

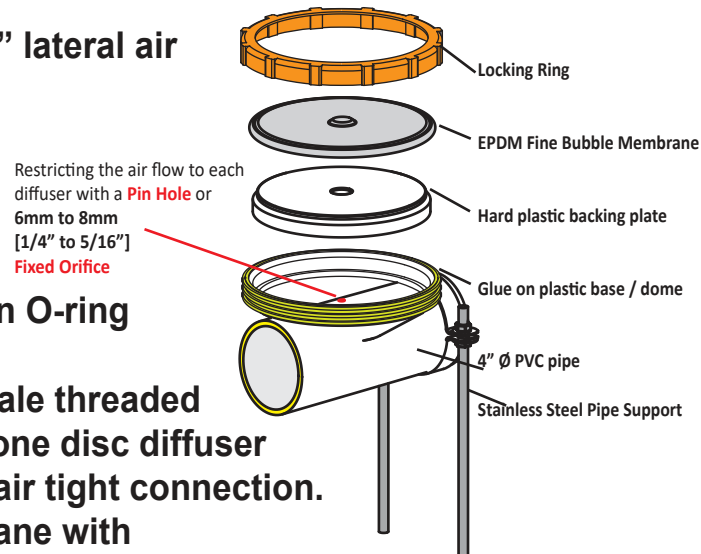
## Conventional 9” Fine Bubble Disc Diffuser System:

- Product Construction Detail & Design Weaknesses
- WWT Application Limitations

### Diffuser Design Evaluation:

#### Detail of construction conventional 9” Fine Bubble Disc Diffuser System:

1. A circular base is solvent bonded / glued to a 4” lateral air pipe (PVC & ABS only!). Other know systems a connection saddle with a threaded or bayonet locking connection.
2. A rigid circular backing plate – some design combine base and backing plate into one part.
3. Base & backing plate have a groove to receive an O-ring shaped seal.
4. Base had a circumferential male thread for female threaded locking ring to fixate the flexible EPDM or Silicone disc diffuser membrane, to compress the O-ring seal for an air tight connection.
5. Circular EPDM or Silicone disc diffuser membrane with circumferential O-ring.



### Design Weaknesses

#### System Turn down limited by pin hole balancing orifice design

- see discussion turndown limitation of conv. 9” disc diffuser systems for detail

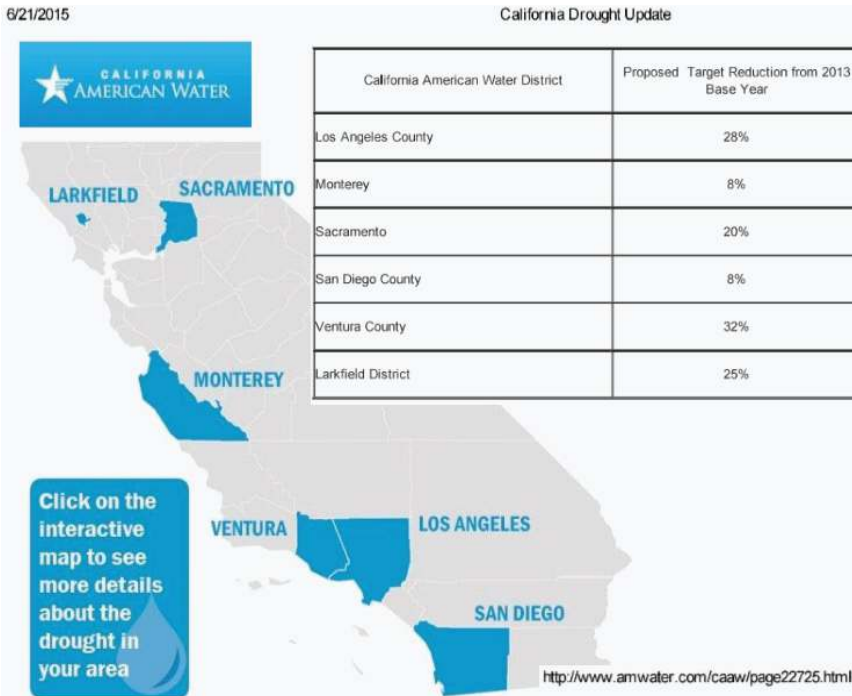


## Design Weaknesses - Continued

- Not capable or only limited capability of nutrient loading driven process design
- Represents a single point of design reg. SOTE to projected nutrient loading optimization on a yr. 1 to yr. 20+ planning time scale

