



What's That Smell?

Best practices and strategies
for an effective odor control system

September 13, 2019



Outline



Background



Why Address Odors?



Odor Causes



Design Considerations

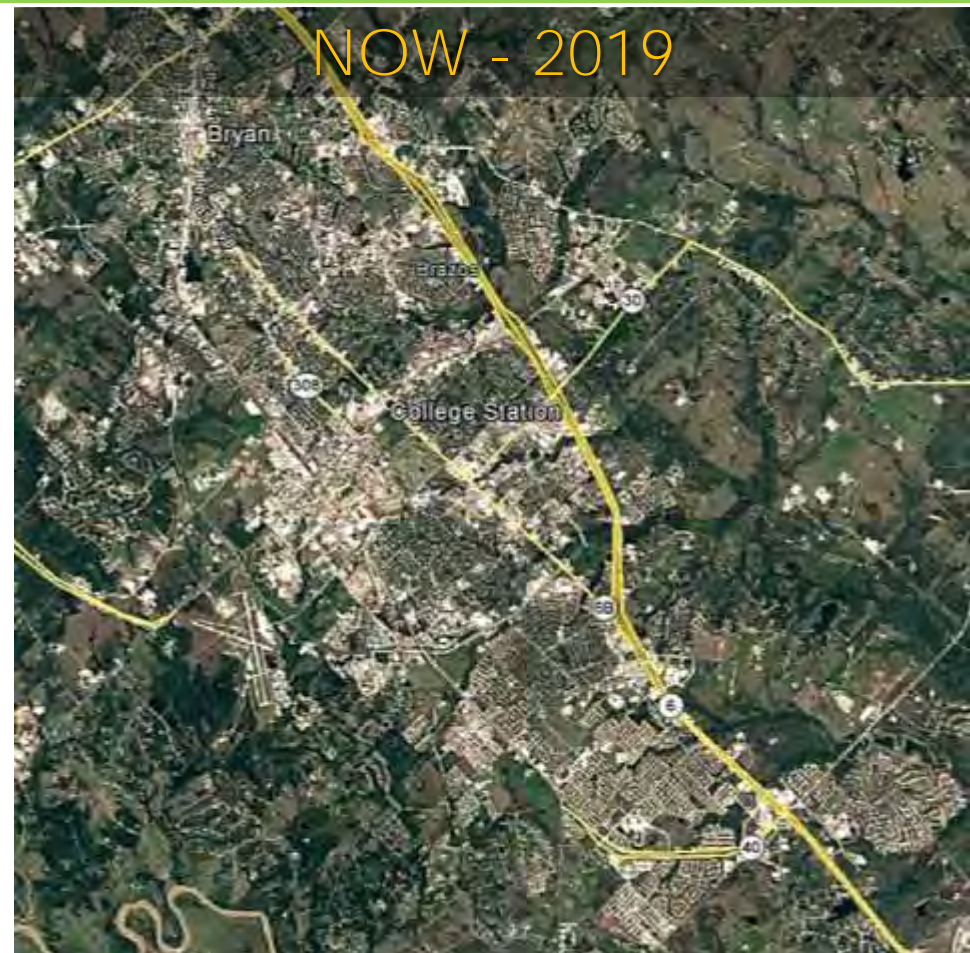
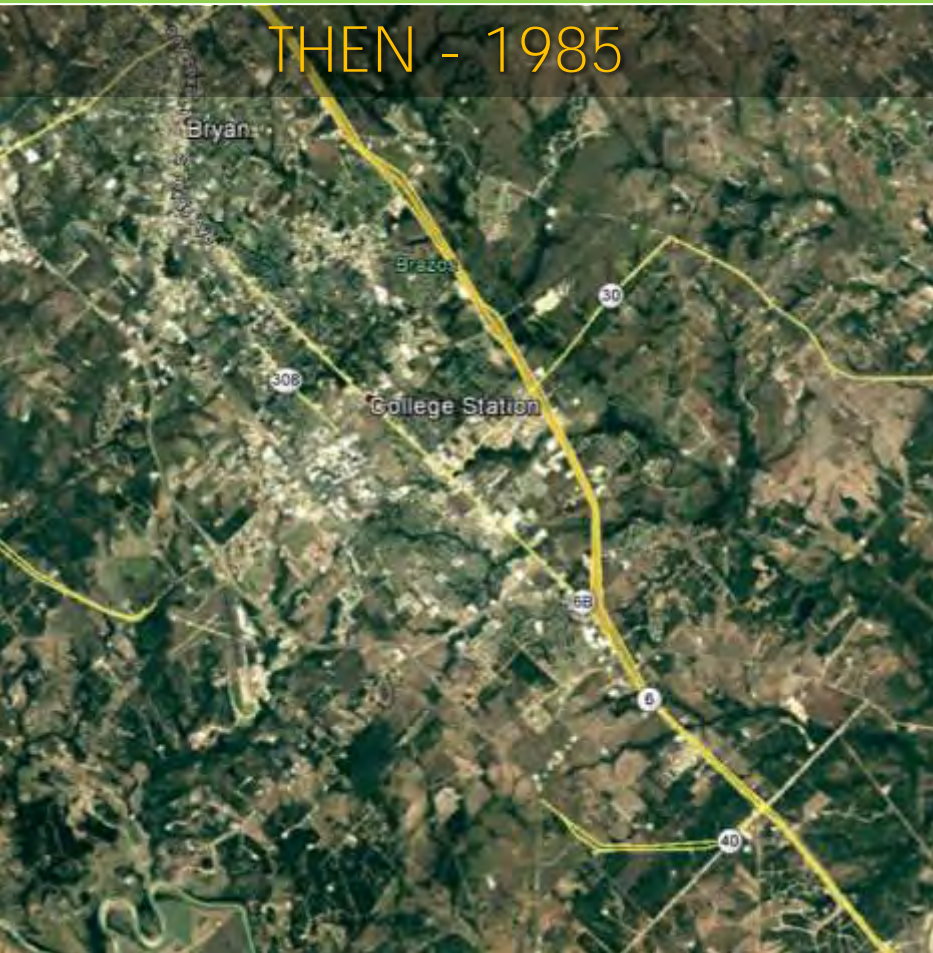


