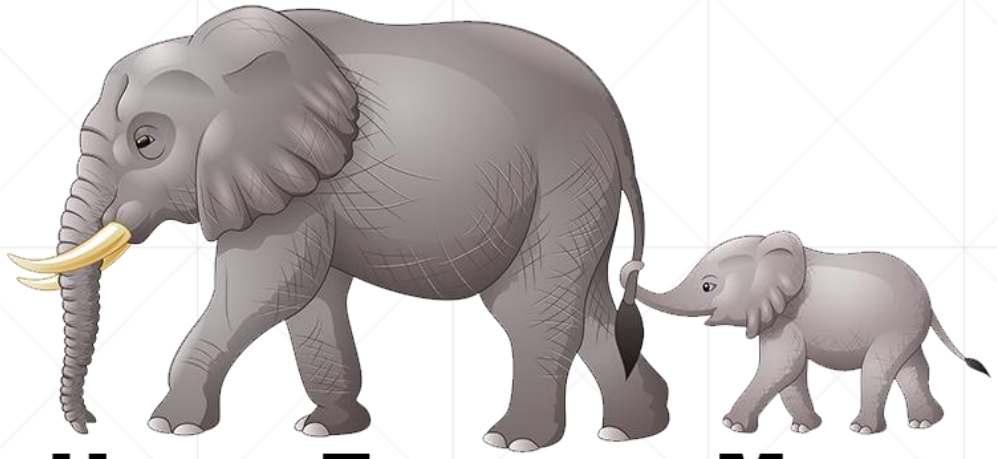
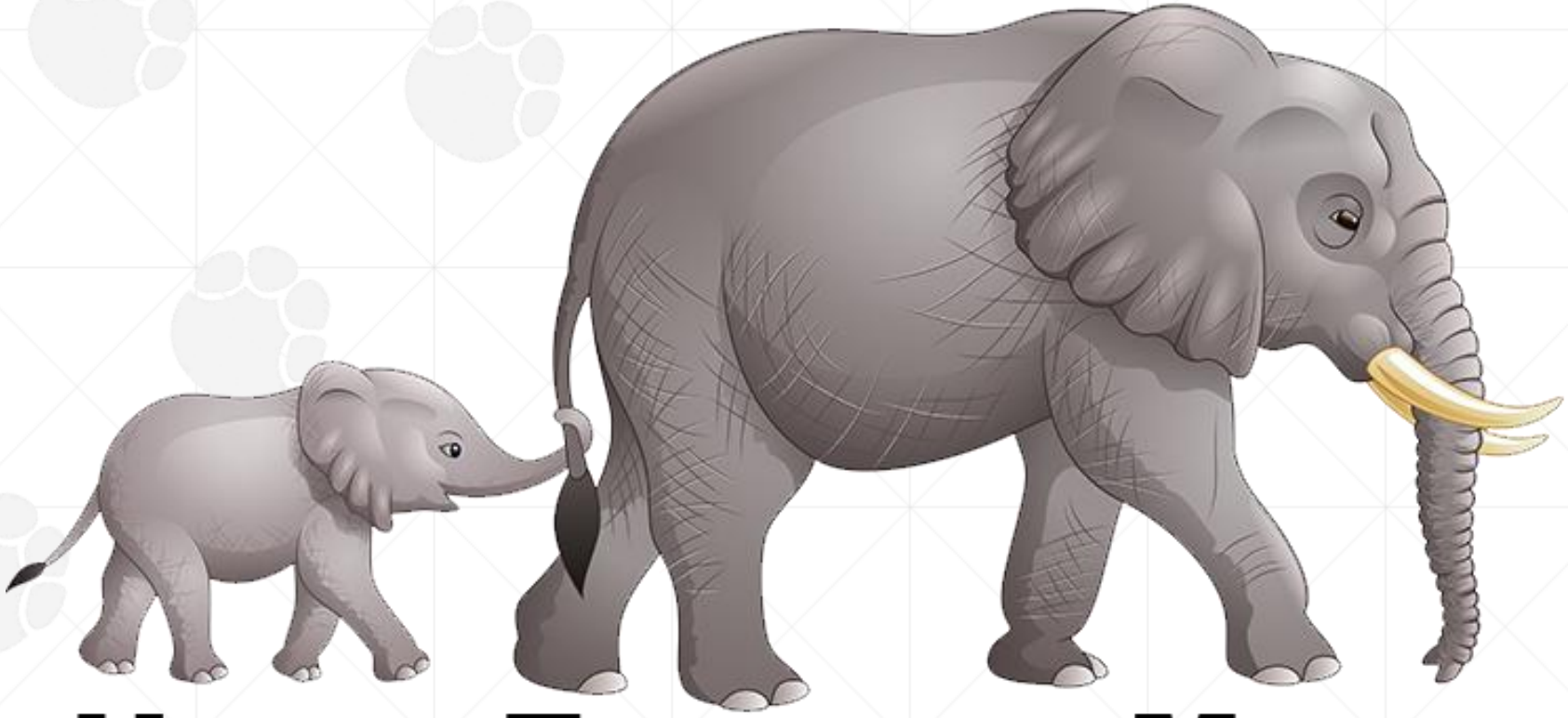
Thursday, September 18, 2025




