

# FWEA Air Quality Seminar

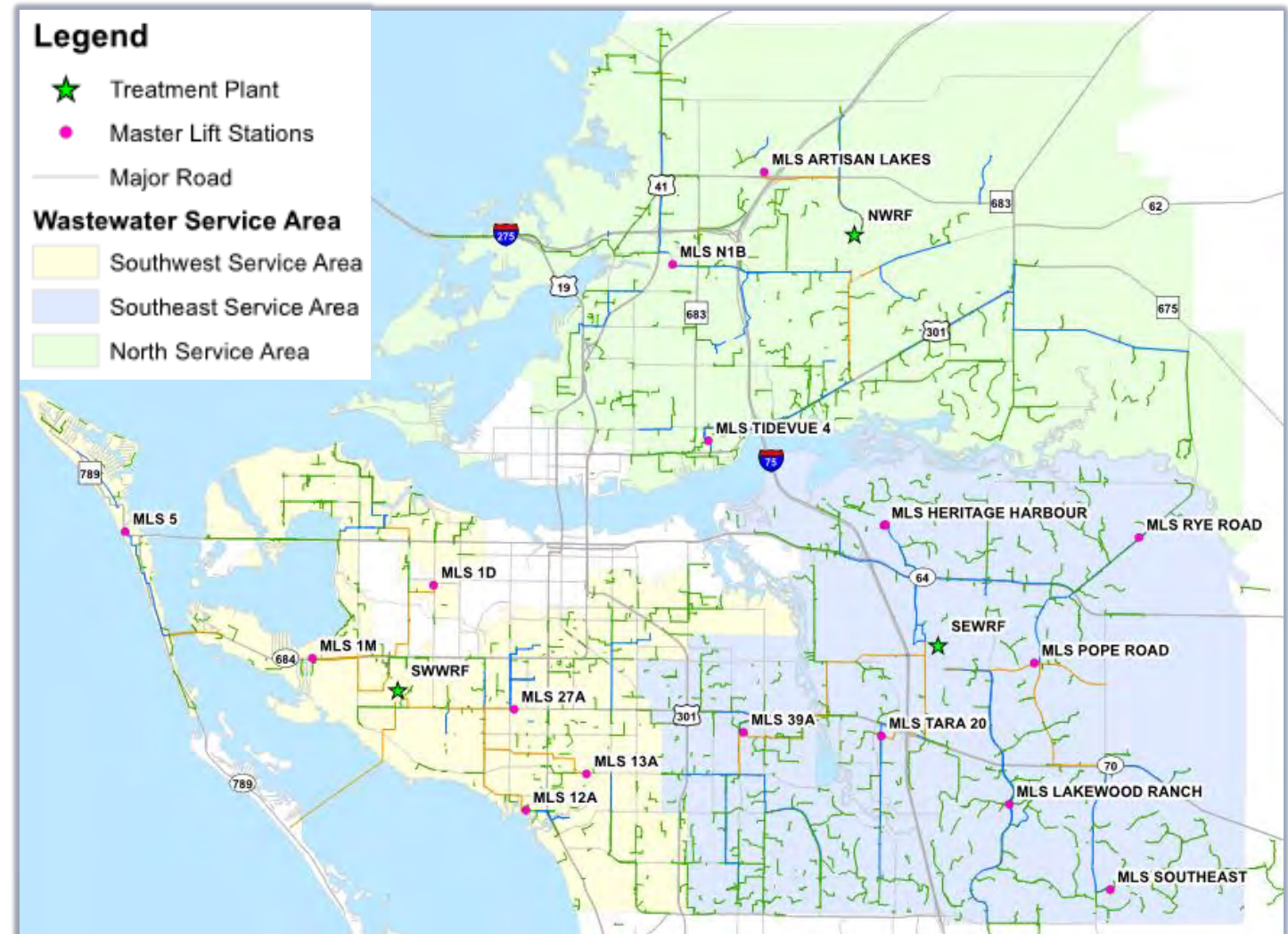
Erik Gibson; Manatee County Utilities



# Manatee County, Florida Collection System

## Key Stats

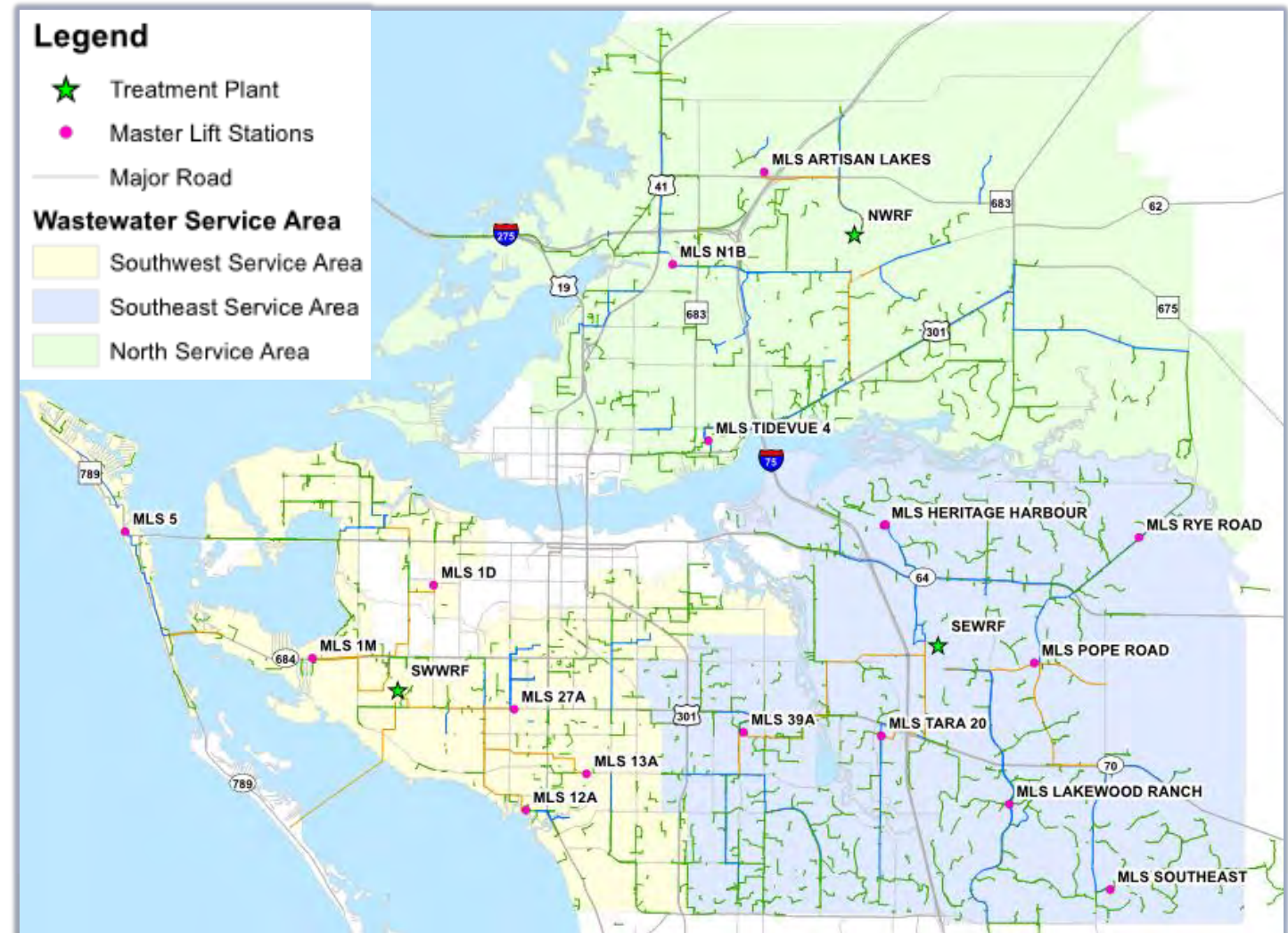
- 153,339 customers
- Covers unincorporated area, majority of County
- Flat terrain → majority of flow has long RT
- Warm temperatures → wastewater quickly loses DO
- Sulfide generation extensive,  $H_2S$  release opportunity widespread



