



Phase 1 – Technology Assessment

Presentation of Completed Phase 1 - Findings

Presented by Troy Hotchkiss and Debra Jones
4/9/2024

Current state of the Plant

- TCEQ Notice to City dated February 23, 2024
 - **Not in compliance – Potential fines for mandatory enforcement**
- Originally identified in Schneider Electric Business Case in 2014, re-identified in 2021 Business Case
- Newer (2023) fine-bubble diffusers installed, but are now failing
- Alleged violations of ammonia limits during plant maintenance periods in 2023
- Original aeration technology installed before ammonia limits in TCEQ Permit
- Diffuser failures will continue to increase in frequency until a catastrophic event – imminent failure
- City engaged SE and HDR to work on short-term and long-term solutions

Short-term solution implemented March 5th,
but does not solve issue's root cause



Current aeration process is the equivalent of driving a car in the redline 24/7.... Its only a matter of time till bad things happen

Anticipated Outcome - TCEQ enforcement without action

Operations team is CORRECTLY TRYING to push more air through diffusion system that is MASSIVELY undersized.

- Net effect - overstressing EPDM membrane
- Causing the perforations that make the fine bubbles to stretch and eventually tear
- Compounding the situation is tank depth (deeper than typical, which can be a hugely beneficial factor for optimizing aeration) with huge backpressures
- Forcing air through the diffusers causes back pressure on the blowers
- Leading to very HOT AIR (demonstrated in image)
- Air rapidly degrades the elastic properties of the membrane, making it brittle
- Continues to compound/accelerate the failure of the system

Long-term solution is scope of IGA Phase 2, recommended by City Staff, SE, and HDR



Technology Assessment Overview

IGA - June 2023

Measures considered and description of each solution

Criteria Ranking Categories

Scoring and Weighting

First Cost and Annual Savings (Energy and Ongoing O&M)

Recommendations

Propose next steps

Measures Vetted

- 1. Aeration Blowers
- 2. Aeration Diffusers
- 3. Plant Water Reuse
- 4. Sludge Dewatering
- 5. Chlorine Contact Basins
- 6. Aerobic Digestors

City Personnel - Order of Preference

- 1. Aeration Diffusers
 - 2. Aeration Blowers
 - 3. Plant Water Reuse
 - 4. Chlorine Contact Basins
 - 5. Aerobic Digestors
 - 6. Sludge Dewatering
- } City's recommended priorities for Phase 2 development

2023 Freeze and Nichols report identified \$20.6M in needs

City preferences discussed 2/14/2024

Scope Priority List

SE recommendations in order of importance to the City

1. ECM 2-A | New Fine Bubble Diffusers
2. ECM 1-A | New Hybrid PD Blower with Control Strategy and Primary Instruments
3. ECM 3-A | Plant Water Reuse

1. Highest operational benefit, existing system is very inefficient and likely contributing to blower failures. Recommend combining with ECM 1A. *Addresses TCEQ notice root cause*
2. High operational benefit, allows for phased approach to blower replacement, lowest first cost of ECM 1 options. Should be combined with ECM 2A. *Addresses TCEQ notice root cause*
3. Highest financial benefits, low cost. Can be implemented utilizing existing city budget. Savings help offset costs. *Saves \$300,000 in BWA water costs and provides 280 water connections*

Scoring Matrix

*See handout

ECM Number	ECM Name	Process Performance	Savings	Costs	Serviceability and Safety	Imp Risks/ Phasing Challenges	Total Score
1	Aeration Improvements - Blowers						
1-A	New Hybrid PD Blower	2	1	5	3	4	3.0
1-B	New PD Blowers	3	2	2	3	3	2.6
1-C	New HST Blowers	3	3	2	3	3	2.8
1-D	New Surface Mounted Aeration Mixers	-	-	-	-	-	-
2	Aeration Improvements - Basin						
2-A	New Fine Bubble Tube Diffusers	5	3	3	3	4	3.6
2-B	New Fine Bubble Panel Diffusers	5	3	3	2	3	3.2
2-C	New Fine Bubble Disc Diffusers	5	3	3	3	3	3.4
3	Water Reuse						
3-A	New Pumps and Piping for Effluent	3	4	4	4	3	3.6
3-B	New Packaged Treatment System for Potable	3	5	2	1	2	2.6

