Hazen

Wastewater Intensification at a Large Municipal Airport

Overview of Wastewater Facilities

Secondary Treatment Facilities

- 3 SBR Trains
- 3 Flow Equalization Basins
- 1 Sludge Equalization Basin

WHY was the Project Needed?

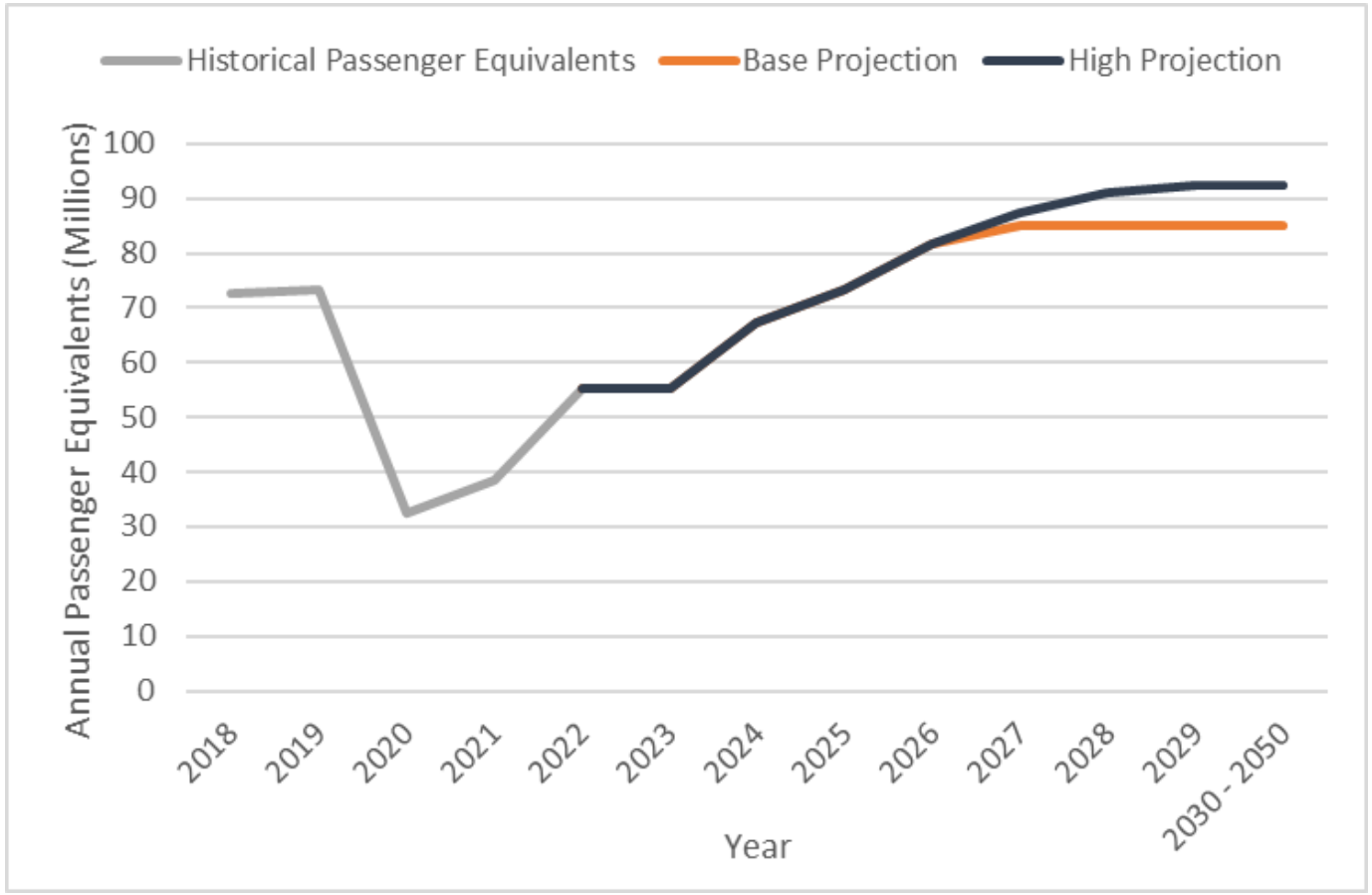
WHAT could reduce Project Cost?