# Manatee County, Florida Collection System

## Key Stats

- Gravity Lines, 1083 Miles
- Force Mains, 449 Miles
- Sewer Laterals, 473 Miles
- Manhole Structures, 24,236
- Lift Stations North Basin, 219
- Lift Stations Southeast Basin, 337
- Lift Stations Southwest Basin, 208
- Consisting of, 19 Master and 745 Satellite Lift Stations
- Total of 764 Lift Stations



# Agenda

- Collection System is a Bioreactor
  - Hydrogen Sulfide
- Design Topics
  - Limit Septicity
  - Limit Turbulence
  - Enforce Pretreatment
  - Design for Corrosion
  - Ventilation
- Odor & Corrosion Control Program Evolution / Management

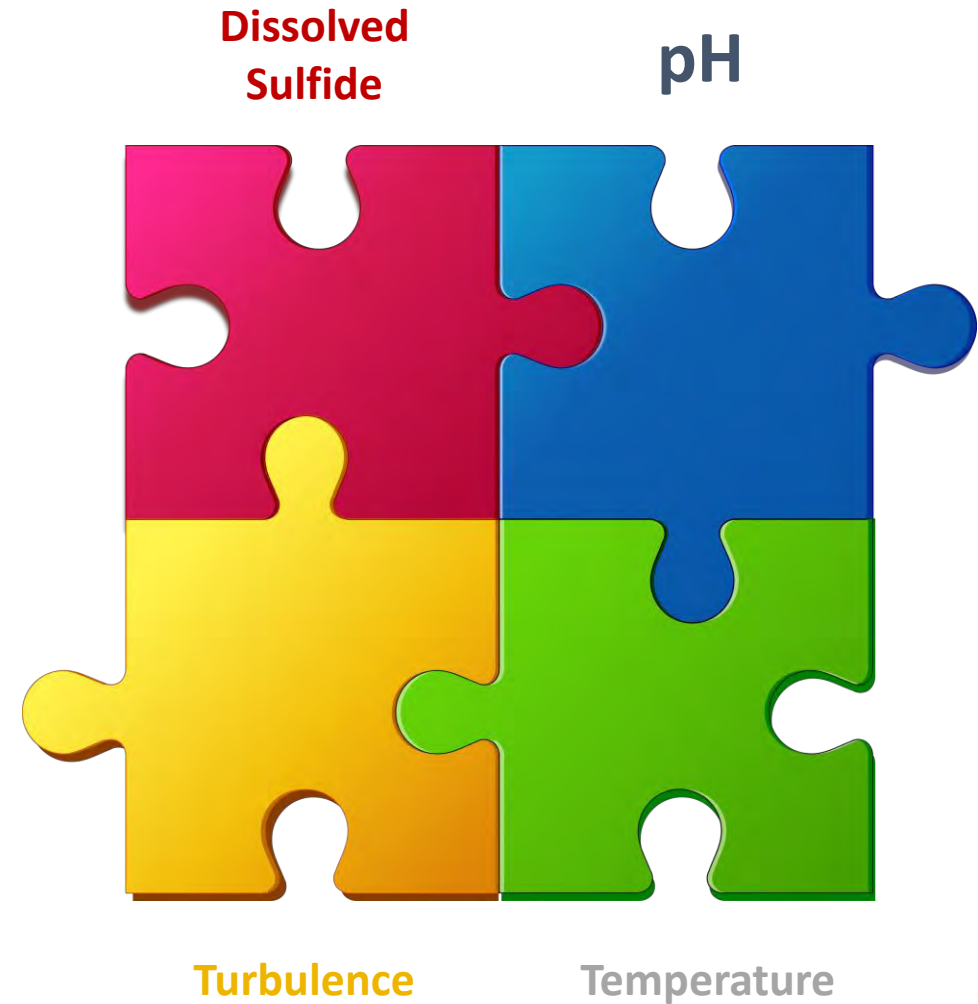
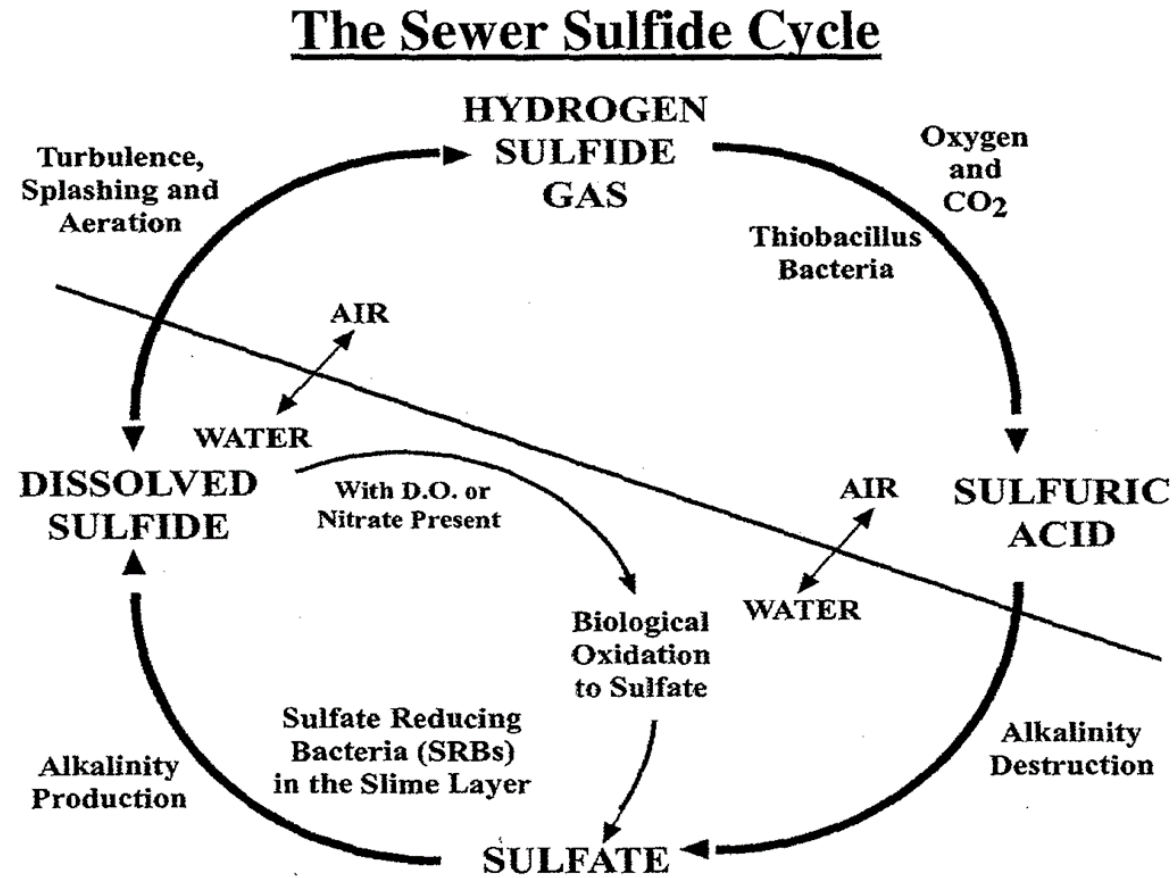


# Hydrogen Sulfide – $\text{H}_2\text{S}$

- Safety concern in confined spaces
- Major cause of wastewater infrastructure corrosion
- Source of most (but not all) wastewater odor problems