ECM Number	ECM Name	Process Performance	Savings	Costs	Serviceability and Safety	Imp Risks/ Phasing Challenges	Total Score
4	Sludge Dewatering						
4-A	New Press - Volute or Screw	3	3	3	3	3	3.0
4-B	New Press - Belt	3	1	3	1	1	1.8
4-C	New Gravity Dewatering Container	1	1	1	1	1	1.0
5	Disinfection						
5-A	Cl Gas with New Air Piping Mods	2	3	5	1	5	3.2
5-B	Convert to Liquid NaOCl - Purchased	2	2	3	3	2	2.4
5-C	Convert to Liquid NaOCl - Generated	2	1	1	2	1	1.4
5-D	New UV Disinfection	3	1	2	4	3	2.6
6	Aerobic Digestion						
6-A	New Blower and Controls	3	3	2	4	4	3.0
6-B	New Diffusers, Blower and Controls	3	3	1	3	3	2.6
6-C	New Compressed Gas Mixing System	3	2	1	2	4	2.4
6-D	New Surface Mounted Aeration Mixers	-	-	-	-	-	-

Cost and Savings Estimates

*See handout

ECM #	ECM Name	Electric	Chemical / Water	Operations	Cost Estimate (\$)	Total Savings Estimate (\$)	Notes
		Savings / Cost (\$)	Savings / Consumption (\$)	Labor & Parts (\$)			
1-A	New Hybrid PD Blower	\$ 5,000			\$ 1,500,000	\$ 5,000	Highest Total Score for ECM-1
1-B	New PD Blowers	\$ 15,000			\$ 3,125,000	\$ 15,000	
1-C	New HST Blowers	\$ 30,000			\$ 3,750,000	\$ 30,000	
1-D	New SM Aeration Mixers				\$ -	\$ -	Investigated but not Recommended
2-A/B/C	New Fine Bubble Diffuser System	\$ 20,000			\$ 2,500,000	\$ 20,000	Highest Total Score for ECM-2
3-A	New Pumps and Piping for Effluent	\$ (3,000)	\$ 395,000		\$ 600,000	\$ 392,000	Highest Totals Score for ECM-3, *Savings is Residential Water Cost Offset*
3-B	New Packaged Treatment System for Potable				\$ -	\$ -	Investigated but not Recommended
4-A	New Press - Volute or Screw		\$ (10,000)	\$ (45,000)	\$ 2,250,000	\$ (55,000)	Highest Total Score for ECM-4, but ECM not Recommended
4-B	New Press - Belt		\$ (10,000)	\$ (80,000)	\$ 3,000,000	\$ (90,000)	
4-C	New Gravity Dewatering Container				\$ -	\$ -	Investigated but not Recommended
5-A	Cl Gas with New Air Piping Mods	\$ 3,000			\$ 300,000	\$ 3,000	Highest Total Score for ECM-5
5-B	Convert to Liquid NaClO - Purchased		\$ (77,000)		\$ 450,000	\$ (77,000)	
5-C	Convert to Liquid NaClO - Generated	\$ (11,600)	\$ 40,000	\$ (35,000)	\$ 3,000,000	\$ (6,600)	
5-D	New UV Disinfection	\$ (15,000)	\$ 97,000	\$ (47,000)	\$ 2,125,000	\$ 35,000	
6-A	New Blower and Controls	\$ 1,000			\$ 1,800,000	\$ 1,000	Highest Total Score for ECM-6
6-B	New Diffusers, Blower and Controls	\$ 2,000			\$ 2,200,000	\$ 2,000	
6-C	New Compressed Gas Mixing System	\$ 3,000			\$ 2,600,000	\$ 3,000	
6-D	New SM Aeration Mixers				\$ -	\$ -	Investigated but not Recommended

Pricing provided on handout

THANK YOU

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se.com