Technology Review

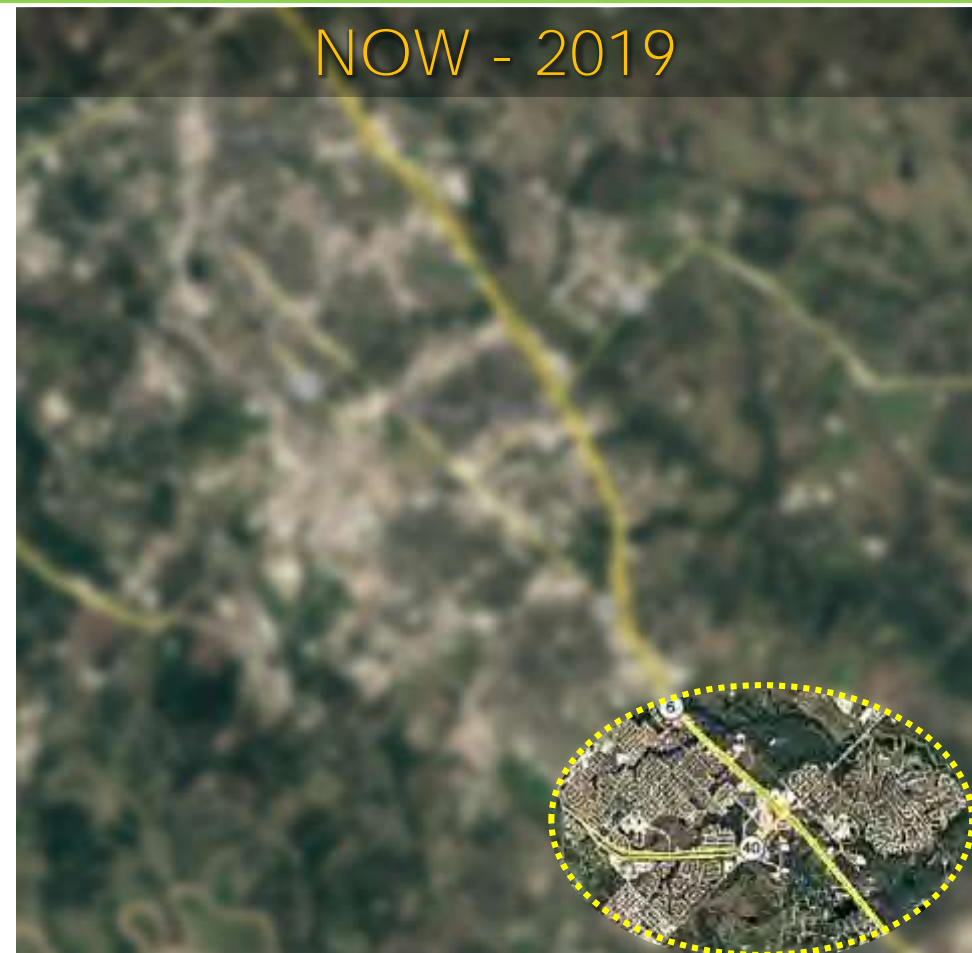
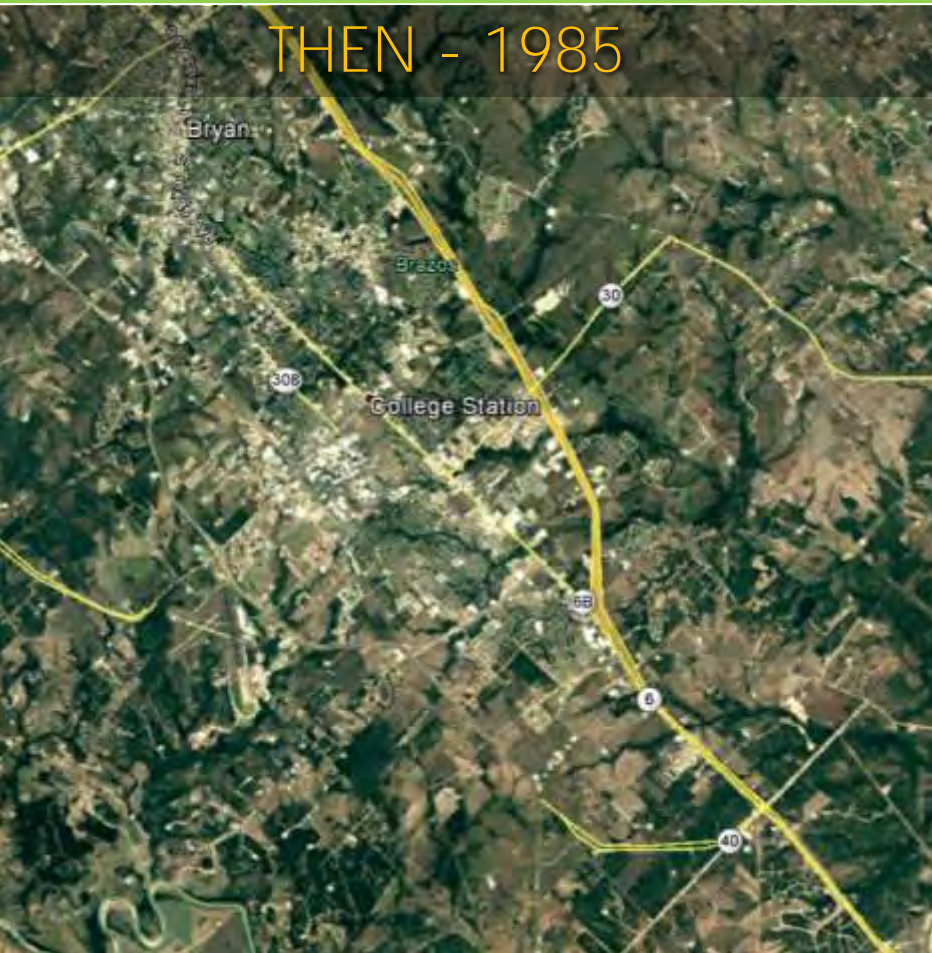