# Source to Solution

## *Unison's 25 Years in Biogas*

Presented by Unison Solutions



# URBANELEPHANTMEDIA

PEER-TO-PEER LEARNING MADE EASY

## Sustainability Training for Urban Designers and Policymakers

**Randy Rodgers**, Director of Big Ideas
Randy@UrbanElephantMedia.com
**563-562-2925**

UrbanElephantMedia.com

# Our Sponsor

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# Our Presenters

**Adam Klass**
*Dir. Business Development*
*Unison Solutions*

# SOURCE TO SOLUTION:

## UNISON'S 25 YEARS IN BIOGAS

Celebrating
EMPLOYEE OWNED
25 YEARS

IQS INTEGRITY QUALITY SERVICE

IT'S THE PEOPLE, IT'S OUR CULTURE


UNISON
Employee Owned

# Overview

- Company founded on January 1, 2000
- Employee Owned: November 2020
- Over 420 systems sold worldwide
- 80 employees (12 engineers)
- 90,000 $ft^2$ manufacturing facility

# Proudly manufactured in the USA

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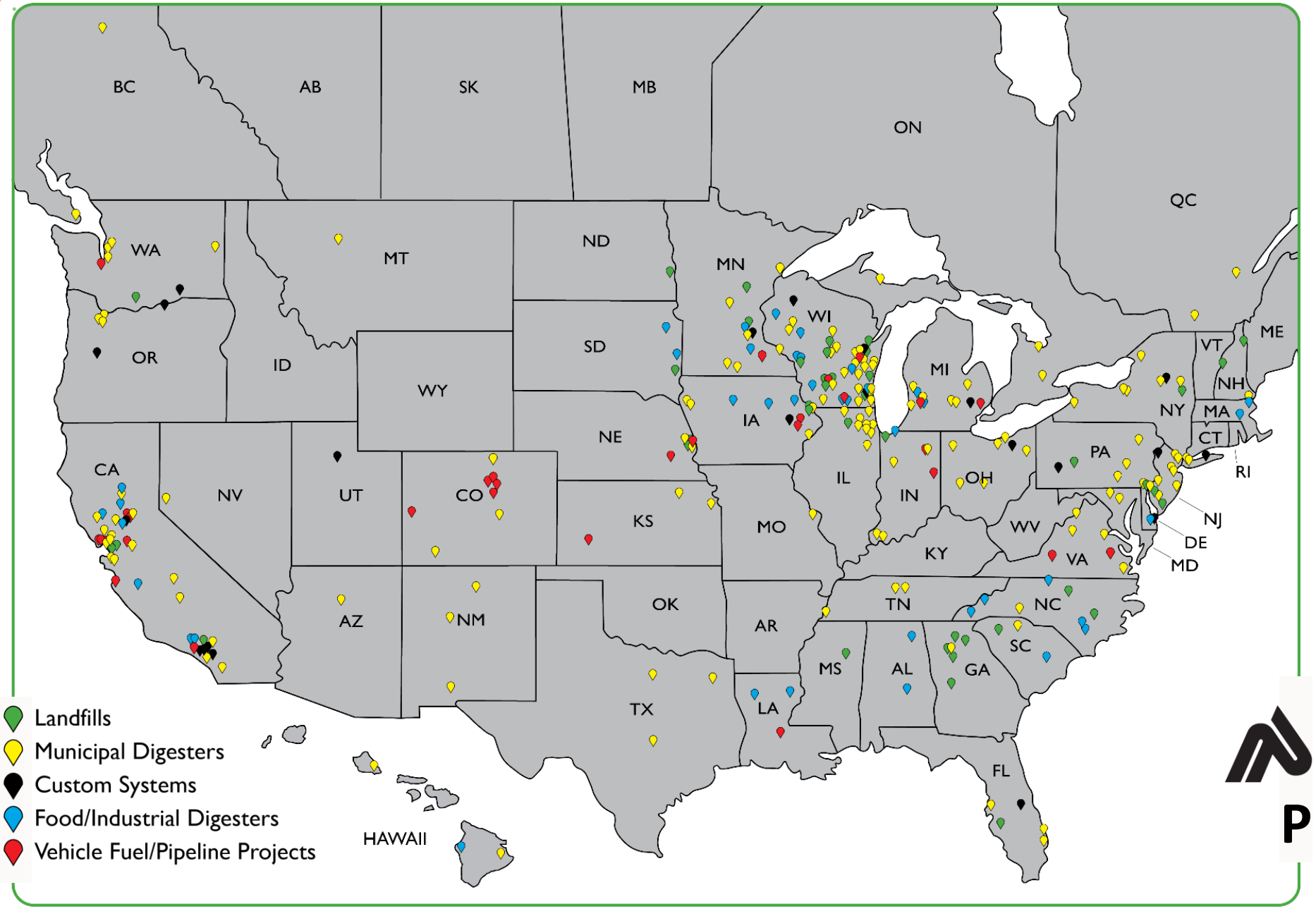


