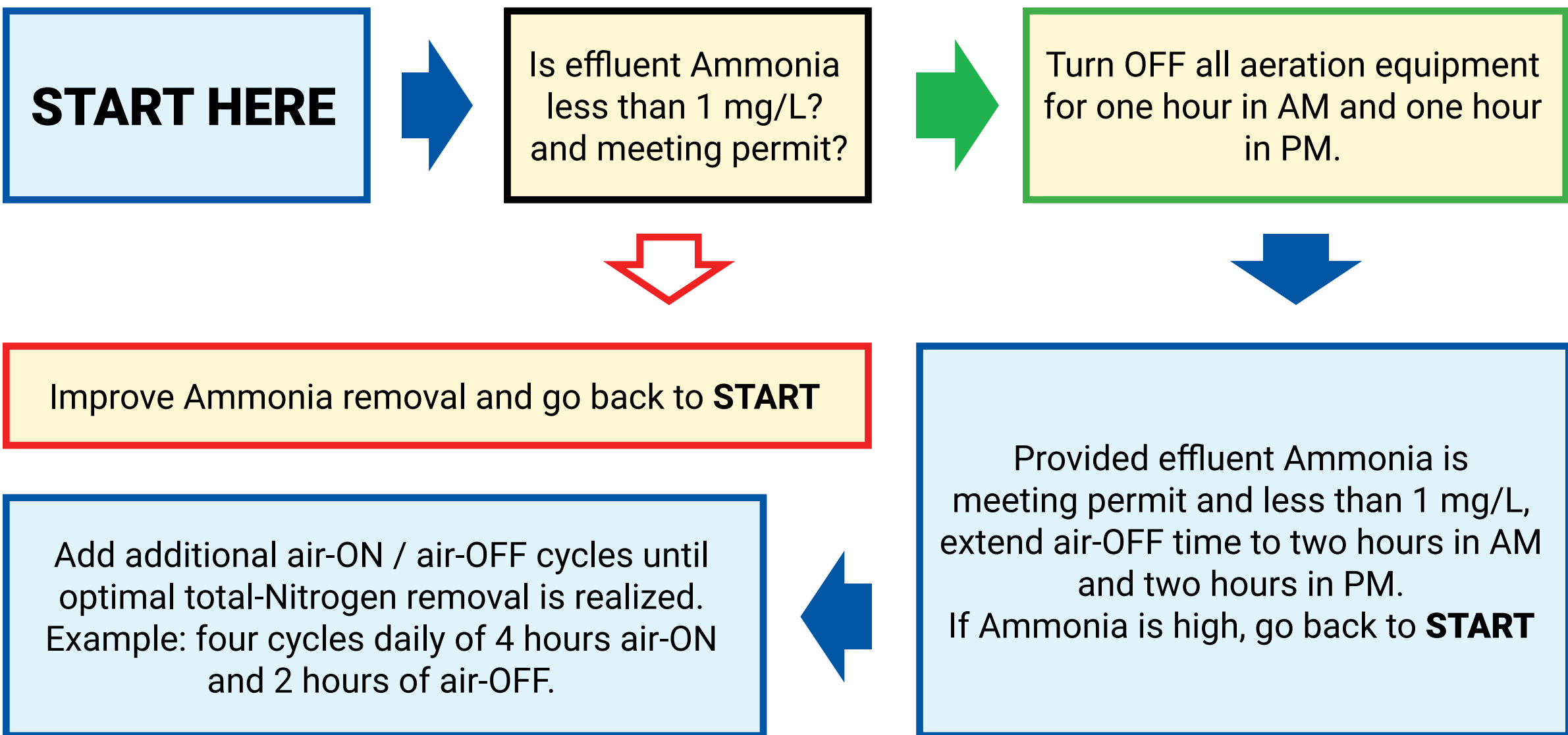
Maintain enough aeration so that a portion of the Oxidation Ditch remains oxygen-rich enough to remove Ammonia while limiting aeration such that another portion of the Oxidation Ditch becomes oxygen-poor enough to remove Nitrate.

