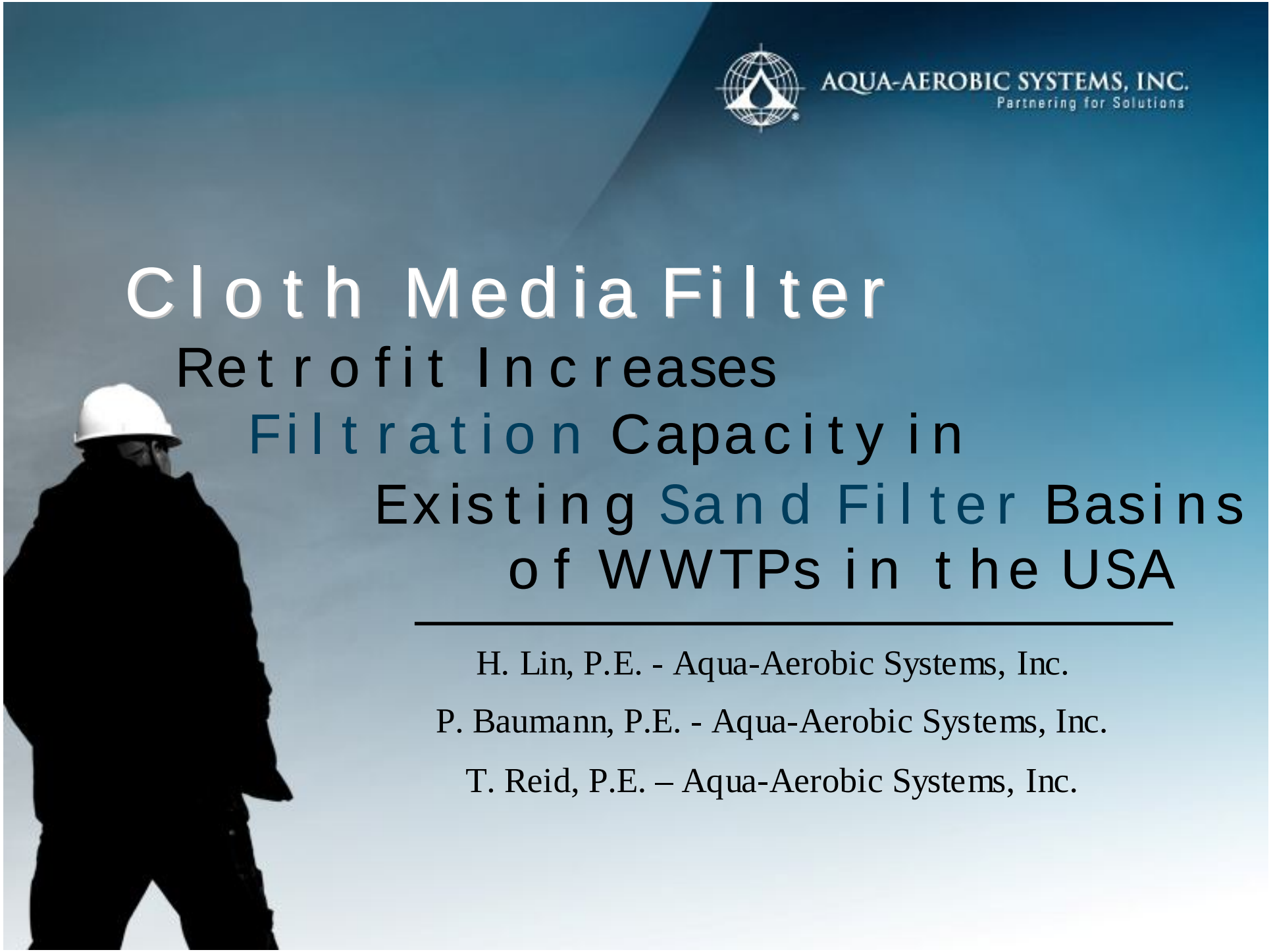

Cloth Media Filter Retrofit Increases Filtration Capacity in Existing Sand Filter Basins of WWTPs in the USA

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Presentation Outline

- Problems With Existing Shallow Bed Traveling Bridge Filter
- AquaDiamond® Cloth Media Filter
- AquaDiamond® Retrofit
- Testing
- Conclusion

Shallow Bed Traveling Bridge Filter

- Since early 1970s
- Advanced wastewater treatment
- Removal of residual suspended solids

Operational Issues with Existing TBFs

- Decline in operational efficiency
  - Decrease in the hydraulic loadings
  - Decrease in the solid loading rates
  - Increase in the backwash rates
  - Short circuiting
- Increase in O&M cost
  - Power consumption
  - Chemical usage
  - Maintenance cost