### Case Study:

2015 State of California – 3 yr. prolonged drought condition  
– 30% + per capita water consumption reduction resulting in:



- 30% + Reductions of hydraulic flow to WWTP (MGD)
- 40% + Increase hydraulic retention time
- Slight BOD, [mg/l] influent strength increase
- 20%+ Reduction in SOTR – required Std. O<sub>2</sub> Transfer Rate, KgO<sub>2</sub>/day
- 20%+ Reduction of SCFM [Nm<sup>3</sup>/h] required blower capacity / air volume

### Additional factors to consider:

- Residential diurnal hydraulic flow and nutrient loading patterns
- Annual and Yr. 1 to yr. 20+ projected plant loading
- The average plant loading of most municipal WWTP in the US is 40% to 60% of the max. plant capacity due to design requirements for peak loading and safety factors.
- Most updated municipal WWT plants run on blower VFD and aeration basin DO control
- Most 9” disc fixed grid systems are based on the complete mix assumption:
  - The minimum blower air SCFM [Nm<sup>3</sup>/h] requirements for aerobic digestion & nitrifying O<sub>2</sub> uptake is always equal or greater than the minimum required air mixing requirement to keep the sludge in suspension.

### The municipal WWT operations California drought predicament:

Almost all 9” disc plants turned down the blower systems of the aeration basins / the WWT process SCFM [Nm<sup>3</sup>/h] to the point where:

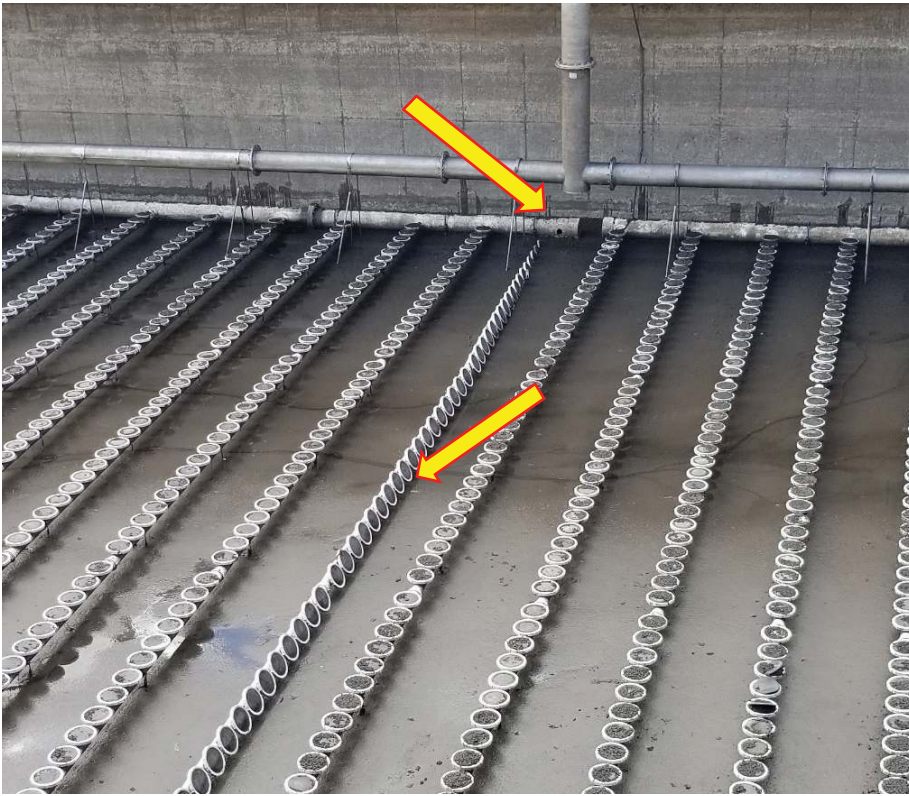
- The even air distribution grid collapsed
- And/or aeration basins became mixing limited