Example: Operate aeration rotor A in the illustration below to maintain an ORP of +150 mV in the blue shaded area and -100 mV in the settled solids in the brown shaded area while operating rotor B only once daily to resuspend solids.



Cycle Aeration Equipment On & Off

Turn aeration equipment on and off to make the entire Oxygen Ditch switch back and forth between oxygen-rich and oxygen-starved.

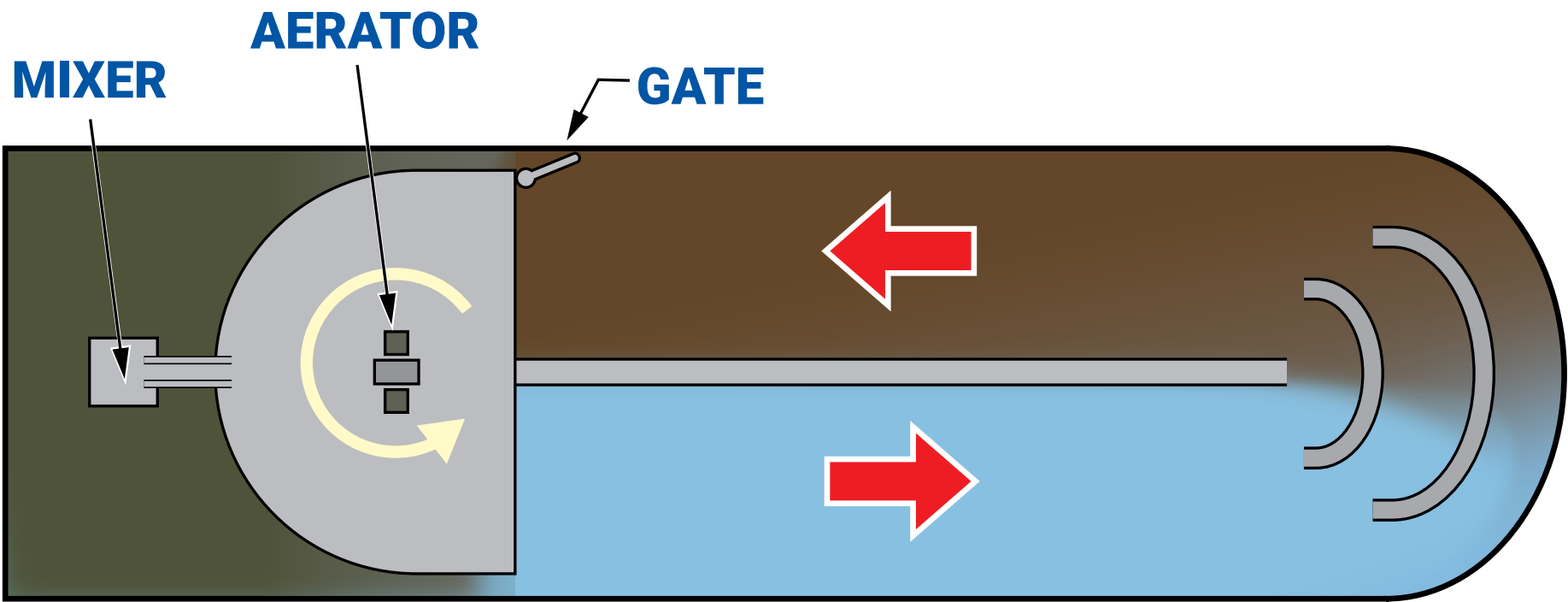


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Make VFAs and Energize PAOs by Making Anoxic Basin Septic

Turn off Anoxic mixers and close the gate between the Oxidation Ditch and the Anoxic Zone to make the ORP in the sludge blanket -200 mV and the Orthophosphate concentration leaving the Anoxic Zone to be three times the concentration entering the Anoxic Zone. Operate mixer(s) daily to resuspend solids.