HOW could risk be reduced?

WHEN do we start?

WHY was the Project Needed?

Loading Projections Will Exceed Plant Capacity



- Passenger equivalent projections based on Airport planning department.
- Low and high projections were made for flows and loads based off Airport passenger projections.

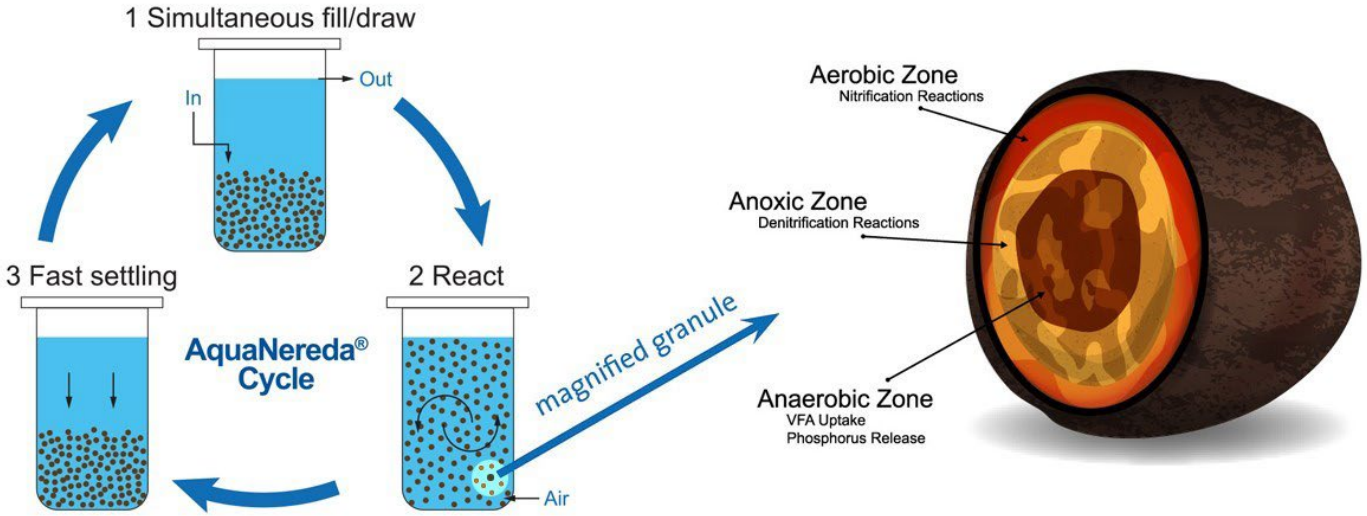
Commitment to Reduce Nitrogen Loading

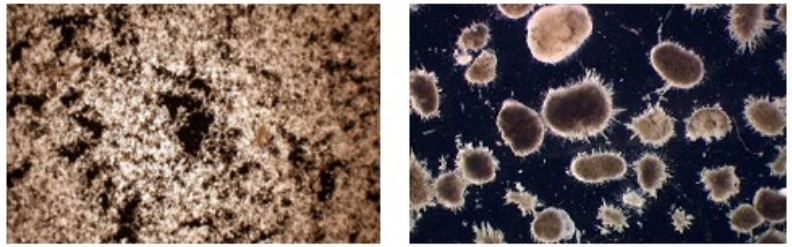
Discharger	Early Action Project	Expected TIN Results
Large Municipal Airport	**Description:** The Discharger will add sequencing batch reactor tanks to its existing three sequencing batch reactor tanks to implement biological nutrient removal. **Schedule:** Completion of the additional sequencing batch reactor tanks by 2022.	**Concentration: < 15 mg/L**

WHAT could reduce Project Cost?