### Resulting in but not limited to:

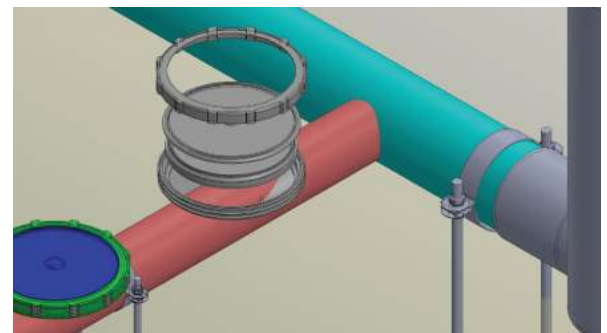
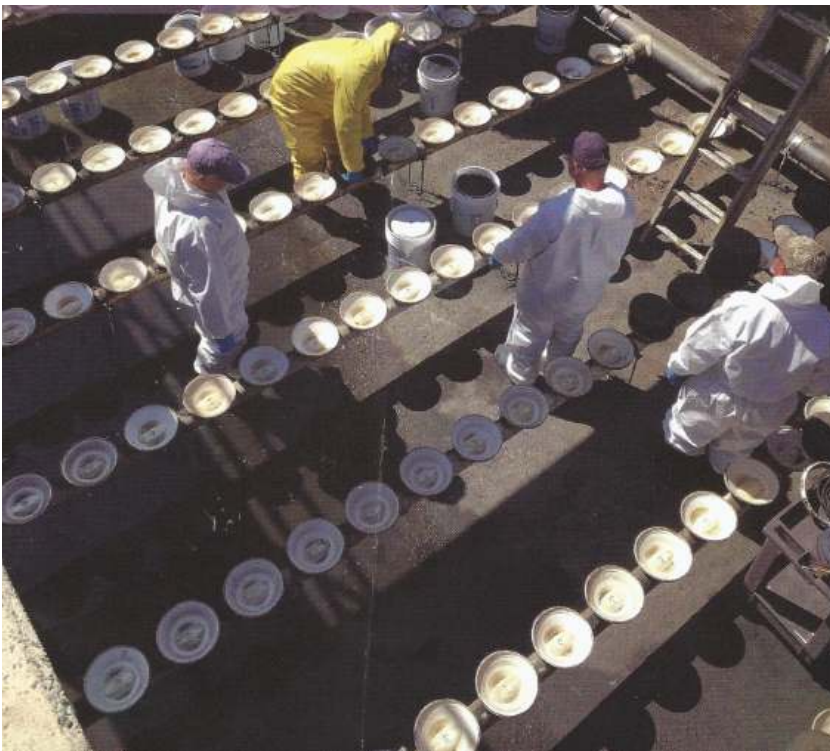
- Clogging of the disc diffuser membranes / shortening of diffuser life
- Running blower systems primarily for air mixing – untapped energy conservation potential of greater than 25%

Solutions: See OxyProcess, FAQ, & PLANET at [www.jaeger-aeration.com](http://www.jaeger-aeration.com) website

## Design Weaknesses - Continued



- High number of diffusers needed, high number of connecting points, high number of linear ft [m] of lateral air piping
- Convoluted lateral air pipe system with a multitude of rigid couplings and connection points subject to material fatigue especially under oscillating / changing loading condition / temperature change caused material expansions & contractions.
- Complex, failure prone, and time-consuming installation



- Cumbersome, failure prone, and non-reliable disc diffuser membrane in field replacement