Background

Fox Metro Water Reclamation Facility

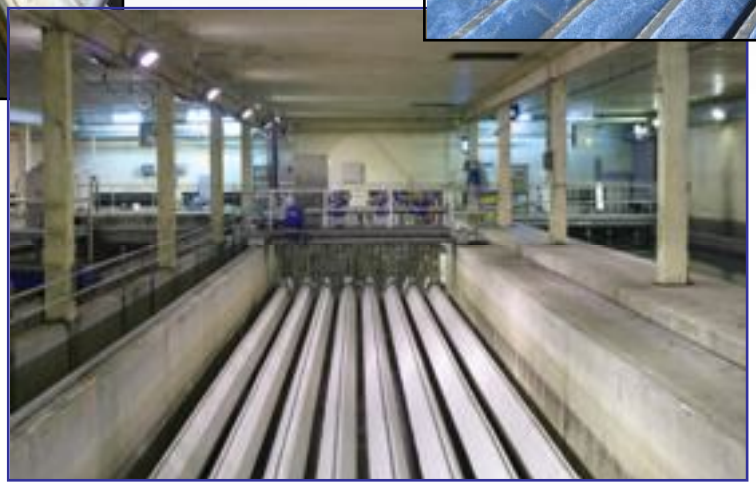
Trinity River Authority (TRA) Central WWTP

Donald C. Tillman Water Reclamation Plant

Solution Criteria

- Increase unit flow capacity without new construction
- Handle clarifier upsets and/or storm flow condition
- Eliminate bio-fouling in the filter media
- Utilize the existing building and filters during expansion