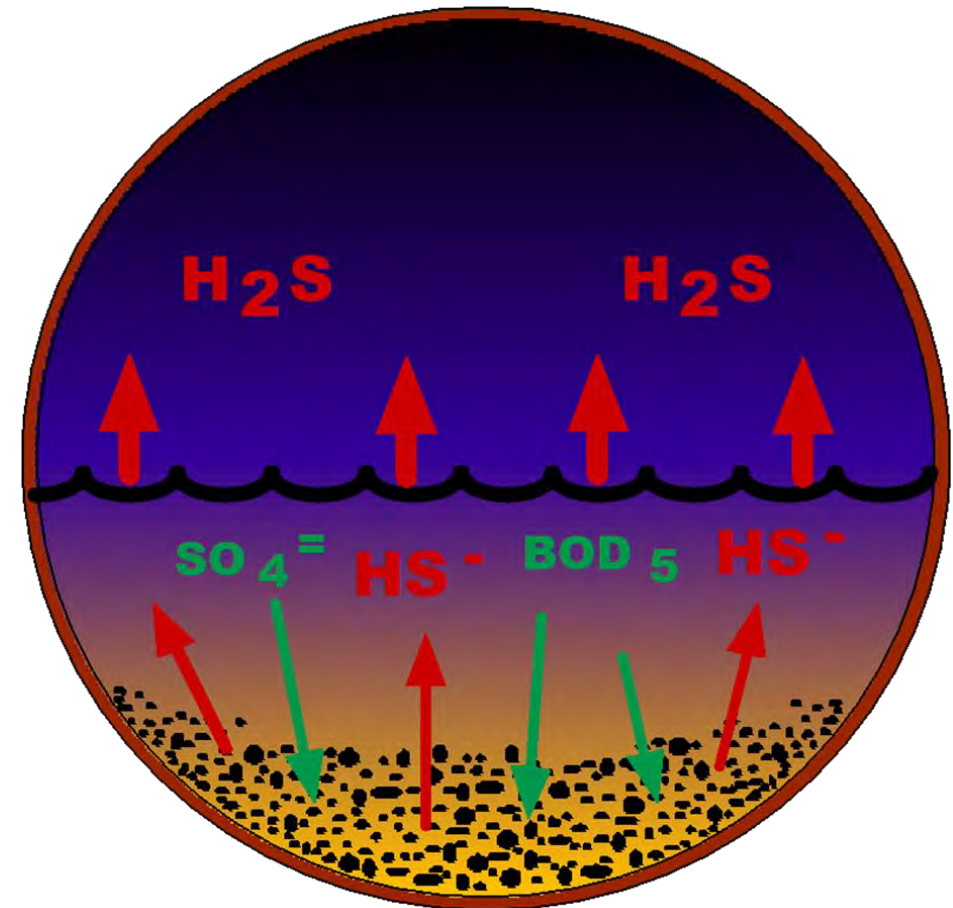
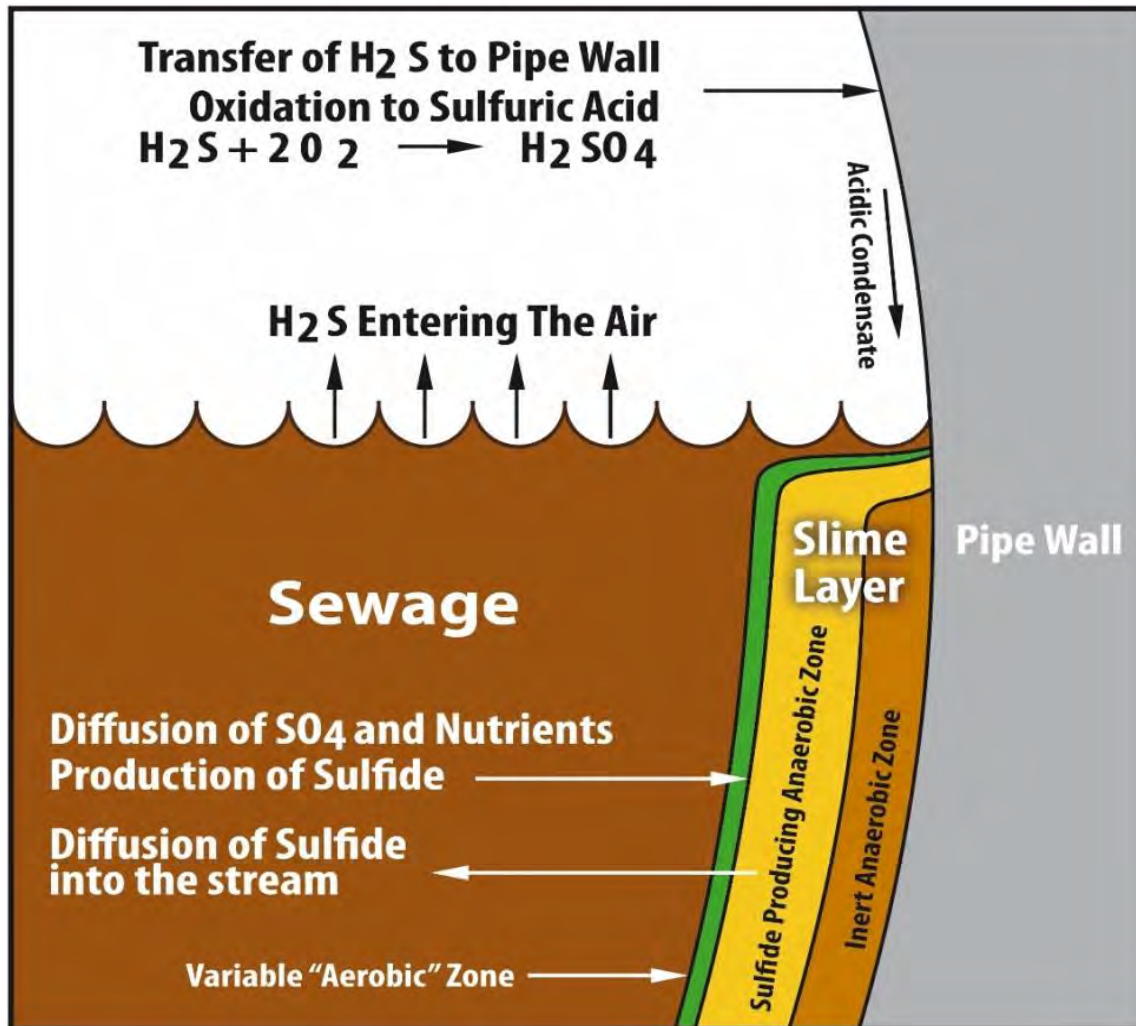


# The H<sub>2</sub>S Puzzle





# H<sub>2</sub>S Generation

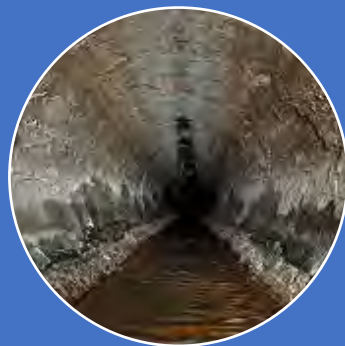


# Limit Dissolved Sulfide



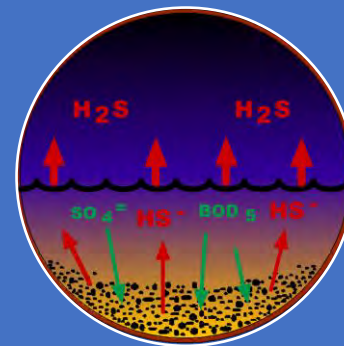
Minimize force mains, maximize gravity

- Capacity exceptions



Don't over-size

- Limit detention time



Keep lines clean

- Minimize debris, surface area



Use chemical dosing as needed

- Control Sulfide
- Control pH







Line Flushing and Pigging is Highly Effective.