Rules of Thumb

Background



Background

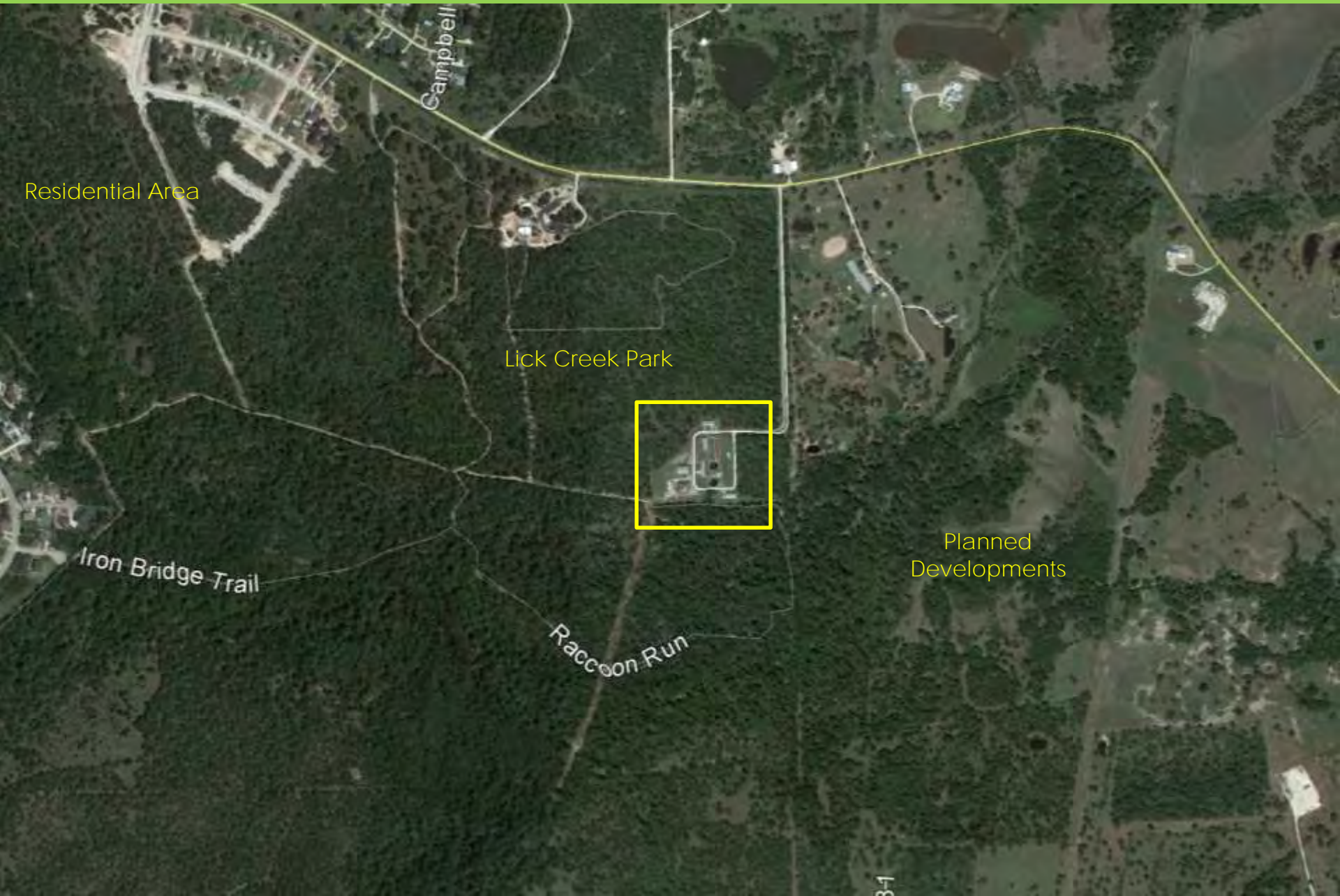


Wastewater Master Plan



Lick Creek WRRF 3 MGD Expansion

Background



Residential Area

Campbell

Lick Creek Park



Planned Developments

Iron Bridge Trail

Raccoon Run

34

Background

Ozone Injection at Lift Station
(Oda-Killa)