AquaDiamond® Filter

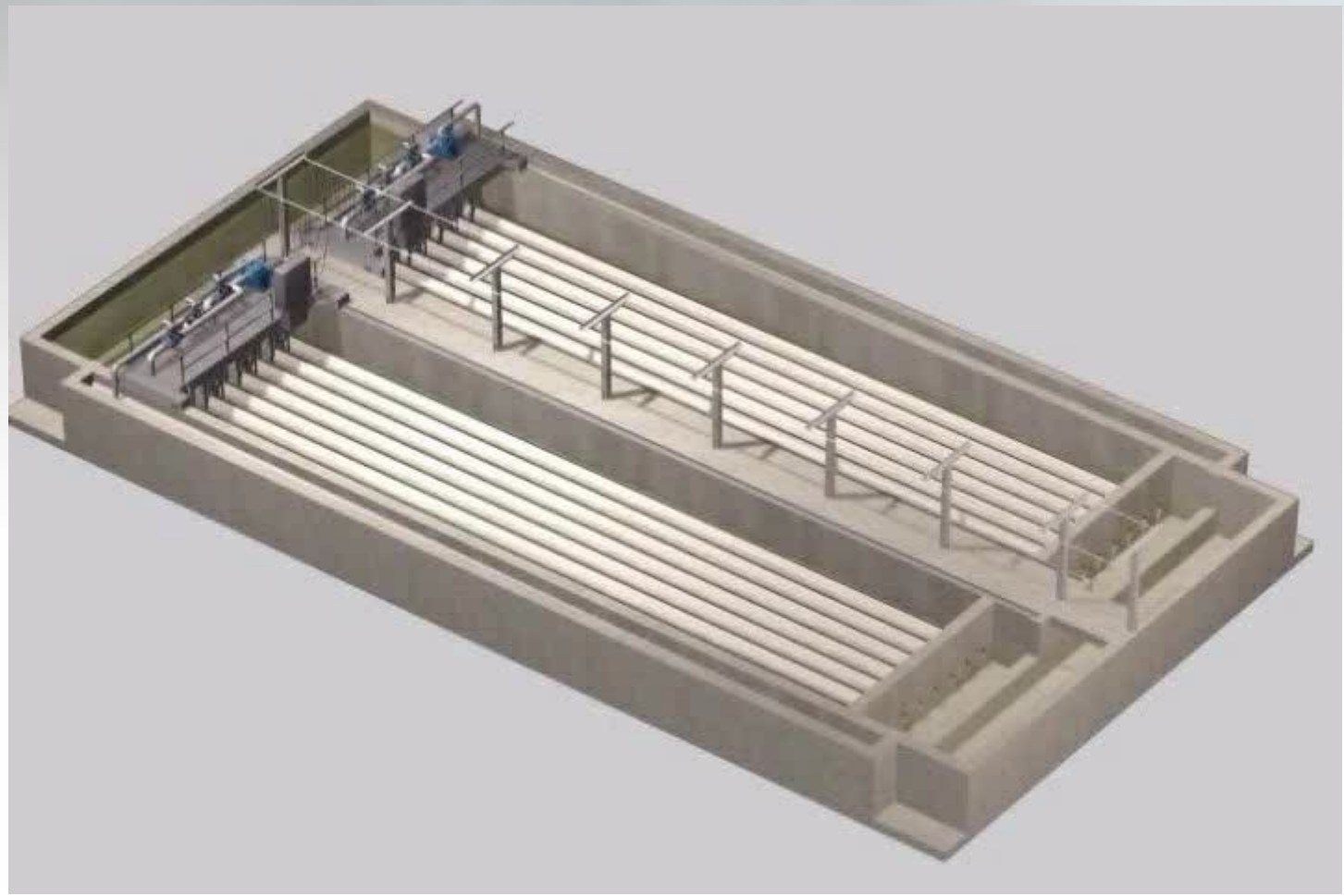


Comparison of TBF and AquaDiamond® Filter

Filtration System	TBF	AquaDiamond® Filter
Filter Bed Size	4.9 m (16 ft) x 33.6 m (110 ft)	4.9 m (16 ft) x 29.0 m (95 ft)
Available Filtration Area ($m^{2)}$	164	238
Average Design Flux Rate (m/h)	5 (2 gpm/sf)	8 (3.25 gpm/sf)
Average Design Flow (m^3/d)	19,200	45,600
Peak Design Flux Rate (m/h)	12 (5 gpm/sf)	16 (6.5 gpm/sf)
Peak Design Flow (m^3/d)	48,000	91,200
Solid Loading Rate ($kg/m^2/d$)	5.9	8.6