# Odor Complaint is an Advance Warning

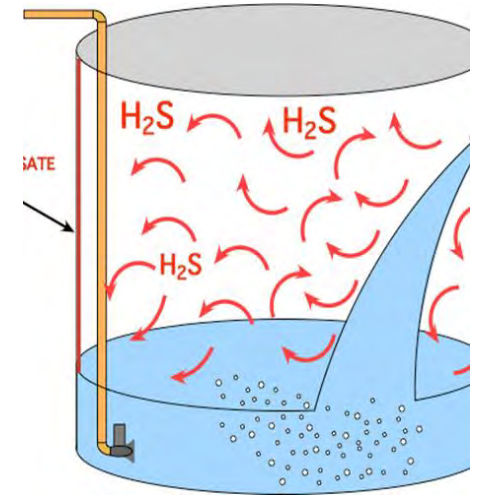
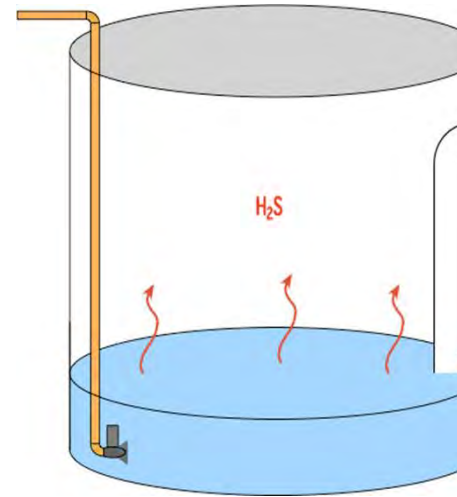
- Odors gain public and political attention
- Alert that there is a problem
- An idea of where to look





## Minimize Turbulence

- Turbulence increases vapor-liquid surface area, accelerates gas release
  - Like CO<sub>2</sub> in a carbonated beverage
  - Turbulence strips H<sub>2</sub>S
- Operate PS at inlet level
- Minimize drops
- Use drop pipes
- Wye flow connections





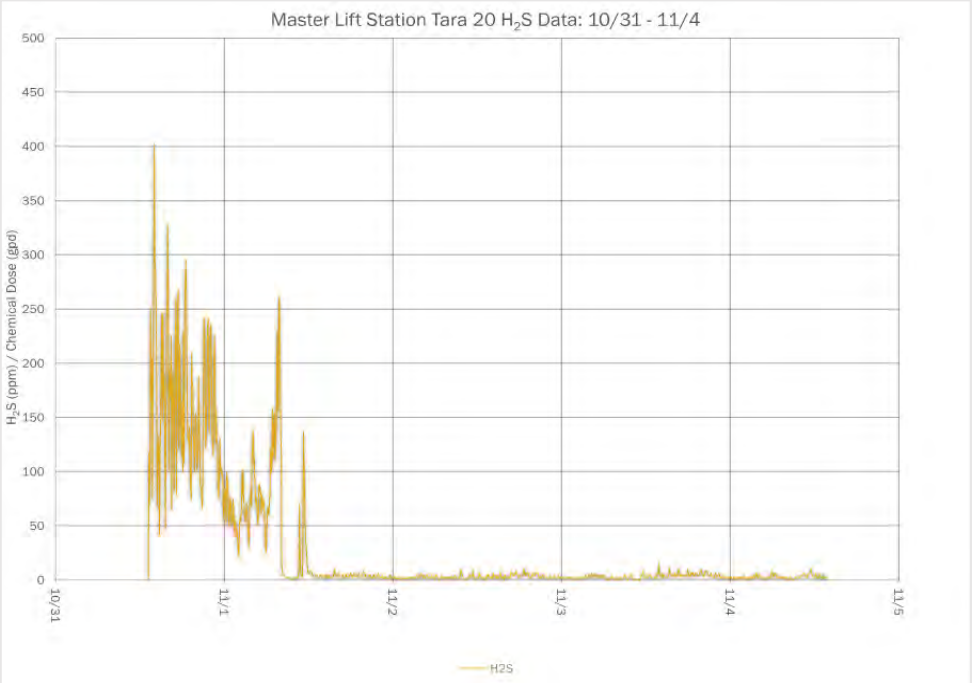
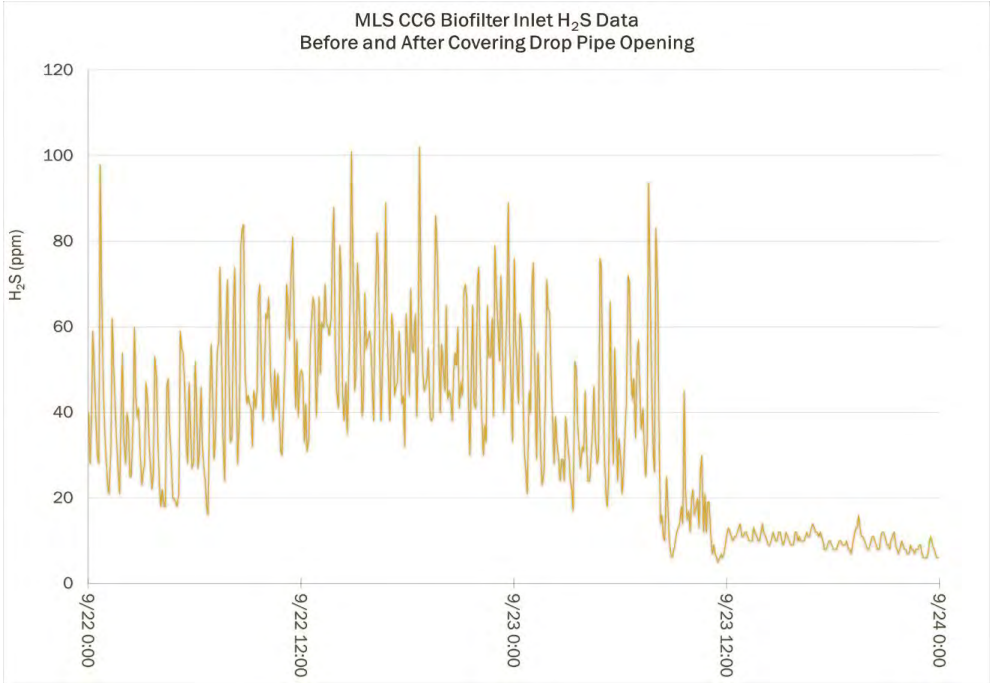
# Leveraging Turbulence Reduction



MLS CC6 H2S Before & After Covering Drop Pipe



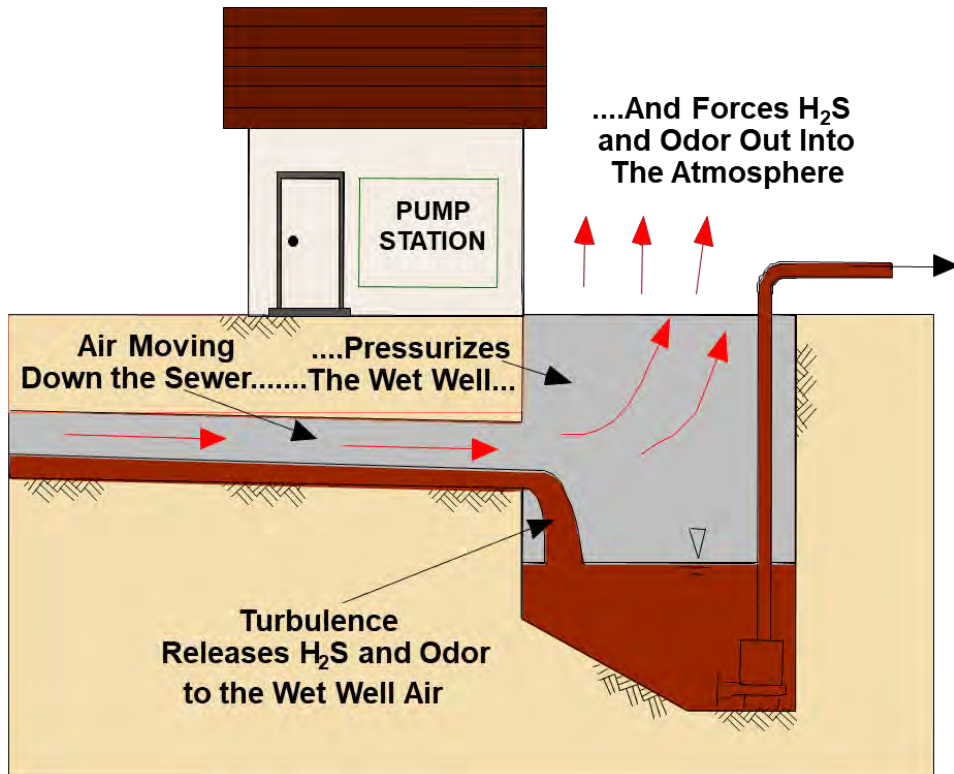
MLS Tara 20 H<sub>2</sub>S Change With Well Level Rise Upstream MH H<sub>2</sub>S