Intensifying the SBR

- Aerobic Granular Sludge was selected for cost and layout development
- Compatible with existing SBR system
- Enhanced BNR through granules
- Simultaneous nitrification/denitrification
- Biological phosphorus uptake





Source: Aqua Aerobic Systems, Inc.

AquaNereda® AGS

Installations

Over 60 Installations Worldwide

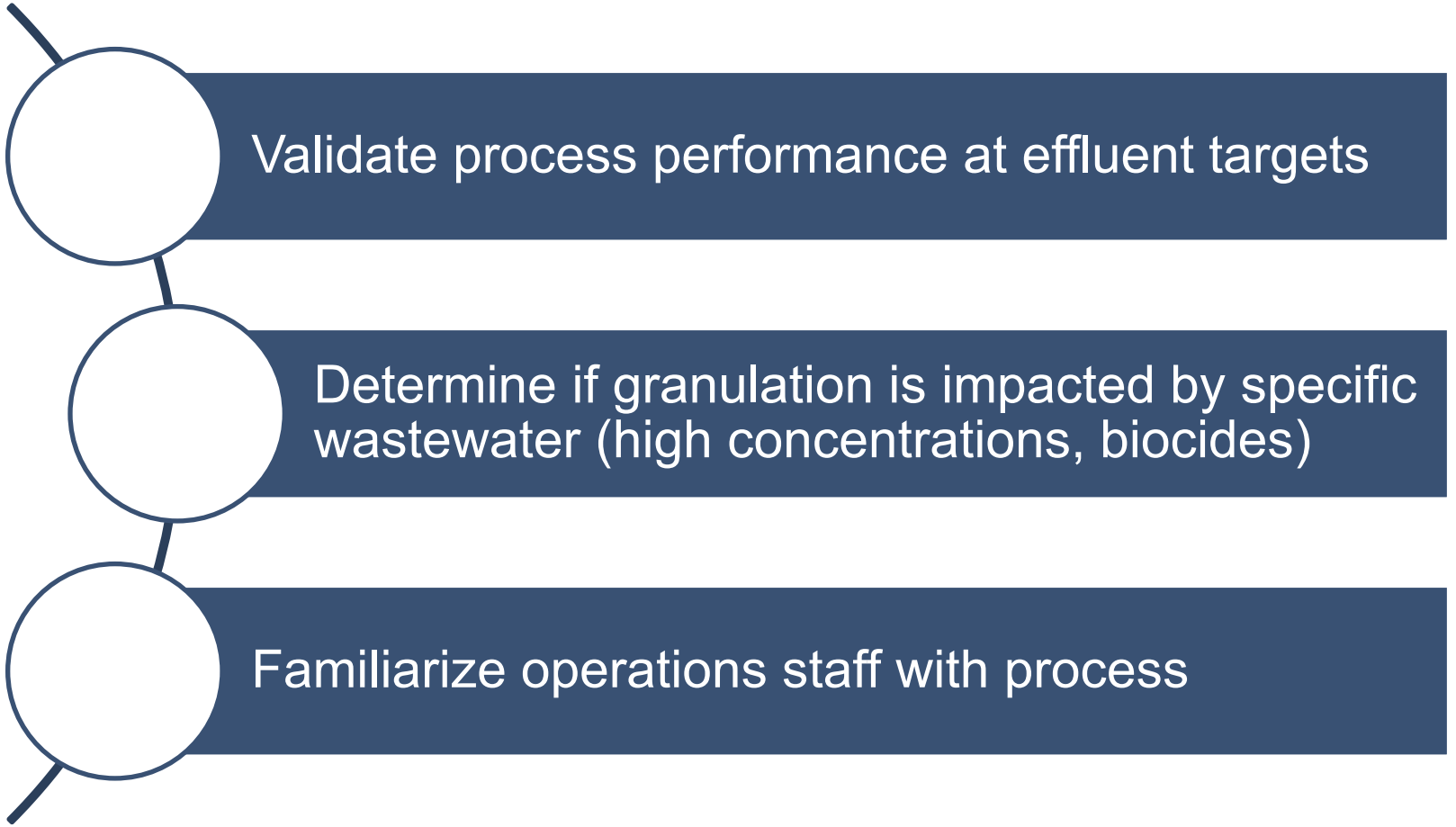
- Foley, AL, US – 4 mgd
- Rockford, IL, US – 0.2 mgd
- Idaho Springs, CO, US – 1.0 mgd
- Normal, OK, US – 0.35 mgd
- Wolcott, KS, US – 2.0 mgd
- Utrecht, NL – 20 mgd
- Garmerwolde, NL – 5.2 mgd
- Kendal, UK – 4.9 mgd
- Jardim Novo, BR – 6.4 mgd