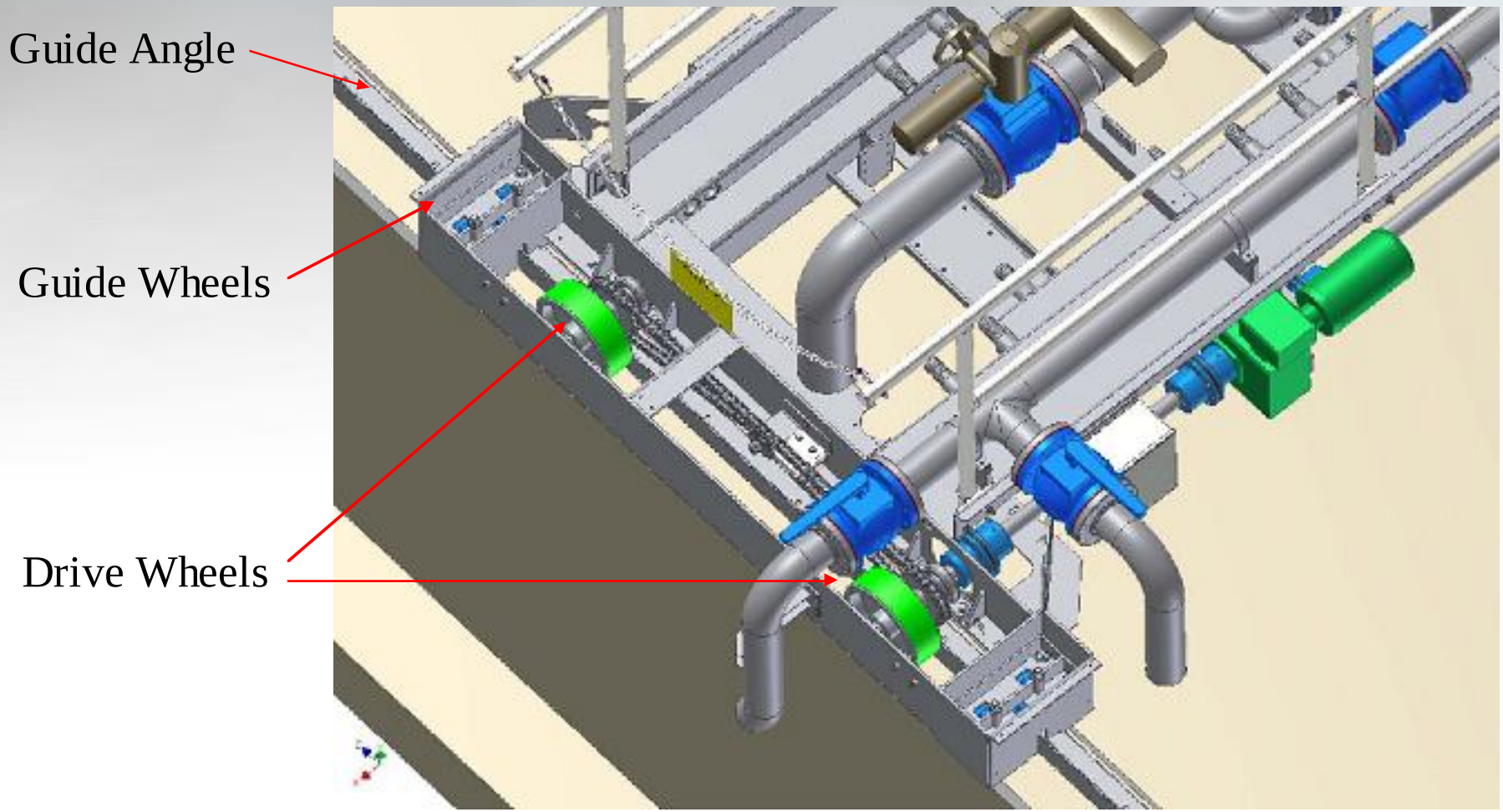
Cloth Media - The Key Component

AquaDiamond® Filter Operation



Filter Benefits - Accessibility of Components

Filter Benefits – Improved Drive & Tracking



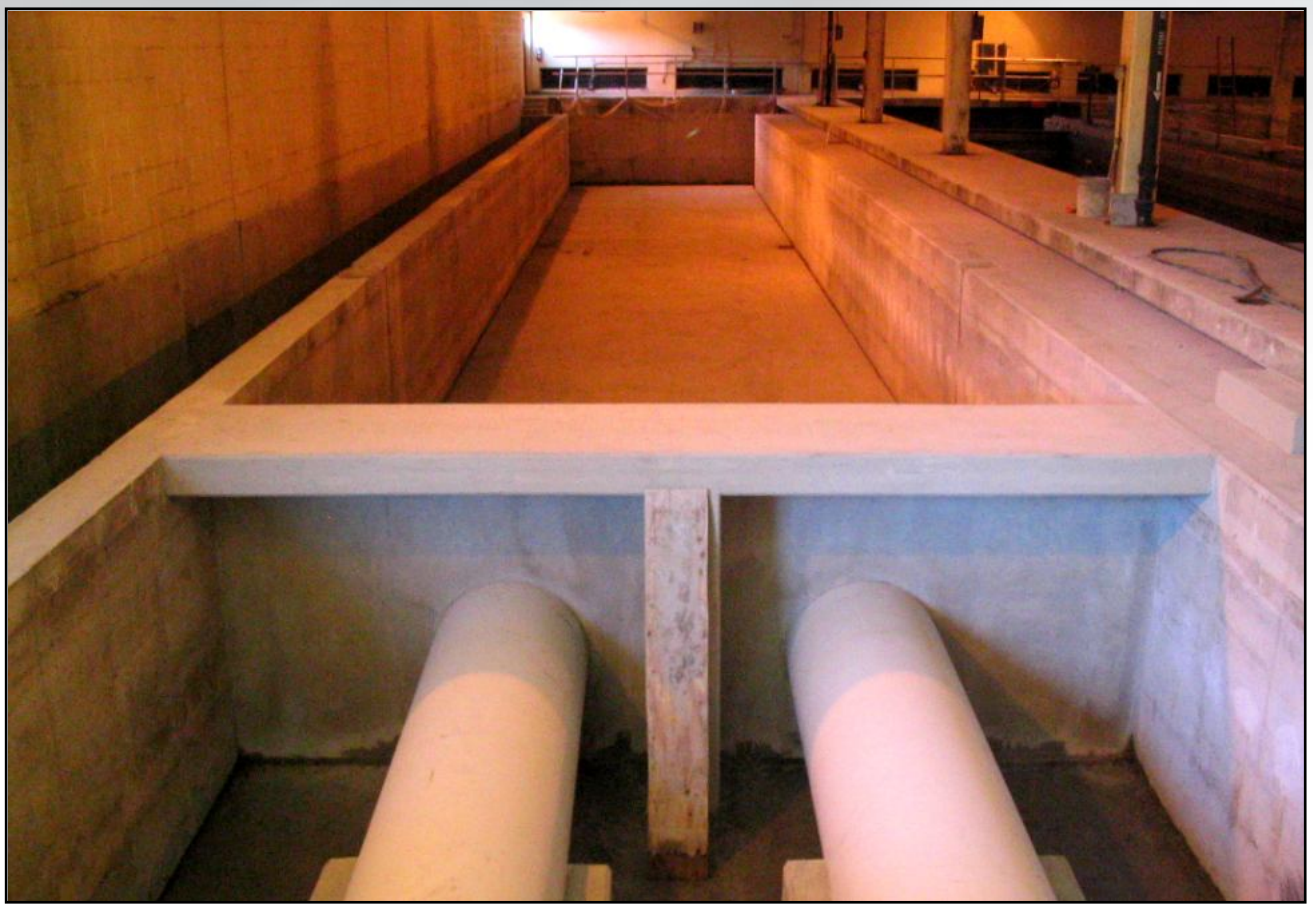
AquaDiamond® Filter Backwash Shoe

AquaDiamond® Filter - Floating Solids Removal

Demolition of Existing TBF

AquaDiamond® Filter

Influent Structure

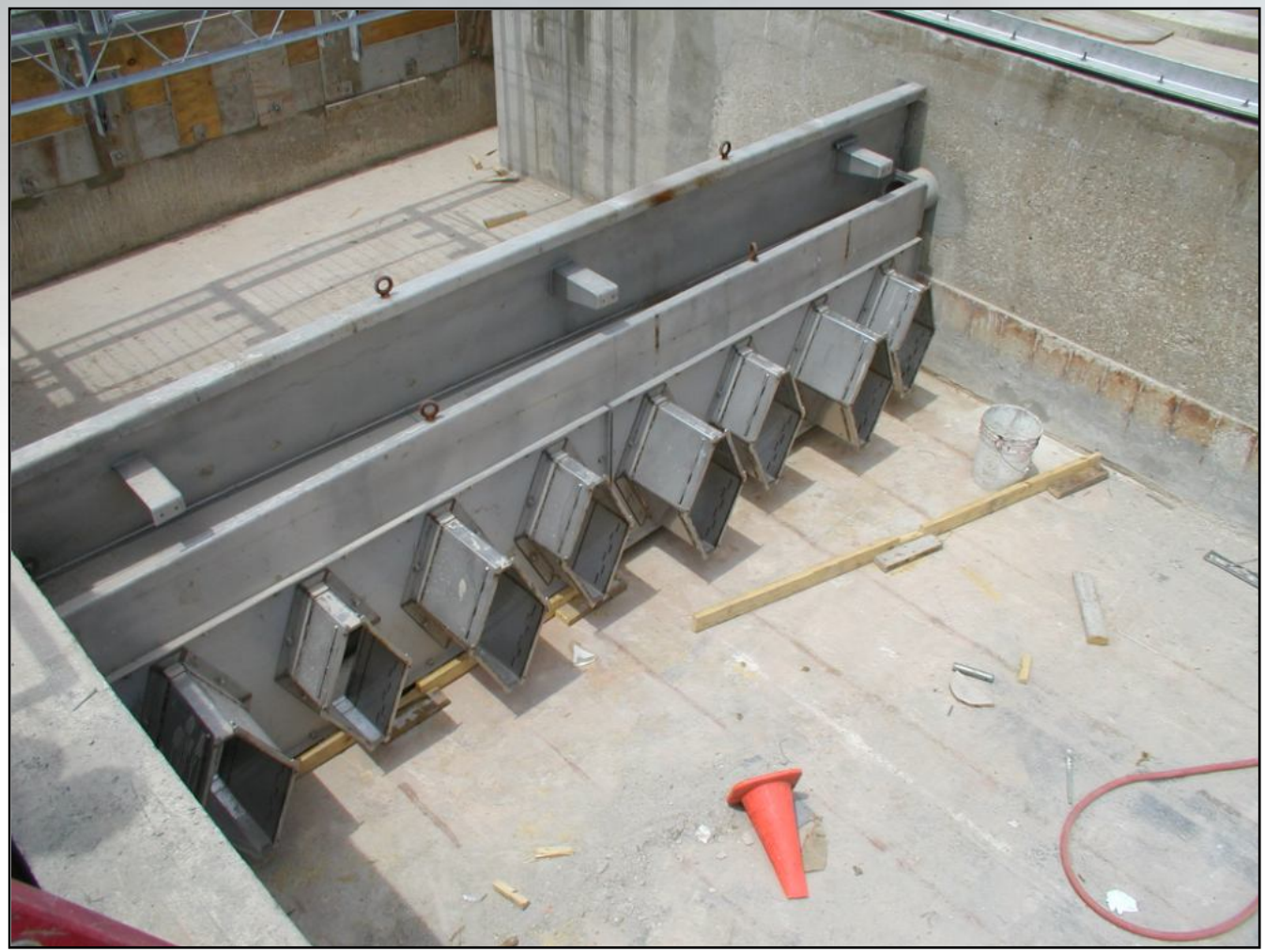


AquaDiamond® Filter

Influent Structure

AquaDiamond® Filter

Effluent Wall

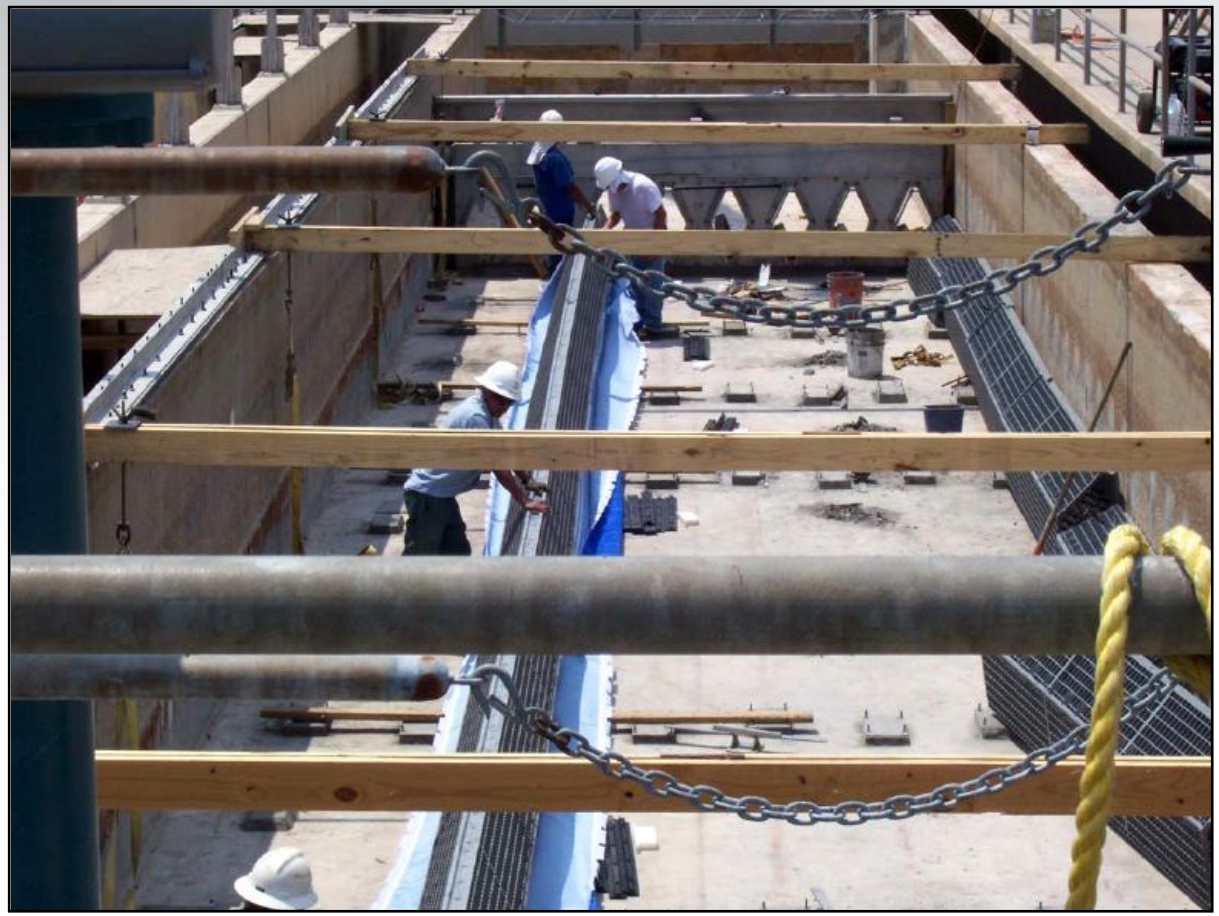


AquaDiamond® Filter

Frame Assembly

AquaDiamond® Filter

Cloth Media Installation



AquaDiamond® Filter

Installed Unit

