Overwhelmed and Overloaded?
Do More with Less by Increasing Capacity and Resiliency with IFAS

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What is IFAS?

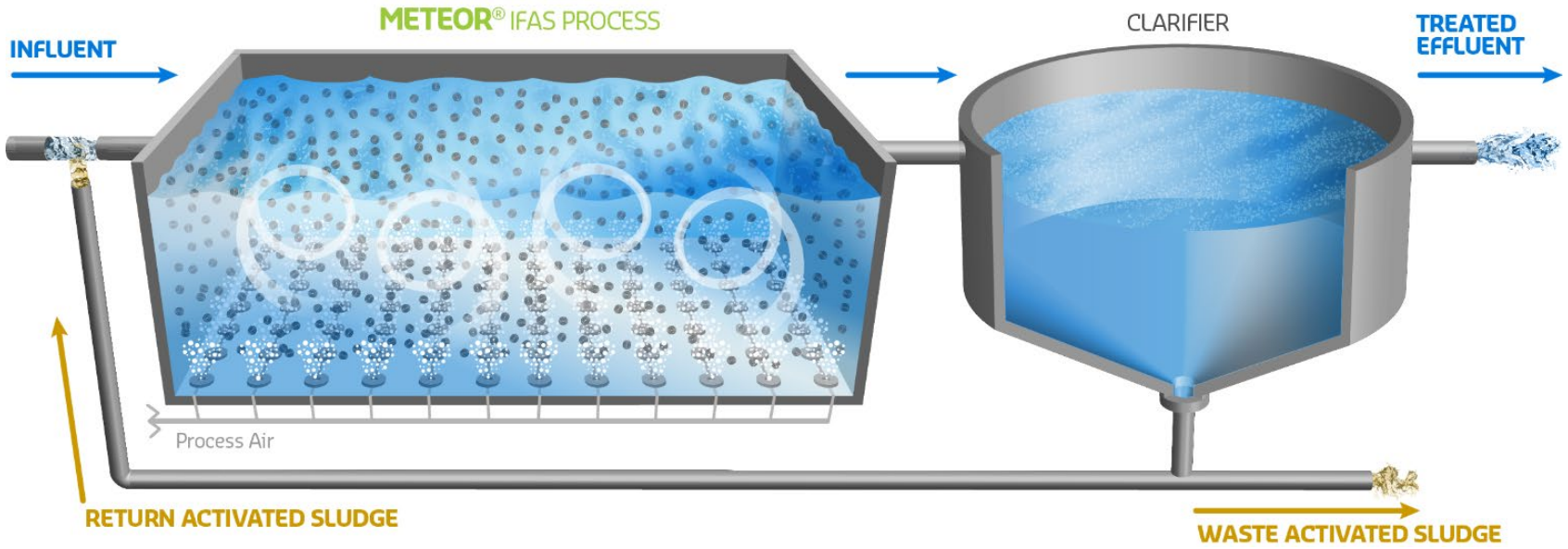
Integrated Fixed Film Activated Sludge

- Hybrid Process:

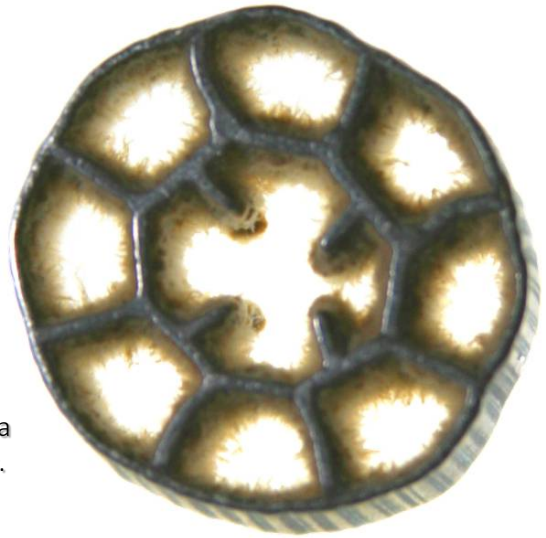
  Fixed Film + Suspended Growth

  Immersed media added to conventional activated sludge
- Increases biomass inventory

Integrated Fixed-Film Activated Sludge (IFAS) Process



IFAS Process Schematic
Courtesy: Infilco Degremont, Inc.