Capture & Diversion
at Headworks

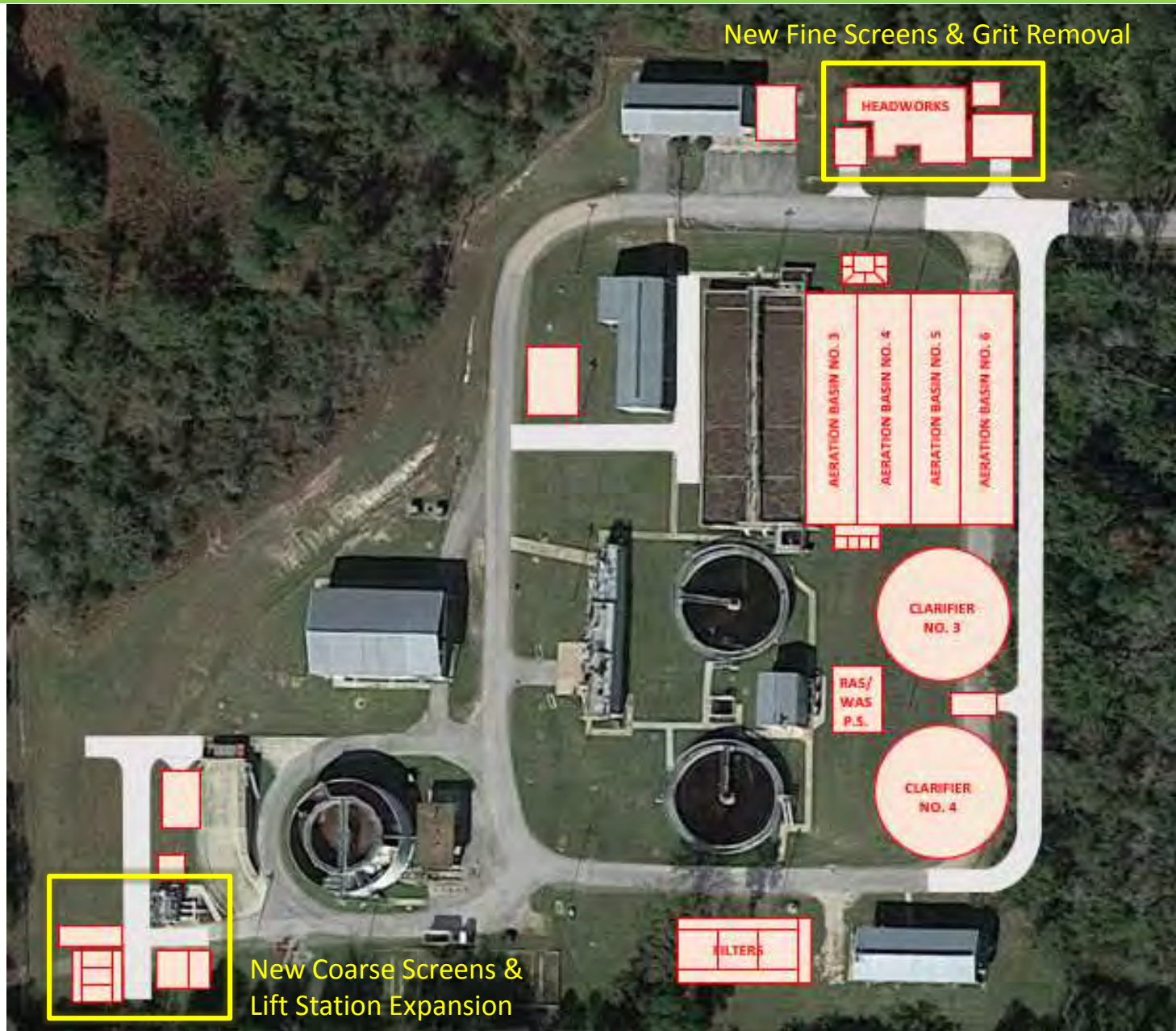


Headworks

Lift Station

Walking Trail

Background



Why Address Odors?



Complaints



Corrosion



Safety

Odor Causes



Hydrogen Sulfide – Rotten Egg



Organic Sulfur Compounds – Various



Nitrogen Compounds – Fishy



Volatile Organic Compounds (VOCs) – Various

Odor Causes

Major Odor Locations

- Collection Systems
- Influent Lift Station
- Headworks



- Primary Clarifiers

H_2S / Ammonia & Amines

- Solids Handling

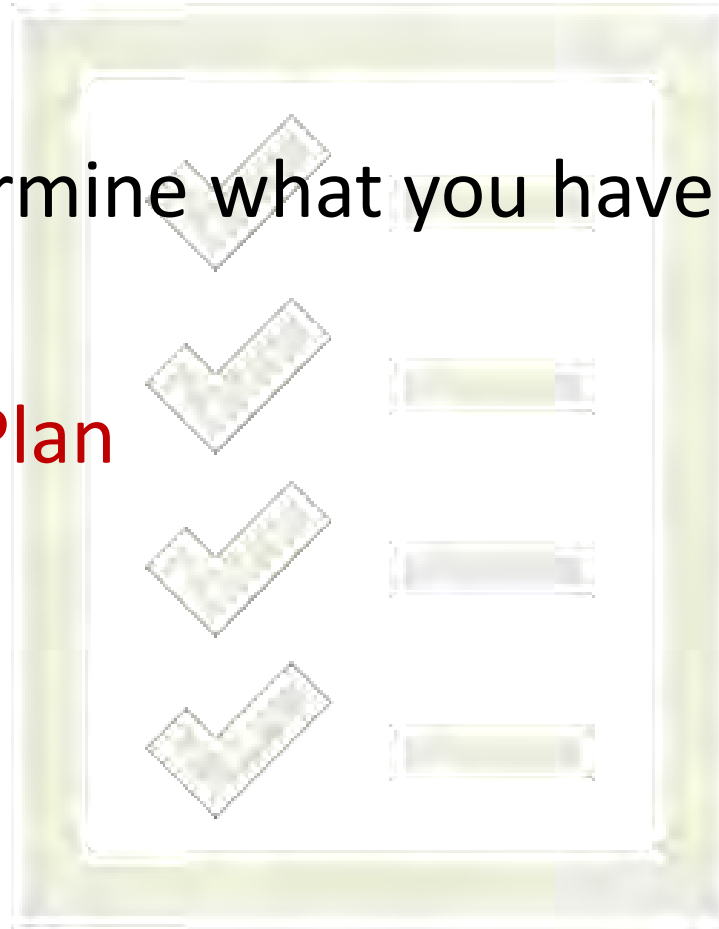
Organic Reduced Sulfur
Compounds (ORSCs) /
Ammonia & Amines

Design Considerations

First Things First

Must determine what you have...