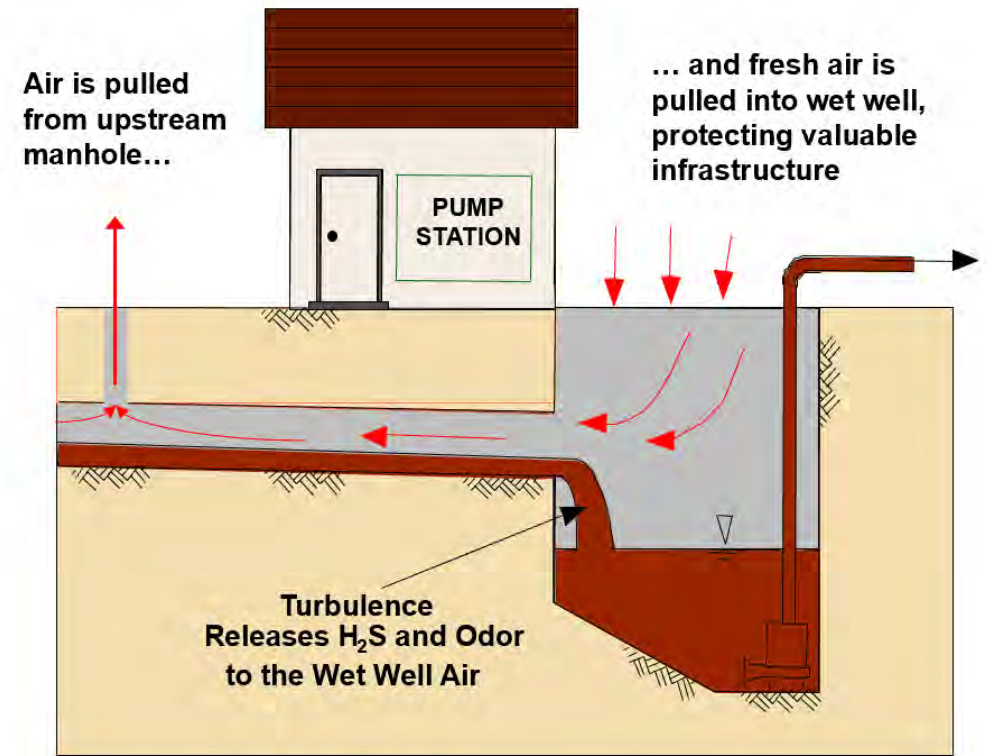
	Min	Max	Average
With manhole ventilation	0	217	26.28
Without manhole ventilation	1	711	155.24