Wolf Creek, AL Facility

Idaho Springs, CO Facility

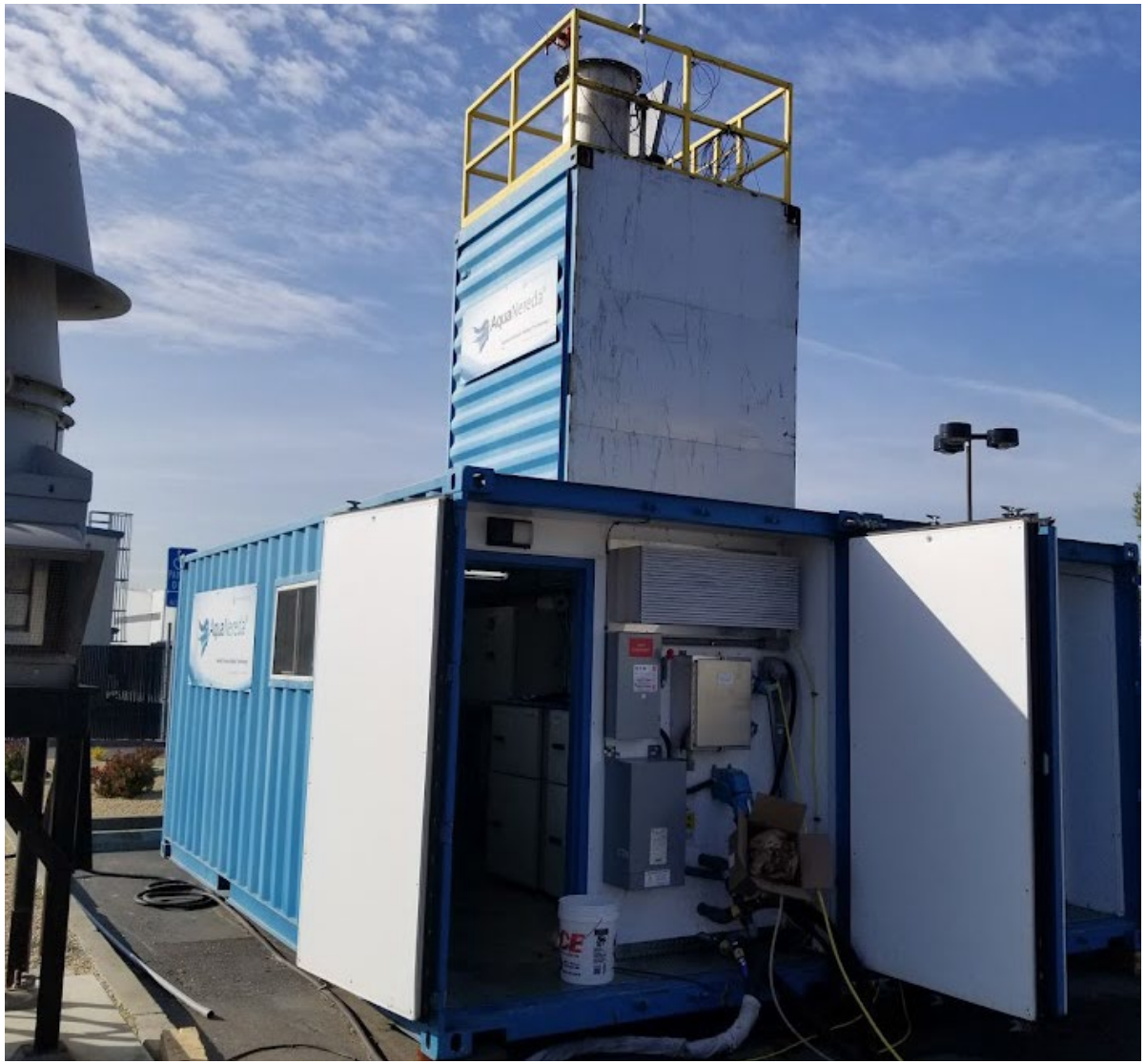
HOW could risk be reduced?