Sampling Plan



Design Considerations

Sampling Plan

Data

- ✓ At least 5 days
- ✓ Seasons – Summer & Winter

Tests

- ✓ Hydrogen Sulfide
- ✓ Total Reduced Sulfur
- ✓ Ammonia and Amines



Design Considerations

Sampling Plan

Volumes and Flowrates

Question Time



Design Considerations

Question Time

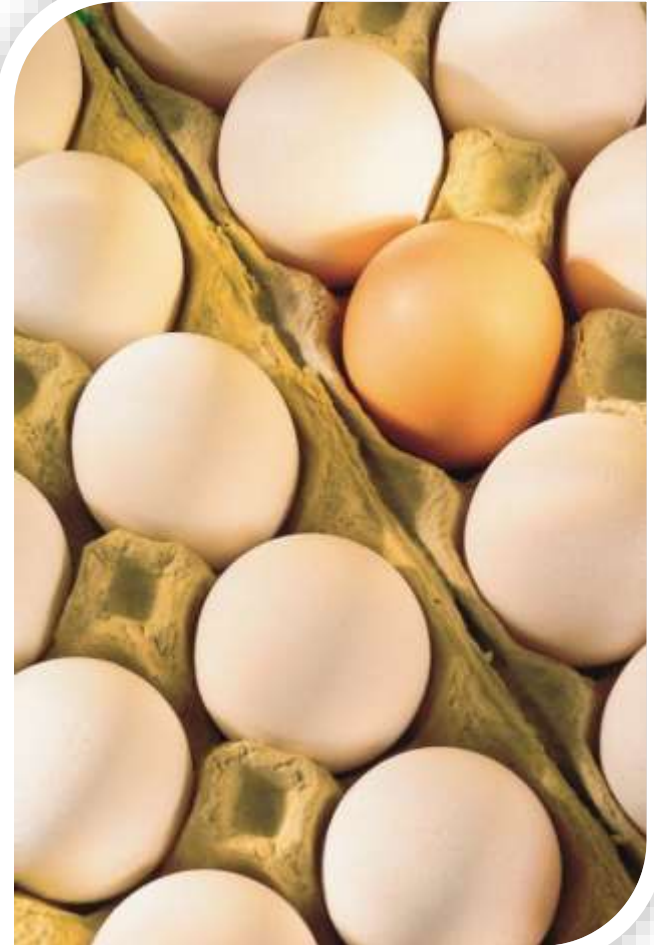
O&M

Available Space

Constituents

Cost

Staff



ODOR CONTROL TECHNOLOGY SELECTION

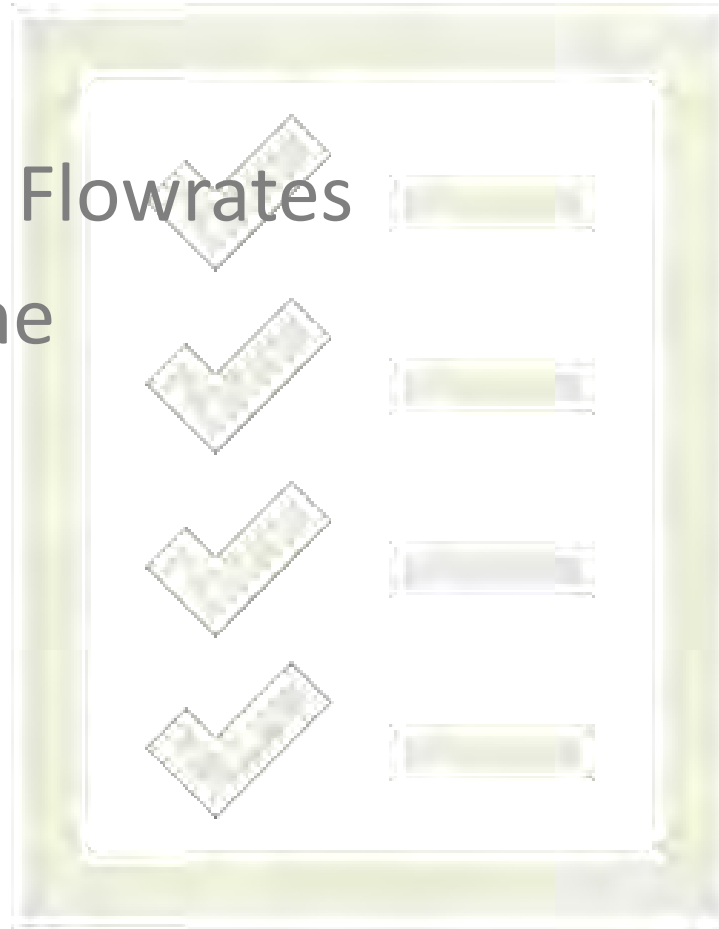
Design Considerations

Sampling

Volumes and Flowrates

Question Time

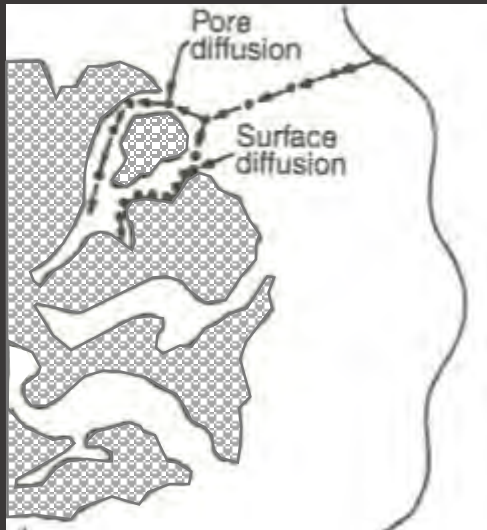
Technologies



Design Considerations

| TECHNOLOGY | EFFECTIVENESS |
|----------------------|----------------------------------|
| CHEMICAL SCRUBBERS | H ₂ S, Ammonia/Amines |
| CARBON ADSORBER | H ₂ S, VOCs, ORSCs |
| BIOFILTERS | H ₂ S, VOCs, ORSCs |
| BIOSCRUBBER | H ₂ S |
| BIOTRICKLING FILTERS | H ₂ S, VOCs, ORSCs |
| CHEMICAL ADDITION | H ₂ S |
| THERMAL PROCESSES | VOCs |

Technology Review



Carbon Adsorber

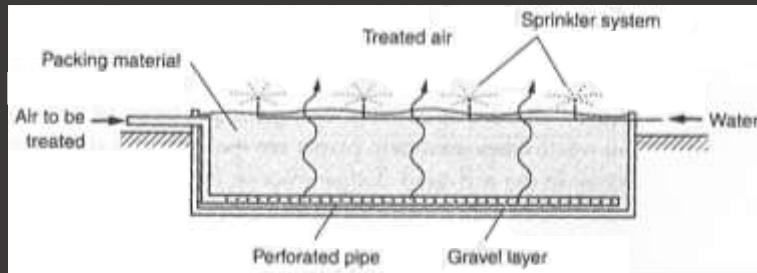
Features

- H₂S, VOCs and ORSCs
- Physical process
- No chemicals or feed water required
- Simple operation
- Carbon replacement
- Small footprint