# Targeted Ventilation

## Old Approach – Capture Odor at Wet Well

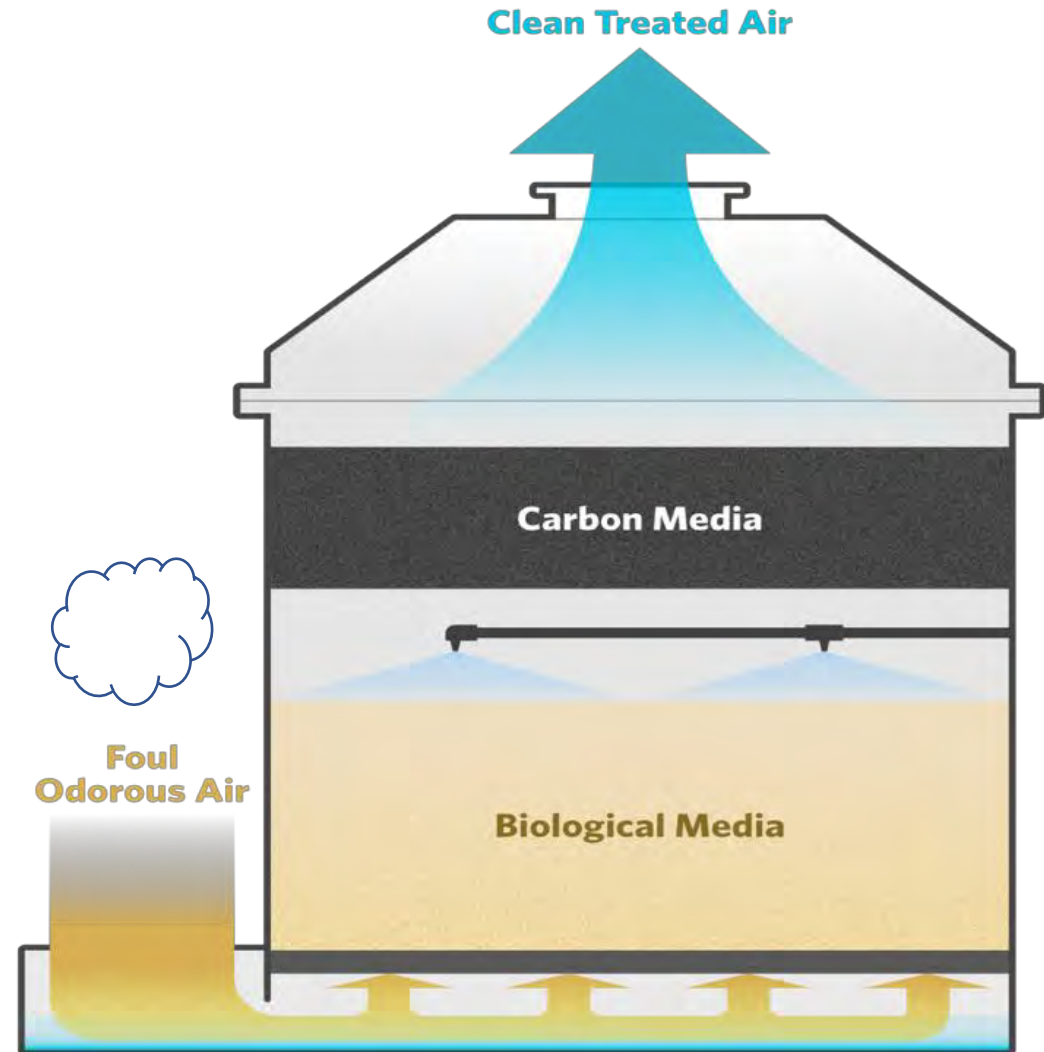


## New Approach – Capture Odor Upstream from Wet Well



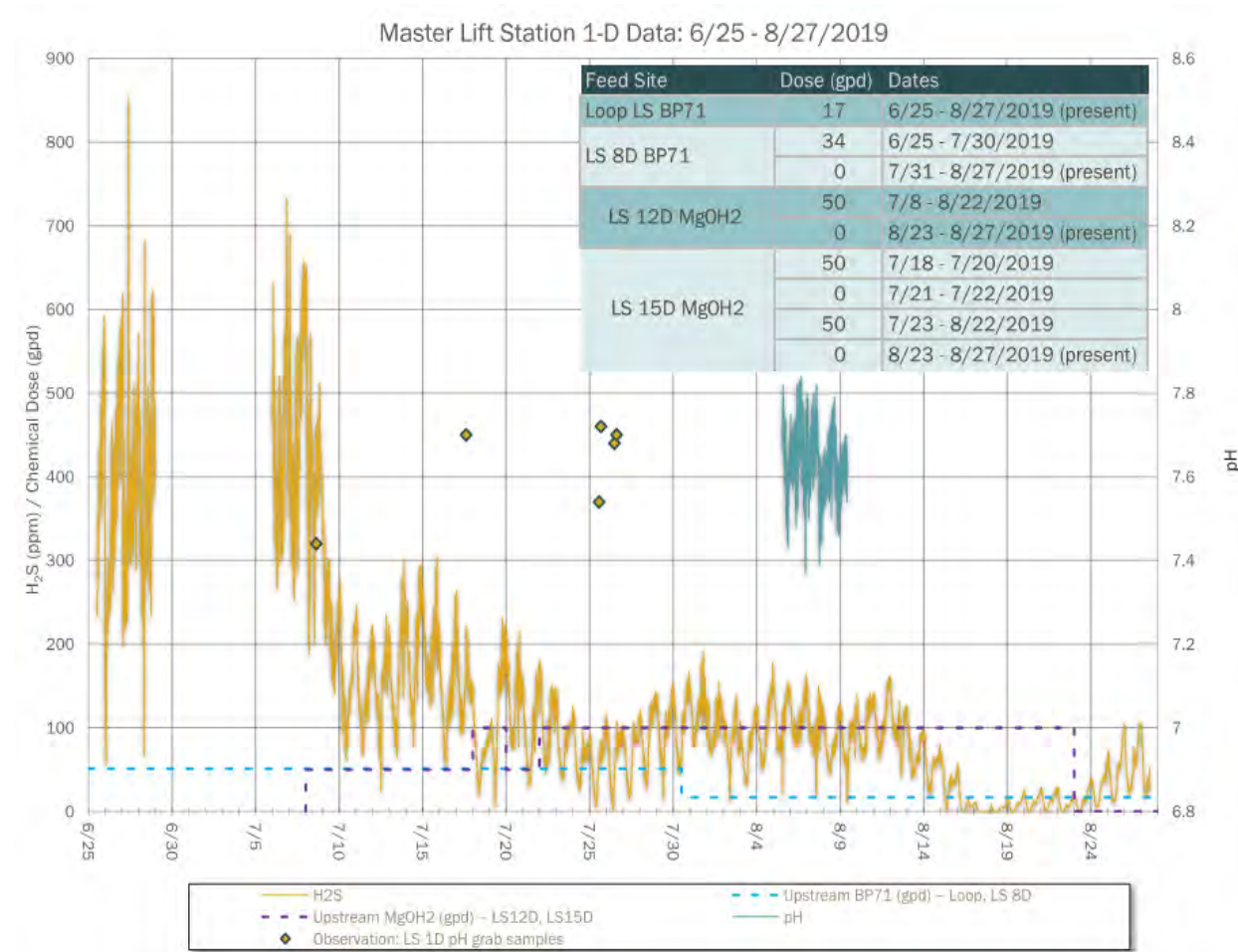
# Ventilation

- Use natural ventilation
- Supplement with mechanical
- Consider make-up air source and quality





# Chemical Treatment With Two Venders To Maximize Performance.





# Shift to Corrosion Resistant Designs Elements



New Polymer Concrete Structures





Composite Rim, Cover, and Rings







Old Design With Concrete Structures and Odor Control  
Pulling Air Only From The Wet Well



# New Polymer Wet Well and Climate Controlled Building



RTU# STATION NAME ->	RTU569 RW2- RIVERWOODS (BIOXIDE)		RW1 LS (SAMPLE)			RTU532 - RW4- RIVER WILDERNESS 4 (BIOFILTER/SAMPLE)			RTU 546 - N1C/WETWELL					RTU841 OAKLEAF 2 PS (BIO+71)		RTU516- THOUSAND OAKS - (CARBON) THOUSAND OAKS PS (SAMPLE)					RTU553 - N6B (BIOFILTER)		
REPT MTG DATE:	FEED RATE (GPD)	TARGET FEED (GPD)	Ph Levels	D. Sulfide	N03	BIO AIR FLOW (CFM)	H2S INLET	H2O RATE (GPD)	BIO AIR FLOW (CFM)	H2S INLET	H2O RATE (GPD)	OUTLET V.L AVG H2S	W.W V.L AVG H2S	FEED RATE (GPD)	TARGET FEED (GPD)	C.S. AIR FLOW	C.SCR H2S INLET	Ph Levels	D. Sulfide	N03	BIO AIR FLOW (CFM)	H2O RATE (GPD)	H2S INLET
Dec-20	20	N/A	8.14	7	0	255	8	N/A	1,955		N/A	0	14.54	15	N/A	96	16	N/A	N/A	N/A	118	N/A	20
Jan-21	20	N/A	7.67	4.5	0	255	6	N/A	2,164		N/A	0	8.19	15	N/A	92	0	N/A	N/A	N/A	255	N/A	18
Feb-21	20	N/A	7.87	0	2	245	10	384	1,955		3,291	0	6.92	15	N/A	105	0	7.62	0	3	113	196	20
Mar-21	20	N/A	7.54	2	0	245	43	372	1,815		3,291	0	10.42	15	N/A	96	18	7.64	2.8	0	113	196	14
Apr-21	20	N/A	8.14	0	5	245	104	372	1,955		3,672	0	17.01	15	N/A	100	0	7.72	0	3	113	196	20
May-21	20	20	8.11	0	3	216	102	395	2,025		3,672	0	38.52	15	15	96	0	7.89	0	3	109	215	74
Jun-21	20	20	8.18	0	3	216	86	372	1,955		3,838	0	30.26	14.4	15	96	1	7.56	0	6	122	215	5
Jul-21	21	20	7.88	0	12	226	5	372	2,025		3,179	0	8.25	15	15	96	0	7.54	0	3	122	196	18
Aug-21	22.9	22	7.91	0	4	216	66	361	977		2,843	0.01	42.6	15	15	96	0	8.03	0.2	1.5	135	184	4
Sep-21	12	20	7.96	0	3	?	?	?	?	?	?	?	174.27	8	15	96	2	?	?	?	?	?	?
Oct-21	20	20	8.04	1.5	1	216	88	372	2,164		5,142	0	145.61	15	15	92	4	7.8	0.7	8	135	184	8
Nov-21	22	20	8.16	0	8	226	94	372	1,955	218	5,699	0	144.13	10	15	96	0	8.13	0.5	2	127	184	21
Dec-21	18	20	8.18	0	10	128	82	406	1,745	39	6,203	0	97.96	14.2	15	96	1	7.54	0	2	122	184	36
																					2022		
Jan-22	17.9	20	8.29	0	3.5	137	96	406	1,955	133	6,661	0	88.82	11.1	15	96	2	7.57	0	4	122	184	44
Feb-22	20.5	20	7.8	0	3.5	177	165	404	1,955	223	6,661	0	94.15	15.2	15	96	1	7.49	0.5	3.5	113	184	38
Mar-22	26	20	8.19	0	5	157	155	445	2,025	8	6,661	0	54.2	15.7	15	96	0	7.47	0	3	113	184	36
Apr-22	20	20	8.29	0	4	206	150	490	2,234	198	6,978	0	50	15	15	92	2	7.67	0	8	122	184	46
May-22	22	22	8.09	0	2	206	120	515	2,234	139	7,323	0	57	15	15	96	2	7.66	0.5	5	118	184	12
Jun-22	22	20	7.83	0	7	206	105	500	2,094	21	7,323	0	63	15	15	96	1	7.87	0.5	4	122	184	24
Jul-22	20	20	8.02	0	7	206	225	432	2,374	182	7,323	0	74	15	15	96	0.5	7.82	0.8	2	122	190	14
Aug-22	20	20	8.17	0	7	206	92	445	2,723	403	7,643	0	108	15	15	100	0	7.79	0.5	3	131	184	10
Sep-22	20	20	7.85	0	5	206	42	432	2,374	279	7,643	0	90	15	15	100	2	7.71	0.3	4	No power fan		
Oct-22	20	20	7.48	15	0	206	62	445	2,304	217	7,184	0	85	14	12	100	1	8.08	0.5	3	131	184	9
Nov-22	20	20	8.18	0	10	206	28	445	2,374	232	7,941	0.3	93	6	12	96	1	7.83	0.2	2	131	184	7
Dec-22	20	20	7.61	0	10	206	62	445	2,513	52	7,941	0.2	149	13	11	100	0	7.73	0.2	2	131	184	44
2023																							
Jan-23	20	20	7.82	0	5	206	70	432	2,374	144	7,563	0.3	119	13	11	96	0	8.18	0	3	131	184	60
Feb-23	20	20	8.02	0	0.5	206	20	458	2,513	85	9,003	0.1	66	14	11	100	0	7.74	0.5	3	131	202	78
Mar-23	20	20	8.19	0	5	206	68	469	2,513	17	10,235	0.4	121	14	12	96	0	8.08	0.3	3	131	254	52
Apr-23	0	0	7.36	0	0	206	135	483	2,513	246	10,883	0	200	15	15	100	0	7.92	0.2	2	131	254	38
May-23	17	4	8.26	0	1.5	206	86	496	2,513	203	9,668	0	209	13	11	96	0	8.07	0	3	131	254	11
Jun-23	18	13	8.05	0	10	206	50	458	2,374	42	9,380	0.01	99	12	11	96	0	7.86	0.2	1	131	254	18
Jul-23	17	17	7.92	0	5	206	58	484	2,513	141	10,235	0.03	106	12	9.9	97	0	7.96	0.4	1	127	254	42
Aug-23	19	17	8.28	0	8	206	32	446	2,793	57	9,305	0	80	12	11	96	0	8.2	1	1	131	254	10
Sep-23	18	18	8.11	0	0	206	20	446	2,513	126	8,219	0	89	12	11	100	0	7.97	0	2	131	254	42
Oct-23	20	18	8.21	0	1.5	206	38	384	2,513	94	8,219	0	94	14	12	96	0	7.89	0	1	131	254	22
Nov-23	20	19	8.11	0	0	206	14	395	2,443	50	7,323	0	80	12	12	105	1	8.01	1	2	127	254	38
Dec-23	20	19	8.17	0	0	206	38	395	2,443	65	6,606	0	71	15	12	105	1	8.11	0	4	127	254	8
2024																							
Jan-24	20		8.18	0	5	206	22	395	2,374	29	9,517	0	58	16		105	0	8.06	0	4	122	254	20