Biomass Growth on Media
Courtesy: Headworks, Inc.

To Be Clear…
IT IS NOT HONEYCOMB CEREAL BITS!!!!

Colorado IFAS Plant

IFAS Media Retention Screens

Why We Looked At IFAS

- Allison WWTP biologically overloaded
- Existing plant not designed for TCEQ added ammonia nitrogen limit of 12 mg/l
- Plant has trouble with solids loadings and spikes due to meat packing plant discharge

ALLISON WWTP

ALLISON WWTP DESIGN FLOW

- Original Const. at 2.0 MGD: **1966**
- Expansion to 5.0 MGD: **1984**
- Rated Capacity:

  Average Daily: 5.0 MGD

  2-Hr. Peak: 15.0 MGD

- Current Avg. Daily Flow: **2.8 MGD**

Allison Design Basis

	Original Design	2019	
BOD5	230 mg/l	273 mg/l	19% Higher
TSS	230 mg/l	308 mg/l	34% Higher
TKN		58 mg/l	

(MAX LOADINGS BOD5 940 mg/l – TSS 1,400 mg/l

TCEQ Discharge Parameters

	Then	Now
BOD5	20 mg/l	20 mg/l
TSS	20 mg/l	20 mg/l
NH3-N	none	12 mg/l

ALTERNATIVES CONSIDERED

1: Add Aeration Basin Capacity (Single-Stage Nitrification)

2: Retrofit Existing Aeration Basins to IFAS System

3: Add Aeration Basins and Secondary Clarifiers (Two-Stage Nitrification)

4: Add Primary Clarifiers

5: Add Equalization Basin

Alternative Comparison

Alternative	Advantages	Disadvantages
1 – New Aeration Basins for Additional Capacity (Single-Stage Nitrification)	✓ Allows a phased approach from 12 to 3 mg/L ✓ Same operation as existing process ✓ Increases capacity of aeration basins	x Less buffer for shock loads without changing MLSS x Additional land area
2 – Retrofit Existing Aeration Basins to MBBR/IFAS	✓ Lowest capital cost ✓ Allows a phased approach ✓ Utilize existing infrastructure ✓ Operationally stable/robust environment for autotrophic bacteria in varying organic and ammonia loading	x Requires modification to existing aeration basins – structural condition x More aeration required x Maintaining operation during construction
3 – New Aeration Basins and Secondary Clarifiers (Two-Stage Nitrification)	✓ Allows for independent control of nitrifiers ✓ Additional buffer against shock loads ✓ More stability of ammonia oxidizing bacteria (AOBs) than single-stage	x Highest capital cost x Additional equipment to maintain x Operation/process different from existing x Additional land area
4 – New Primary Clarifiers	✓ Allows a phased approach ✓ Primary sludge favorable thickening and dewatering characteristics	x Odorous sludge produced by primary clarification x Higher sludge production – solids handling modifications x Additional land area
5 – New Equalization Basin	✓ Could allow for isolation of toxic loadings	x Not a viable long-term solution without additional aeration basin capacity x Odors generated from storage of influent x Instrumentation to determine when to divert flows to EQ basins x Additional land area

IFAS Advantages

- ✓Lowest capital cost of the alternatives
- ✓Allows a phased approach
- ✓Increase treatment in same reactor volume
- ✓Resistance to shock loads and washouts
- ✓Improve settling and clarifier performance
- ✓Operationally stable/robust environment for autotrophic bacteria in varying organic and ammonia loading