AquaDiamond® Filter Start-up

Installations	Fox Metro WRF	TRA Central WWTP	D.C. Tillman WRP
No. of Filter Units Retrofitted	5	6	8
Startup Time	January 2005	February 2008	January 2010
Designed Peak Flow Capacity, m^3/d	456,000	547,200	730,000

Filter Testing

- Test protocols developed and approved
- One week to two months duration
- Average flows and loads conditions
- Maximum flows and loads conditions
- TSS, turbidity, flow rates, backwash rates

High Solids Testing

AquaDiamond® Filter

Test Results in Fox Metro WRF

Date	Filter Flow (m^3/d)		Influent TSS mg/L		Average Effluent TSS (mg/L)	Backwash Rate
	Maximum	Average	Maximum	Average		
1	59,500	53,785	11	9.8	2.2	0.63%
2	55,526	42,506	10	6.9	2.7	0.56%
3	48,448	39,705	12	6.8	3.5	0.56%
4	56,132	40,462	12	6.2	2.0	0.50%
5	51,362	36,752	12	6.5	2.4	0.60%
6	46,101	36,336	10	4.9	2.9	0.56%
7	46,896	37,396	11	6.8	2.7	0.51%
8	55,375	39,478	9	4.8	2.2	0.80%
9	46,063	36,790	9	6.2	2.8	0.43%
10	44,436	36,336	8	4.7	2.5	0.51%
11	50,719	39,856	6	4.4	1.9	0.50%
12	51,060	38,645	8	4.5	1.9	0.48%
13	68,206	41,484	106	14.3	3.4	1.17%
14	69,493	58,819	171	25.3	5.2	1.41%
15	67,600	53,217	110	14.4	2.2	0.68%
16	63,437	49,962	8	5.7	2.2	0.40%
17	68,887	52,990	47	7.6	2.4	0.49%
18	56,056	43,868	7	4.8	2.5	0.55%
19	48,864	40,462	10	5.8	2.8	0.49%
20	45,042	38,039	10	6.6	4.3	0.56%
21	48,978	40,613	15	6.2	3.0	0.53%

