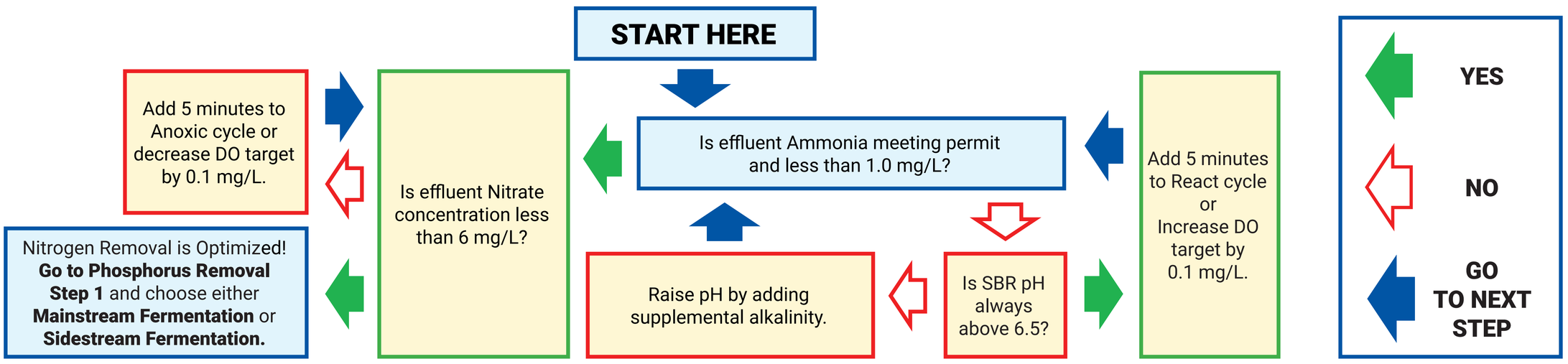
Biological Nutrient Removal in SBRs (Sequencing Batch Reactors)

Strategies for Nitrogen Removal

SBRs are designed to remove both Ammonia and total-Nitrogen. Optimize Nitrogen Removal by operating equipment as shown below.