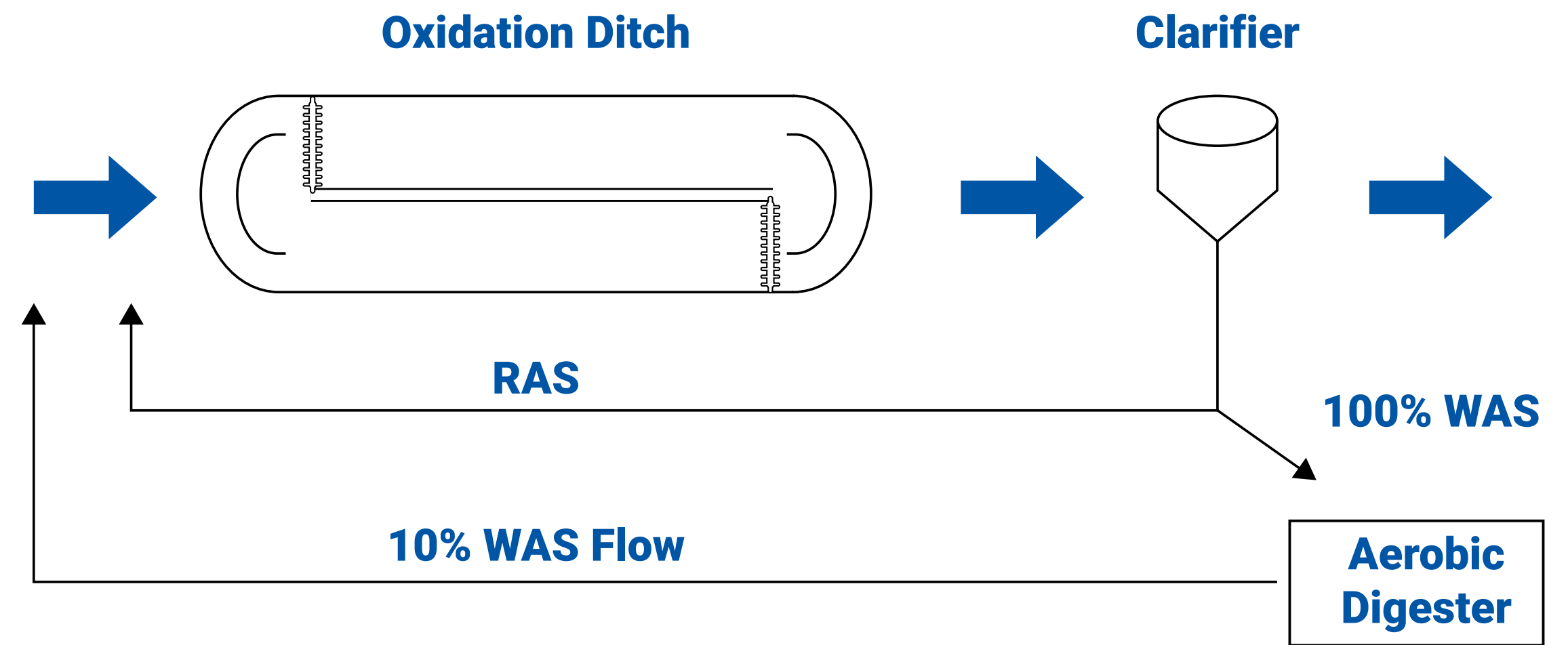
Make VFAs and Energize PAOs by Creating Septic Sludge Blanket in Oxidation Ditch

Minimize mixing to allow mixed liquor suspended solids to settle into sludge blankets with ORP of -200 mV. Resuspend daily.

Make VFAs and Energize PAOs by Using Aerobic Digester as both Digester and Fermenter

Daily stop aerating, stop mixing the Aerobic Digester for at least six consecutive hours to drop ORP to -200 mV. While aerating the Aerobic Digester daily for at least 1 hour, send a volume of PAO-rich digested sludge equal to 10% of the Waste Activated Sludge (WAS) volume back into the Oxidation Ditch.

The Orthophosphate (PO_4) concentration in a filtered Digester sample should be 15-30 mg/L as P. If less than 15, more air-off time is needed. If more than 30, more air-on time is needed.



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