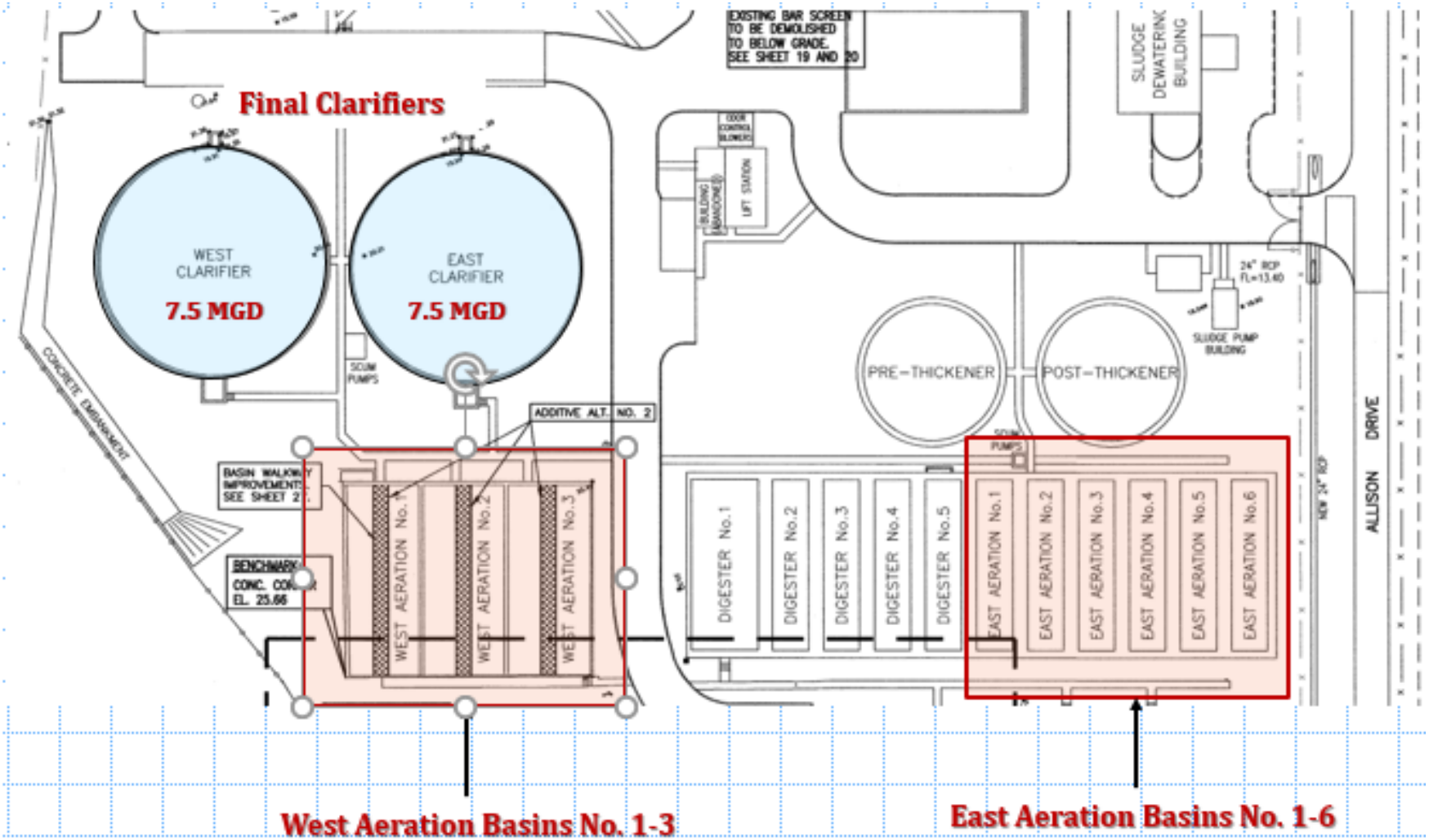
EXISTING IFAS FACILITIES VISIT

(City Staff, Consultants and Equip. Reps)

- Metro Denver WWTP – Denver, Co.
- Williams Monaco WWTP – Colorado
- Broomfield WWTP – Broomfield, Co.
- Crow Creek WWTP - Cheyenne, Wy
- Dry Creek WWTP – Cheyenne, Wy

Feb. 2019

EXISTING AERATION BASINS



IFAS DESIGN CONSIDERATIONS

- Upstream ¼” screening critical (bar screens)
- Normally operates a higher DO levels
- Coarse bubble aeration recommended to keep media in suspension
- Media retaining screens required to keep media in the aeration basins
- Basin level monitoring recommended due to potential screen blinding
- Possible issues with foaming


ANOTHER DAY
IN PARADISE
QUESTIONS?