Ideal applications

- Low to moderate concentrations
- Polishing

Technology Review



Biofilter

Features

- H₂S, VOCs and ORSCs
- Simple operation
- Irrigation system
- No chemicals required
- Large footprint
- Organic media (\$), engineered media (\$\$)

Ideal applications

- High organics
- Available footprint
- Goldilocks effect
- Moderate, consistent concentrations

Technology Review



Biotrickling Filter

Features

- Targets H_2S
- VOCs and ORSCs
- Small footprint
- Synthetic media
- Irrigation Required
- No chemicals required

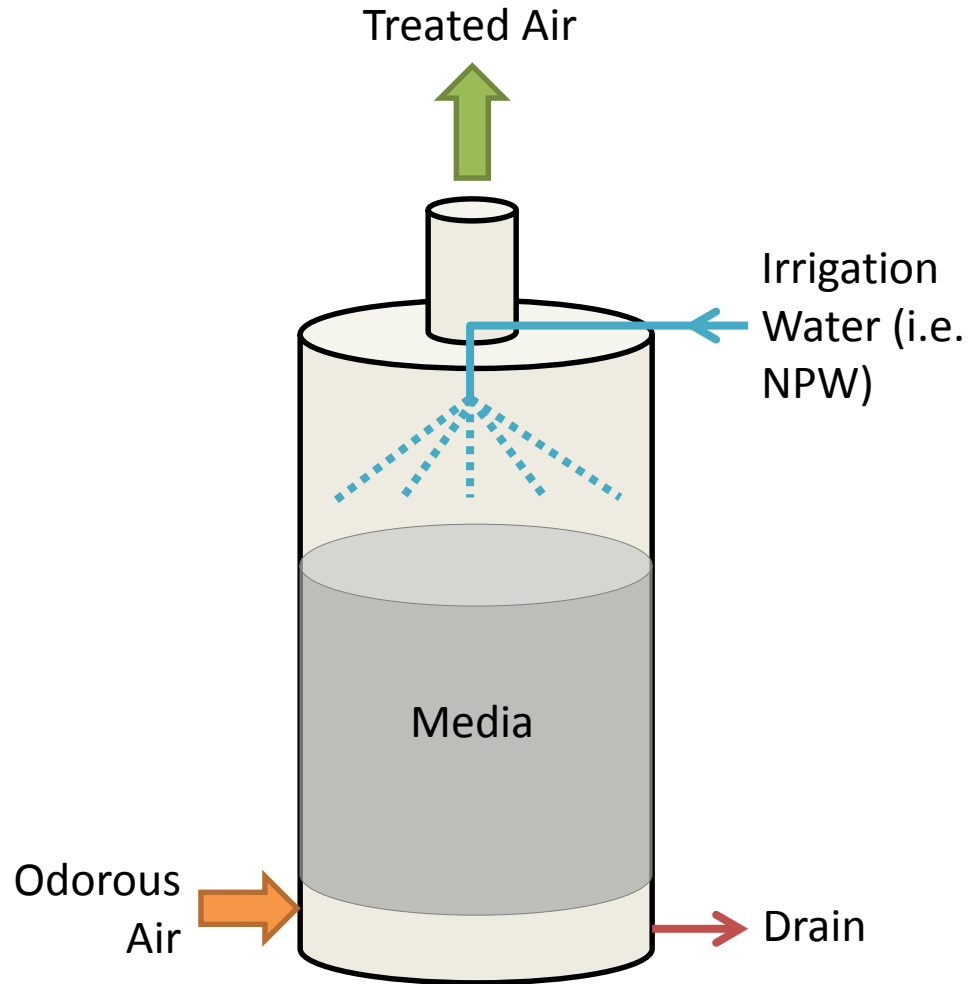
Ideal applications

- Large airflows
- Moderate to high concentrations