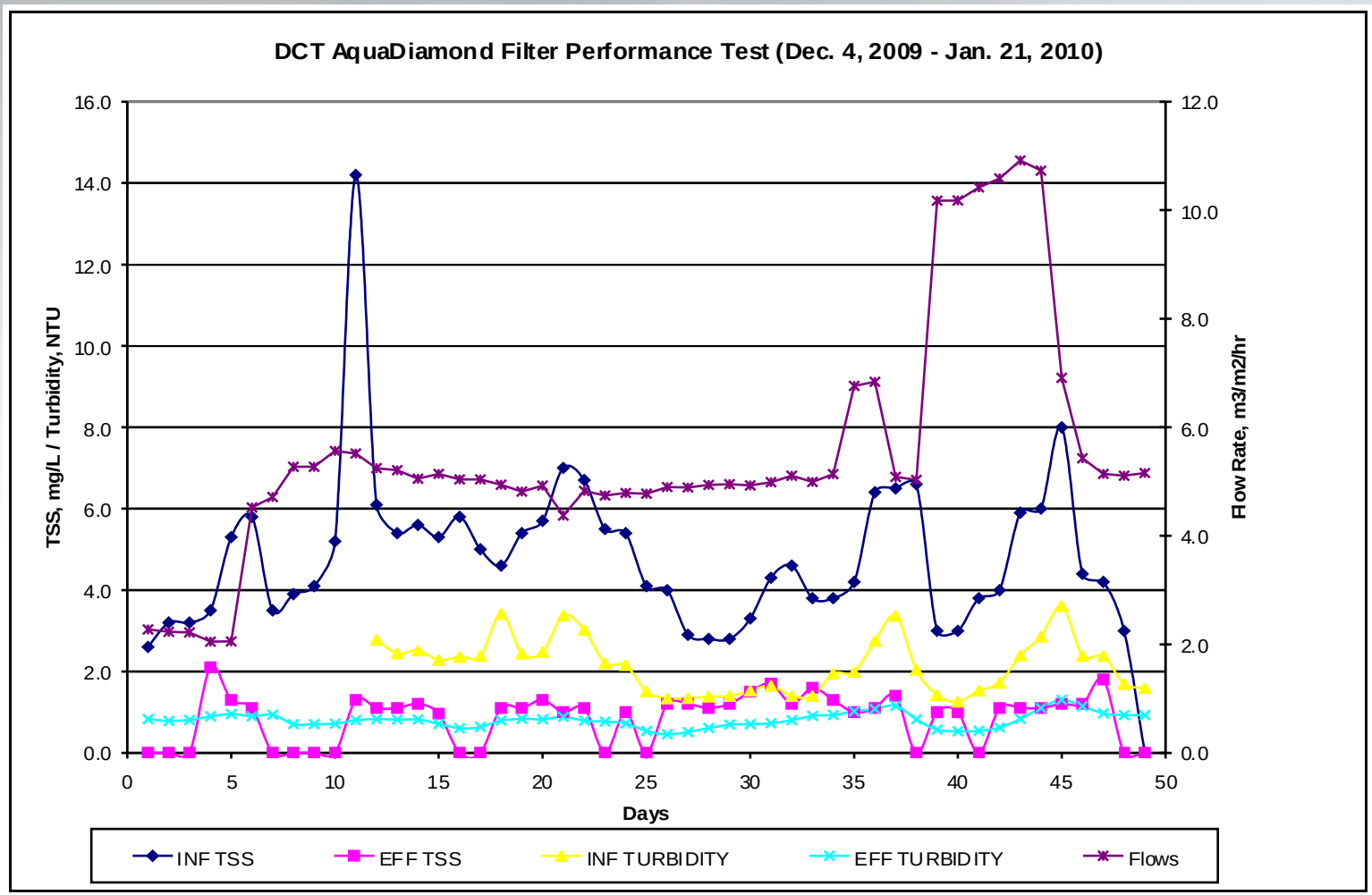
AquaDiamond® Filter

Test Results in TRA Central WWTP

Date	Filter Flow (m^3/d)		Influent TSS (mg/L)		Effluent TSS (mg/L)		Backwash Rate
	Maximum	Average	Maximum	Average	Maximum	Average	
11-Feb-08	-	49,761	-	10.2	-	1.7	1.69%
12-Feb-08	90,840	28,433	29.1	9.6	5.0	3.0	1.63%
13-Feb-08	90,840	26,514	58.9	12.6	1.6	1.6	2.23%
14-Feb-08	90,840	46,586	33.1	17.7	3.4	2.0	2.02%
15-Feb-08	-	47,241	-	14.0	-	2.0	1.63%
16-Feb-08	-	47,260	-	15.0	-	1.0	1.67%
17-Feb-08	-	40,772	-	15.0	-	1.0	1.56%