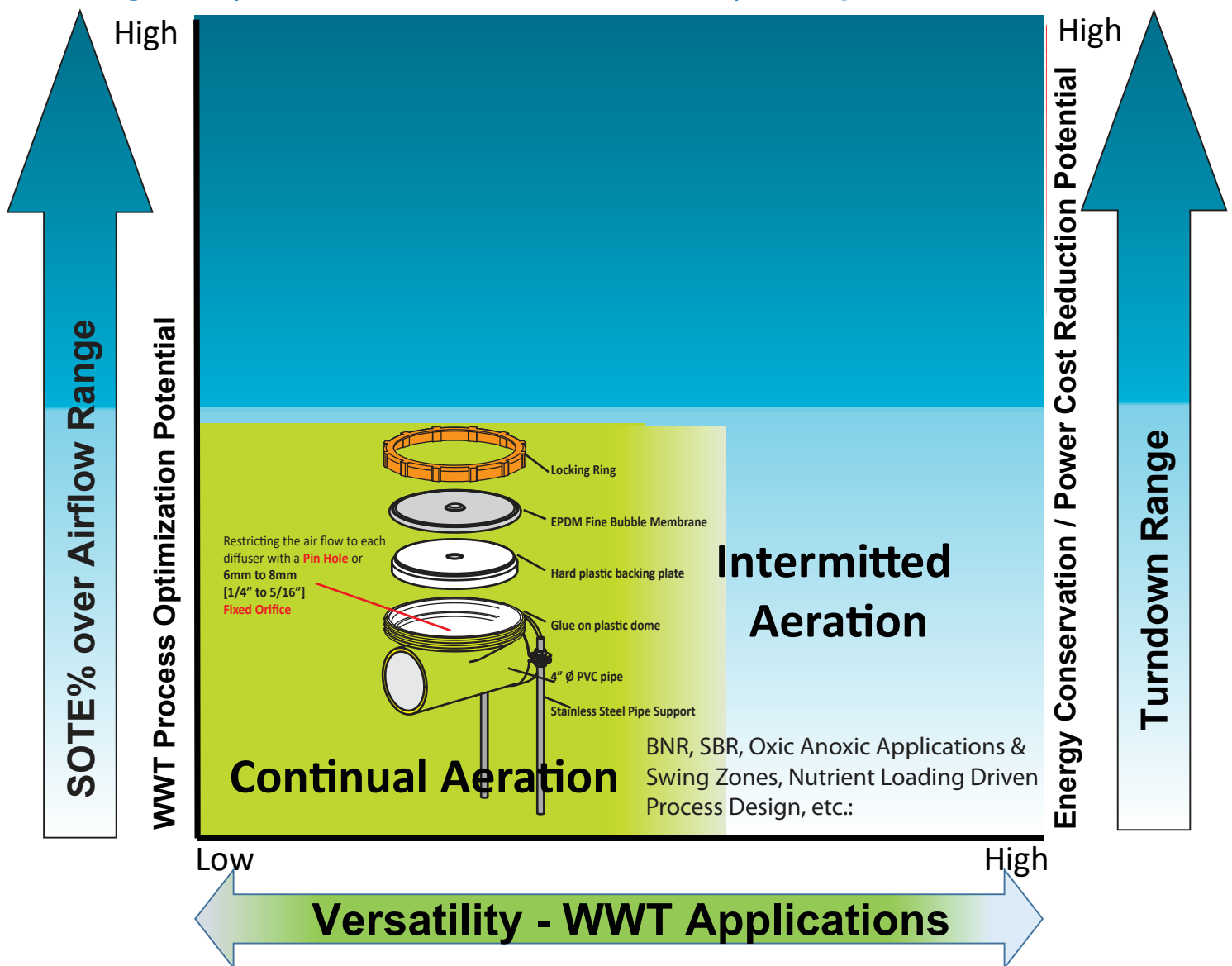
# Conventional Fine Bubble Membrane Disc Diffusers

- Product Construction Detail & Design Weaknesses
- WWT Application Limitations

## Summary:

Complex, failure prone, & time-consuming system design & installation

- System Turndown limited
- Not capable of nutrient loading driven process design
- Not compatible with energy conservation – electrical power cost reduction goals of yr. 1 to yr. 20+ planning time scale
- fixed grid only - non retrievable - no resilience to system upsets



For more information, please contact your regional sales representative or get in touch with us directly:

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