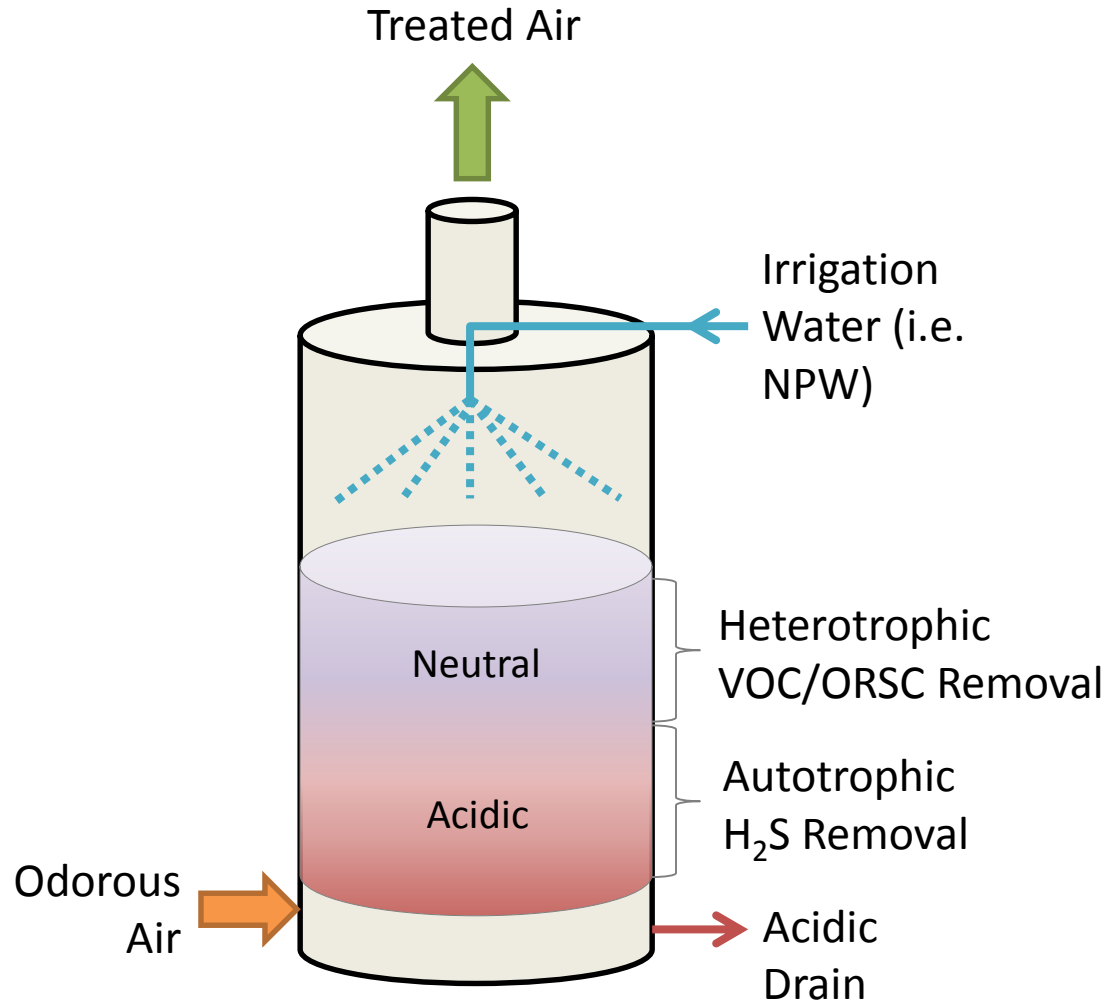
Technology Review

Biotrickling Filter



Technology Review

Biotrickling Filter



Technology Review



Bioscrubber

Features

- Targets H_2S
- Small footprint
- Synthetic media
- Irrigation Required
- No chemicals required

Ideal applications

- Large airflows
- Moderate to high concentrations

Technology Review

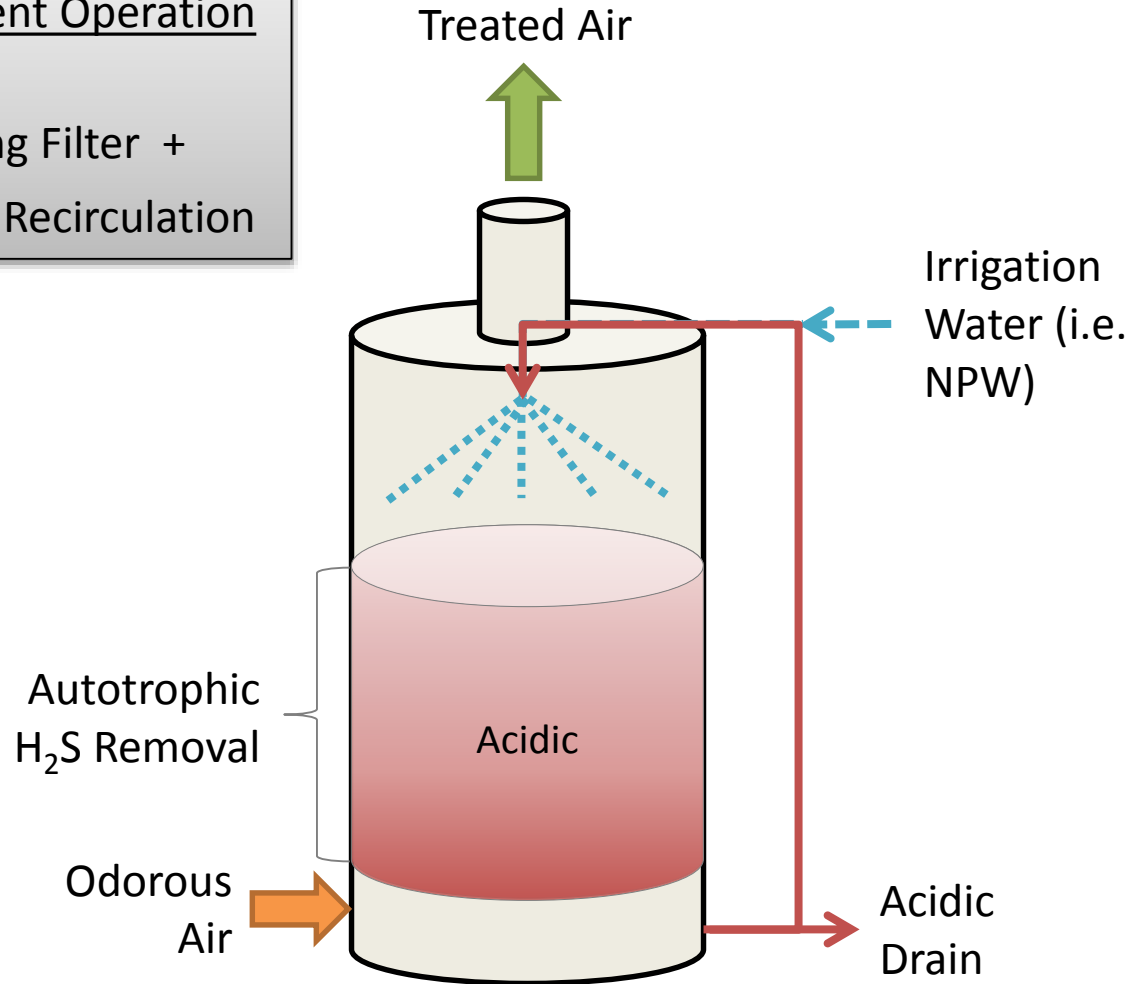
Bioscrubber

Same Tower, Different Operation

Bioscrubber =

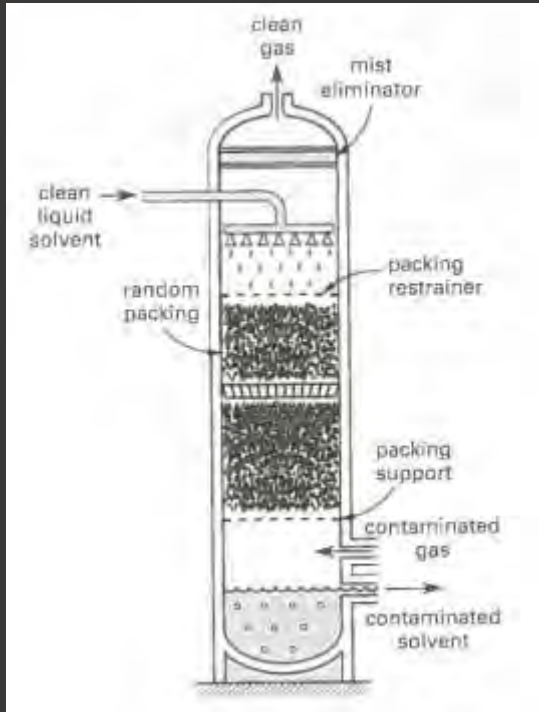
Biotrickling Filter +

Recirculation



Technology Review

Chemical Scrubber



Features

- H₂S and ammonia
- Small footprint
- Chemicals required
- Higher O&M
- Safety requirements