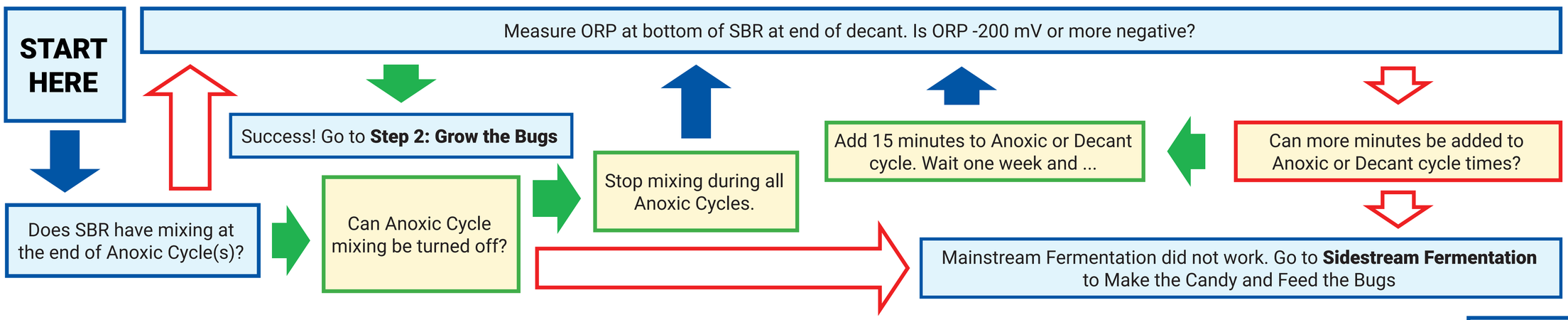


Strategies for Biological Phosphorus Removal

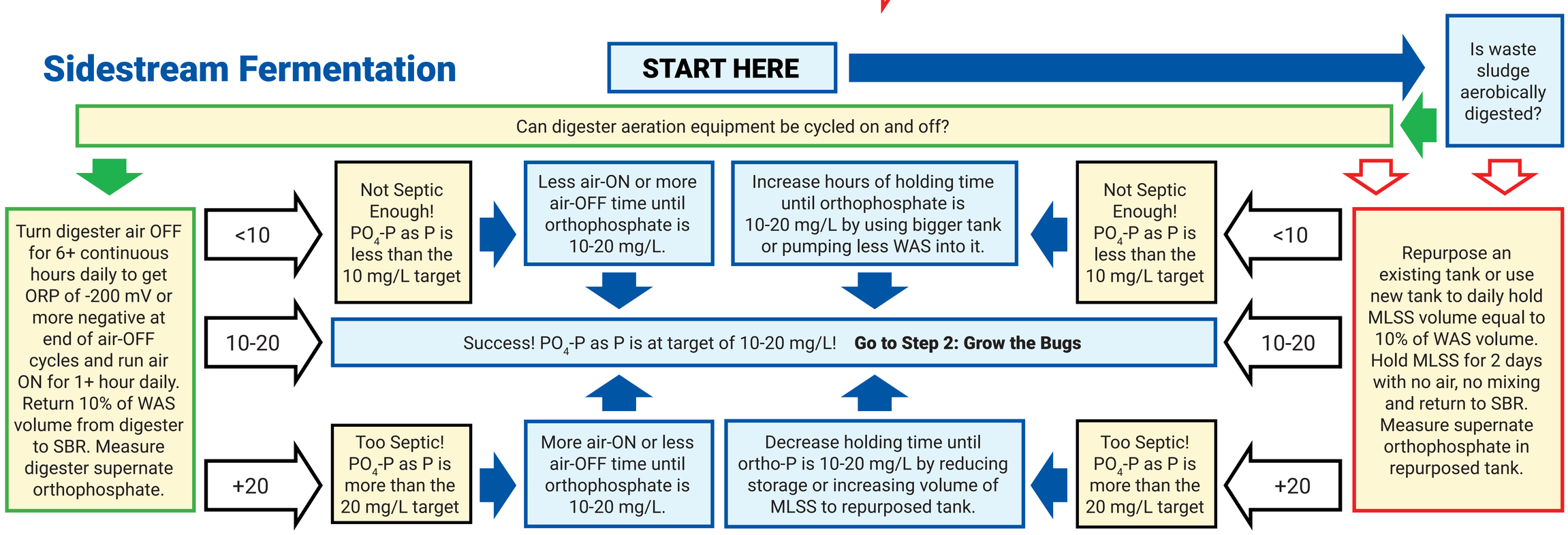
Few SBRs are designed for Phosphorus Removal, yet most can be operated to remove Phosphorus. First, Optimize Nitrogen Removal. Then, Optimize Phosphorus Removal by operating equipment differently than designed, as shown below.

Step 1: Make the "Candy" and Feed the "Bugs"

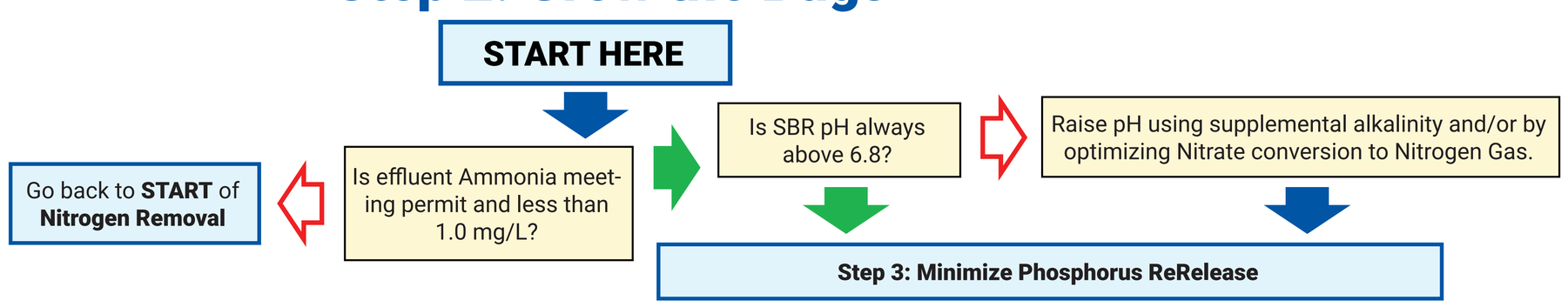
Mainstream Fermentation



Sidestream Fermentation



Step 2: Grow the Bugs



Step 3: Minimize Phosphorus ReRelease

When water temps are above 15°C and ORP values are more negative than -300 mV at the end of the settle/decant/anoxic cycles, settled MLSS may decay and release too much Phosphorus. To fix, shorten the settle/decant/anoxic cycle time in increments of 15 minutes.

Step 4: Manage SideStream Impacts

When fed a steady diet of high concentrations of Phosphorus, enough bugs will grow to "eat" the Phosphorus, but the slow-growing Phosphorus Removal bugs do not respond well to daily fluctuations in Phosphorus loadings. Digester supernate/decant water can contain more than ten times the concentration of Phosphorus as raw wastewater; the same is true of water coming off sludge processing equipment. Manage these sidestreams by providing as steady feed stream of Phosphorus as possible.

TN Department of Environment & Conservation

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