AGS Pilot Purpose

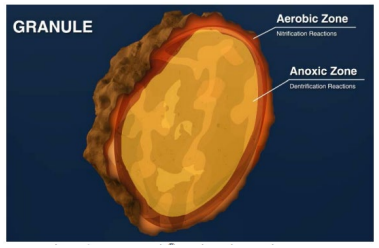


Process Performance Goals

- Effluent ammonia < 0.5 mg/L as N
- Effluent total nitrogen < 15 mg/L as N without external carbon addition
  - **Total nitrogen < 6 mg/L with carbon addition**
- Effluent total phosphorus < 1.0 mg/L as P without filtration
- Effluent TSS < 15 mg/L



Pilot Timeline

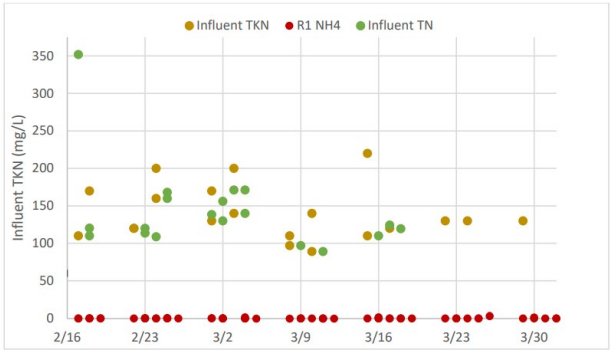


November 2020 – Reactor Delivered

December 2020 - Acclimation

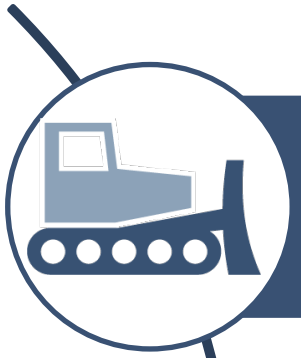
Jan – Feb 2021 – Testing at High Concentrations

Feb – April 2021 – Steady-state operation



WHEN do we start?

Project Will be Delivered as a Design-Build



Develop a constructable project

Provide opportunities for DB contractor to innovate

Develop a conservative project cost estimate

Alternative 1: Three AGS Reactors

Pros

- Lowest capital cost
- Minimal impact to vehicle access

Cons

- No reactor redundancy during construction period
- Requires additional influent FEB and effluent FEB

Alternative 2: Four AGS Reactors – Adjacent Siting Option 1

Pros

- Reactor redundancy is retained during construction
- No new FEBs required (to be confirmed)

Cons

- Higher capital cost
- Loss of one drying beds
- Reduced space for vehicles to the north

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Questions?