Ideal applications

- Fluctuating concentrations



Sodium hydroxide



Sodium hypochlorite

Technology Review

| Parameter | Carbon Adsorber | Biofilter | Biotrickling Filter | Bioscrubber | Chemical Scrubber |
|-----------------------------------|-----------------|-----------|---------------------|-------------|-------------------|
| Small Footprint | • | | • | • | • |
| Simpler Operation | • | • | | | |
| Lower Maintenance Cost | | • | • | • | |
| Lower Capital Cost | • | • | | | |
| WELL SUITED FOR: | | | | | |
| Low H ₂ S Conc | • | | | • | • |
| High H ₂ S Conc | | • | • | • | • |
| Fluctuating H ₂ S Conc | • | | | • | • |
| VOCs/ORSCs | • | • | • | | |
| NH ₃ /Amines | | | | | • |

Rules of Thumb

Don't know flow rate of foul odor?

12

air exchanges/hour

DISASTER
PLAN

1.

Rules of Thumb

Don't know constituents of odor?

Ask yourself a follow-up question:

➤ Where are you **treating**?

Collection Systems

Influent Pump Station

Headworks

Primary Clarifiers

Solids Handling

H₂S

H₂S / Ammonia & Amines

ORSCs / Ammonia & Amines

DISASTER
PLAN

Rules of Thumb

Don't know H₂S concentration for your WWTP?

15 mg/L – 25 mg/L

DISASTER
PLAN

1.

Rules of Thumb

Are you located in a sensitive area?

Consider **polishing**

DISASTER
PLAN

1.

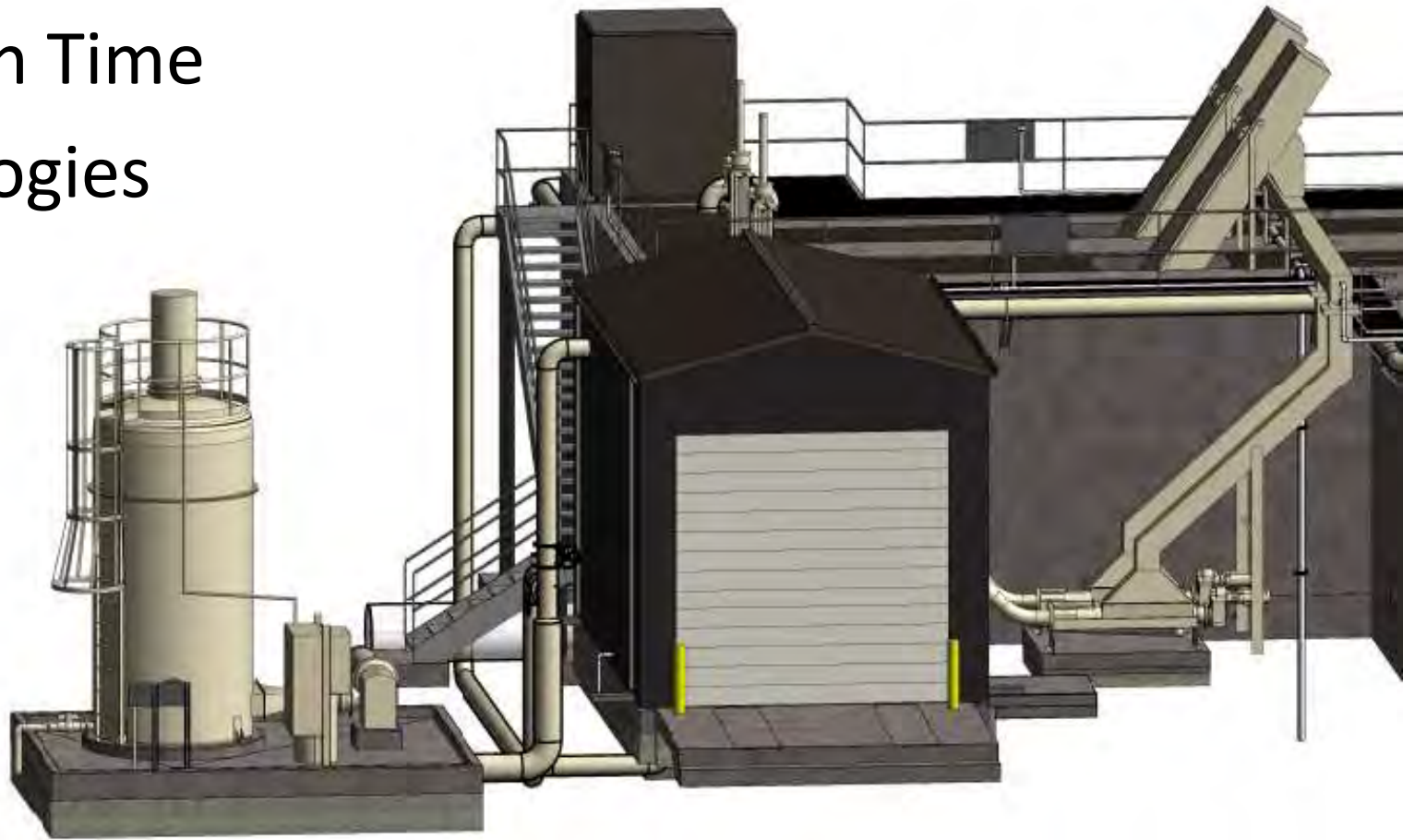
Summary

Sampling

Volumes and Flowrates

Question Time

Technologies



Acknowledgements



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Thank You



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