Monthly Meetings To Review Data And Product Performance, Make Strategic Adjustments To Dosing And Operational Changes.



2024																															
5-Jan	75	83	40	44	23	24	45	45	20	10	18	20	45	53	45	45	36	33	36	0	25	25	25	25	30	40	75	70	538	517	-4%
12-Jan	75	77	40	38	23	29	45	50	20	22	18	18	45	41	45	48	36	36	36	34	25	41	25	24	30	43	75	61	538	562	4%
19-Jan	75	89	40	41	23	23	45	45	20	20	18	24	45	47	45	45	36	30	36	39	25	37	25	25	30	30	75	74	538	569	6%
26-Jan	75	70	40	33	23	28	45	45	20	30	18	19	45	46	45	44	36	37	36	35	25	23	25	27	30	28	75	72	538	537	0%
2-Feb	75	62	40	41	23	18	45	45	20	20	18	22	45	47	45	47	36	35	36	36	25	26	25	25	30	26	75	0	538	450	-16%
9-Feb	75	67	40	45	23	22	45	28	20	20	18	5	45	45	45	48	36	34	36	35	20	25	25	27	30	29	75	70	533	500	-6%
16-Feb	75	74	40	42	23	21	45	45	20	0	18	28	45	45	45	45	36	43	36	46	20	20	25	27	30	29	75	72	533	537	1%
23-Feb	75	68	40	42	23	21	45	100	20	24	18	18	45	45	45	44	36	36	36	40	20	18	25	29	30	32	75	70	533	587	10%
1-Mar	75	81	40	39	23	16	45	46	20	22	18	21	45	48	45	43	36	37	36	36	20	18	25	25	30	32	75	63	533	527	-1%
8-Mar	75	75	40	43	23	18	45	53	20	21	18	17	45	46	45	25	36	36	36	43	20	20	25	22	30	31	75	75	533	525	-2%
15-Mar	75	81	40	41	23	21	45	45	20	18	18	20	45	50	45	43	36	36	36	43	20	20	25	25	30	29	75	75	533	547	3%
22-Mar	75	83	40	44	23	187	45	45	20	19	18	20	45	48	45	44	36	42	36	30	20	21	25	24	30	34	75	75	533	716	34%
29-Mar	75	75	40	42	23	24	45	33	20	14	18	18	45	50	45	43	36	40	36	38	20	19	25	20	30	30	75	75	533	521	-2%
5-Apr	75	73	40	39	23	25	45	41	20	17	18	14	45	49	45	45	36	38	36	42	20	21	25	26	30	31	75	77	533	538	1%
12-Apr	75	71	40	41	26	21	50	30	25	12.5	20	17.5	50	45	50	45	36	40	36	34	25	25	25	25	30	30	75	75	563	512	-9%
19-Apr	75	75	40	41	26	28	50	15	25	31	20	35	50	47	50	51	40	37	40	37	25	24	25	25	30	14	75	75	571	535	-6%
26-Apr	75	73	40	41	26	26	50	52	25	23	20	23	50	61	50	43	40	40	40	43	25	25	25	25	30	26	75	68	571	569	0%
3-May	75	70	40	44	26	26	50	51	25	25	20	14	50	52	50	47	40	40	40	38	25	13	25	26	30	25	75	75	571	546	-4%
10-May	75	79	40	40	26	21	50	53	25	24	20	18	50	41	50	50	40	41	40	34	25	29	25	23	30	26	75	75	571	554	-3%
17-May	75	61	40	40	26	24	50	50	25	25	20	19	50	46	50	51	40	45	40	39	25	25	25	27	30	25	75	75	571	552	-3%
24-May	75	81	40	44	26	25	50	50	25	18	20	28	50	54	50	48	40	0	40	41	25	25	25	24	30	0	75	75	571	513	-10%
31-May	75	71	40	39	26	15	50	50	25	25	20	17	50	52	50	49	40	42	40	47	25	0	25	24	30	28	75	75	571	534	-6%
7-Jun	75	75	40	0	26	27	50	56	25	13	20	18	50	49	50	50	40	32	40	55	25	23	25	23	30	30	75	62	571	513	-10%
14-Jun	75	79	40	38	26	30	50	50	25	16	20	13	50	52	50	52	40	41	40	44	25	28	25	24	30	22	75	78	571	567	-1%
21-Jun	75	80	40	42	26	31	50	60	25	23	20	18	50	48	50	50	40	0	40	41	25	25	25	22	30	20	75	75	571	535	-6%
28-Jun	75	76	40	36	26	29	50	50	25	20	20	19	50	47	50	56	40	0	40	40	25	0	25	26	30	35	75	76	571	510	-11%
5-Jul	75	73	40	40	26	28	50	46	25	22	20	21	50	40	50	52	40	41	40	39	25	27	25	30	30	35	75	76	571	570	0%
12-Jul	75	69	40	36	26	27	50	47	25	21	20	20	50	49	50	49	40	40	40	36	25	25	25	25	30	29	75	76	571	549	-4%
19-Jul	75	75	40	42	26	29	50	51	25	25	20	20	50	49	50	48	40	45	40	35	25	29	25	23	30	30	75	73	571	574	1%
26-Jul	75	69	40	40	26	27	50	53	25	29	20	17	50	49	50	50	40	42	40	42	25	25	25	22	30	32	75	75	571	572	0%
2-Aug	75	76	40	39	26	28	50	44	25	24	20	20	50	49	50	50	40	45	40	39	25	24	25	21	30	28	75	76	571	563	-1%
9-Aug	75	111	40	45	26	0	50	90	25	27	20	20	50	59	50	51	40	40	40	44	25	25	25	134	30	70	75	99	571	815	43%
16-Aug	75	76	40	39	26	26	50	50	25	28	20	22	50	50	56	40	40	40	40	25	26	25	23	30	32	75	76	571	584	2%	
23-Aug	75	64	40	40	26	23	50	50	25	10	20	18	50	54	50	53	40	0	40	36	25	25	25	25	30	29	75	75	571	502	-12%
30-Aug	75	73	40	41	26	27	50	47	25	27	20	30	50	0	50	48	40	49	40	39	25	26	25	24	30	30	75	79	571	540	-5%
6-Sep	75	83	40	39	26	24	50	50	25	19	20	26	50	48	50	45	40	56	40	39	25	25	25	21	30	30	75	86	571	591	4%
13-Sep	75	78	40	38	26	24	50	41	25	24	20	9	50	49	50	51	40	48	40	39	25	25	25	23	30	29	75	74	571	552	-3%
20-Sep	75	77	40	39	26	31	50	50	25	14	20	20	50	50	50	48	40	45	40	38	25	23	25	15	30	30	75	75	571	555	-3%
27-Sep	75	0	40	0	26	0	50	0	25	0	20	0	50	0	50	0	40	0	40	0	25	0	25	0	30	0	75	0	571	0	-100%
4-Oct	75	0	40	0	26	0	50	0	25	0	20	0	50	0	50	0	40	0	40	0	25	0	25	0	30	0	75	0	571	0	-100%
11-Oct	75	0	40	40	26	0	50	48	25	23	20	0	50	51	50	50	40	40	40	37	25	25	25	26	30	0	75	78	571	418	-27%