AquaDiamond® Filter

Test Results in DC Tillman WRP

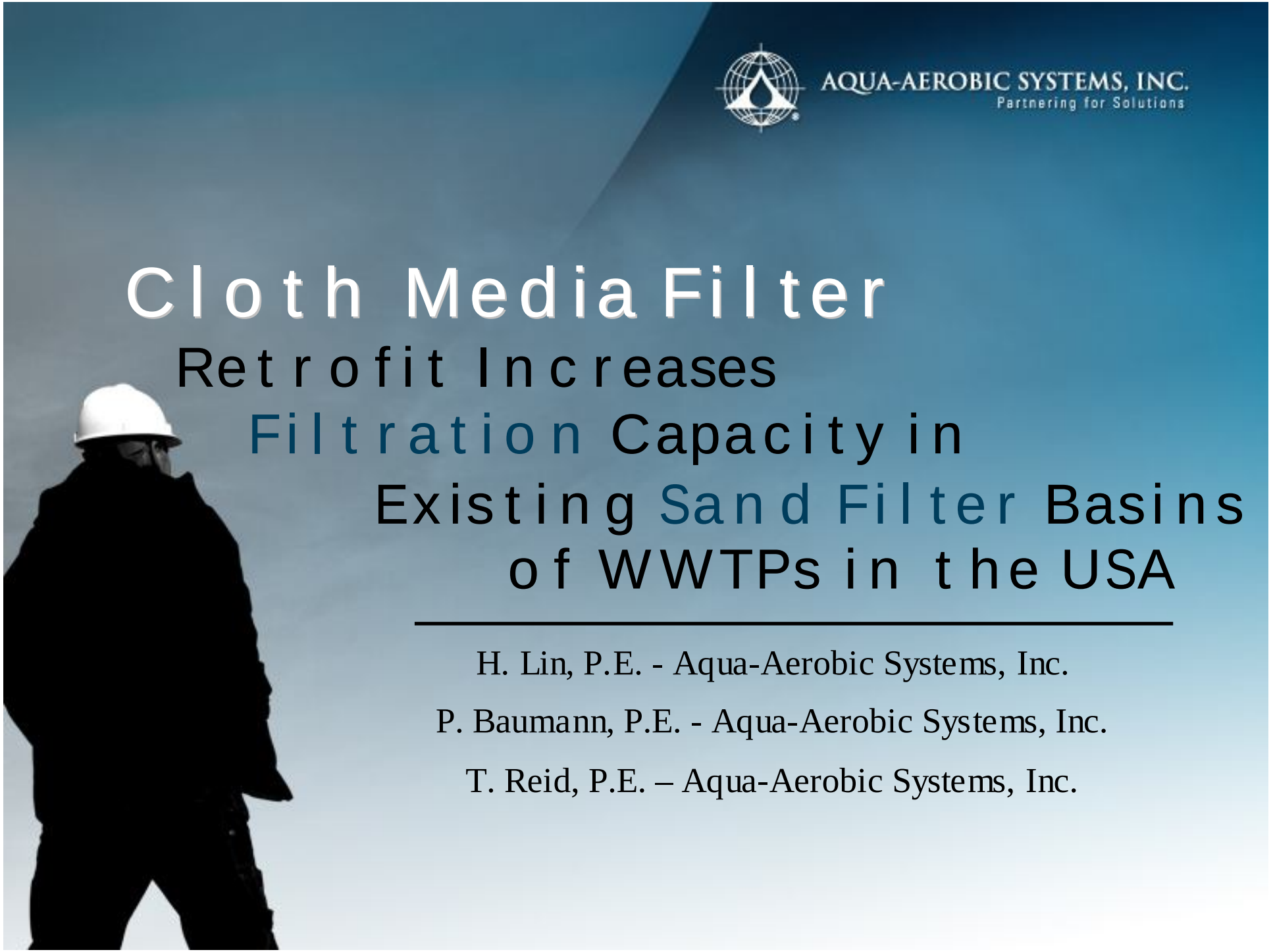


Conclusions

- AquaDiamond® filter matched or excelled shallow bed traveling bridge sand filter performance
- AquaDiamond® filter minimized basin modifications required and fit the existing hydraulic profile
- Over 3 times flow capacity increase possible through the existing basins with the Diamond conversion

Conclusions (continued)

- At similar solids loading, cloth media significantly reduced backwash water volume compared to existing sand filters
- Cloth media able to handle higher solids concentration while maintaining effluent quality



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