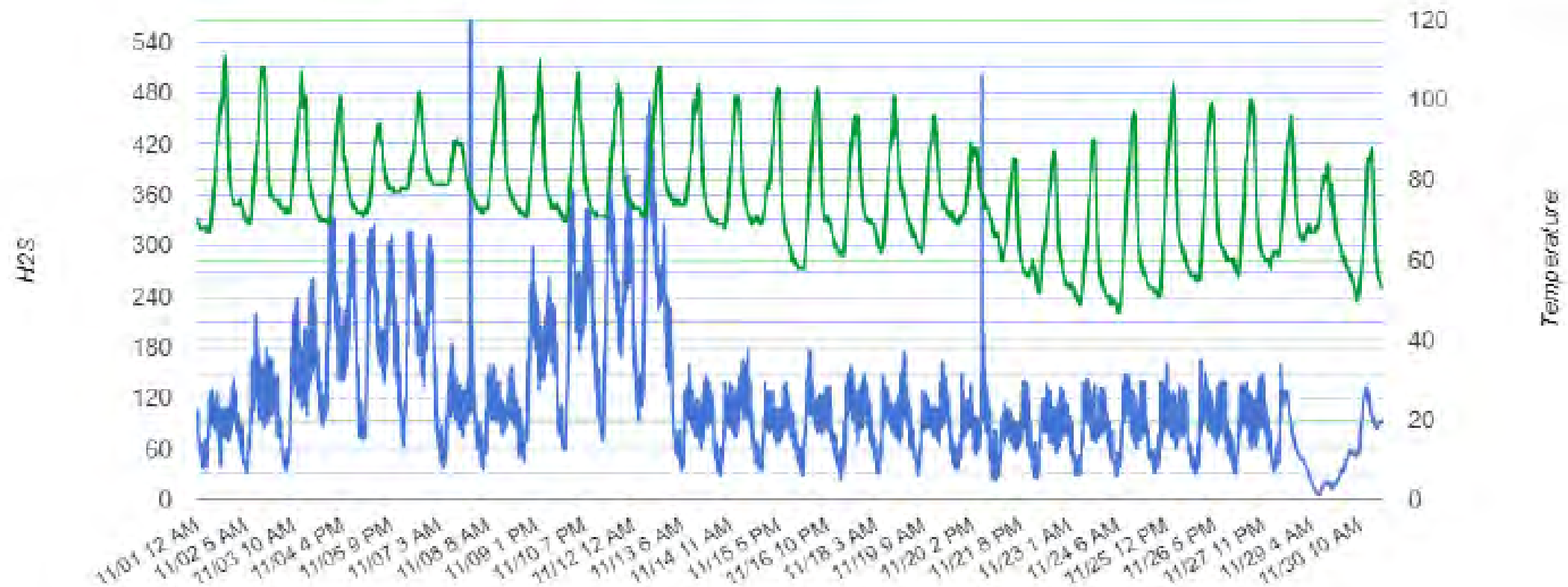
Verify Dose Rates To Help Identify Abnormalities In Reporting

# PARRISH MASTER

Biofilter: 00000

Vaporlink: Parrish Master Inlet 4G

— H<sub>2</sub>S — Temperature

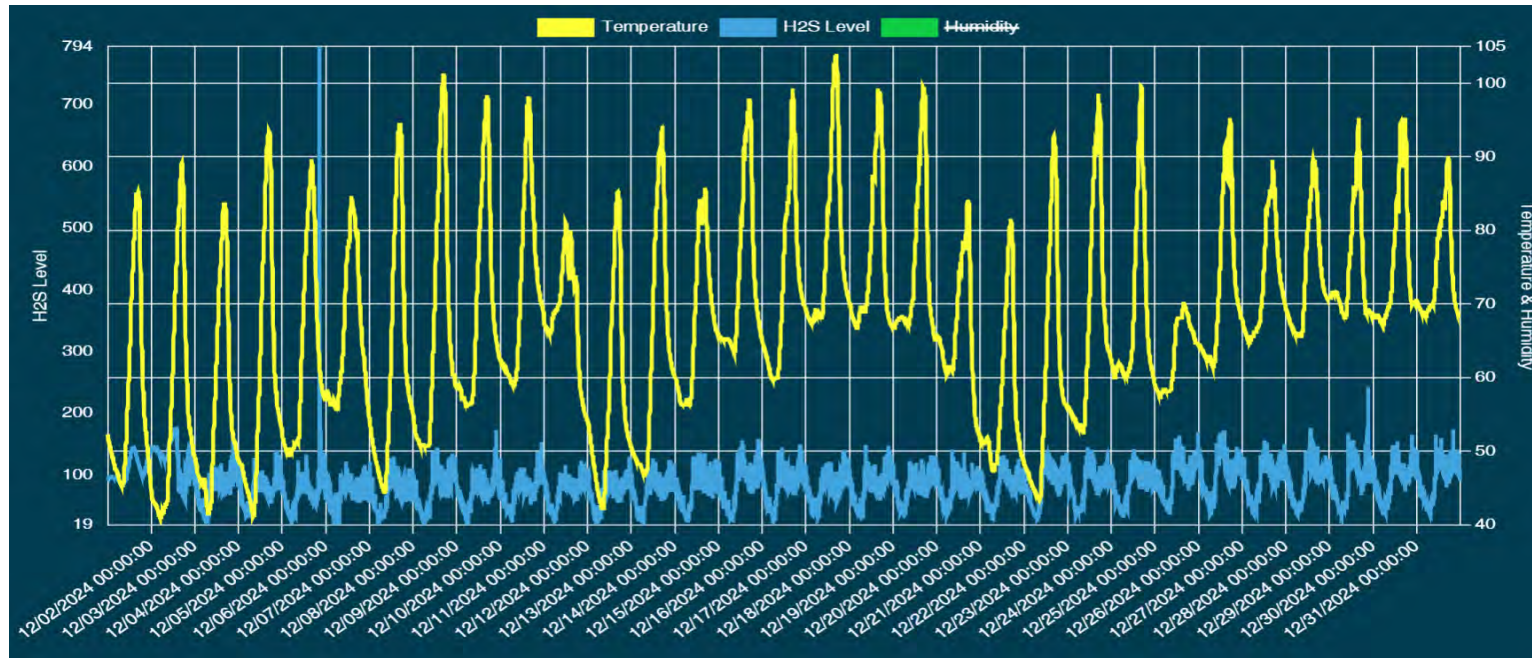


H<sub>2</sub>S LevelMin: 7.00 Max: 566.00 Avg: 113.93

Temperature Min: 47.00 Max: 111.00 Avg: 75.3



## Parrish Master Biofilter Inlet December 2024



12/2/24 3:40 pm  
Average H<sub>2</sub>S – 84.2 ppm ↓  
pH 8.26  
TS – 20  
Surface pH – 5



# Manatee County End Result

## ***Key LS H<sub>2</sub>S Reduced***

- 19 Master/Repump LSs
- 20 ppm avg goal vs 100+ ppm historical
- Basin specific upstream chemical dosing, turbulence reduction, and VPOC
- Implemented via heavy data based approach with continuous H<sub>2</sub>S monitoring

## ***Corrosion Reduced***

- At prime control points and upstream LSs/gravity lines
- LPOC – 34 pH elevation & 35 DS reduction sites
- 1M annual chemical increase
- Odor control & safety benefits

## ***Asset Life Extended***

- 56 LSs & 300+ MHs
- 3 WRF Headworks
- Life extended 15+ yrs
- \$20M cost savings estimate