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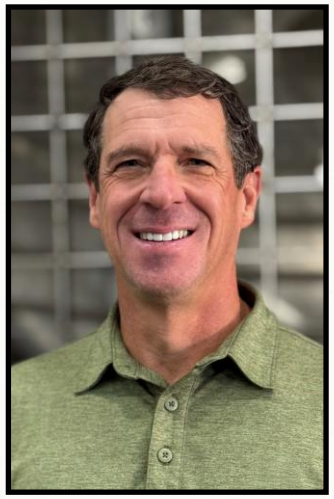
# Project Map

# from Foundation to Future



**Dave Broihahn, PE**
Retiring President/CEO
25 years

**Retiring Co-Founder/ President/CEO**
Dave Broihahn

**Cass Lundgren, MBA**
New President/CEO

**New President/CEO**
Cass Lundgren

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# Application and project development team

Our professional staff has over 100 years of combined experience in biogas applications

**Adam Klaas**
Director of Business Development
19 years

**Eric Wilgenbusch**
Applications Engineer
18 years

**Curt Schiesl**
Applications Engineer
7 years

**Nick Oberbroeckling**
Applications Engineer
6 years

# Aftermarket and service team

Our professional staff has over 100 years of combined experience in biogas applications

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**Kim Murdock-Timmerman**
Product Specialist & Service Manager
14 years

**Don Weeden**
Service Supervisor
17 years

**John Jacobs**
Inside Technical Support Technician
5 years

**Emma Hoefer**
Product Specialist
2 years

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# Engineering team

Our professional staff has over 100 years of combined experience in biogas applications

**Kevin Deiter, PE**
Engineering Manager
Mechanical Engineer
16 years

**Logan Udelhofen**
Mechanical Engineer
8 years

**Evan Carlson**
Mechanical Engineer
7 years

**Derek Venteicher**
Mechanical Engineer
2 years

**Liz Callaway**
Mechanical Engineer
Less than 1 year

**Charlie Fiegen**
Mechanical Engineer
Less than 1 year

# Starting an energy project

- Site conditions
- Inlet gas conditions (gas testing)
- End-use technology/discharge gas conditions
- Unison develops the solution from inlet to end-use

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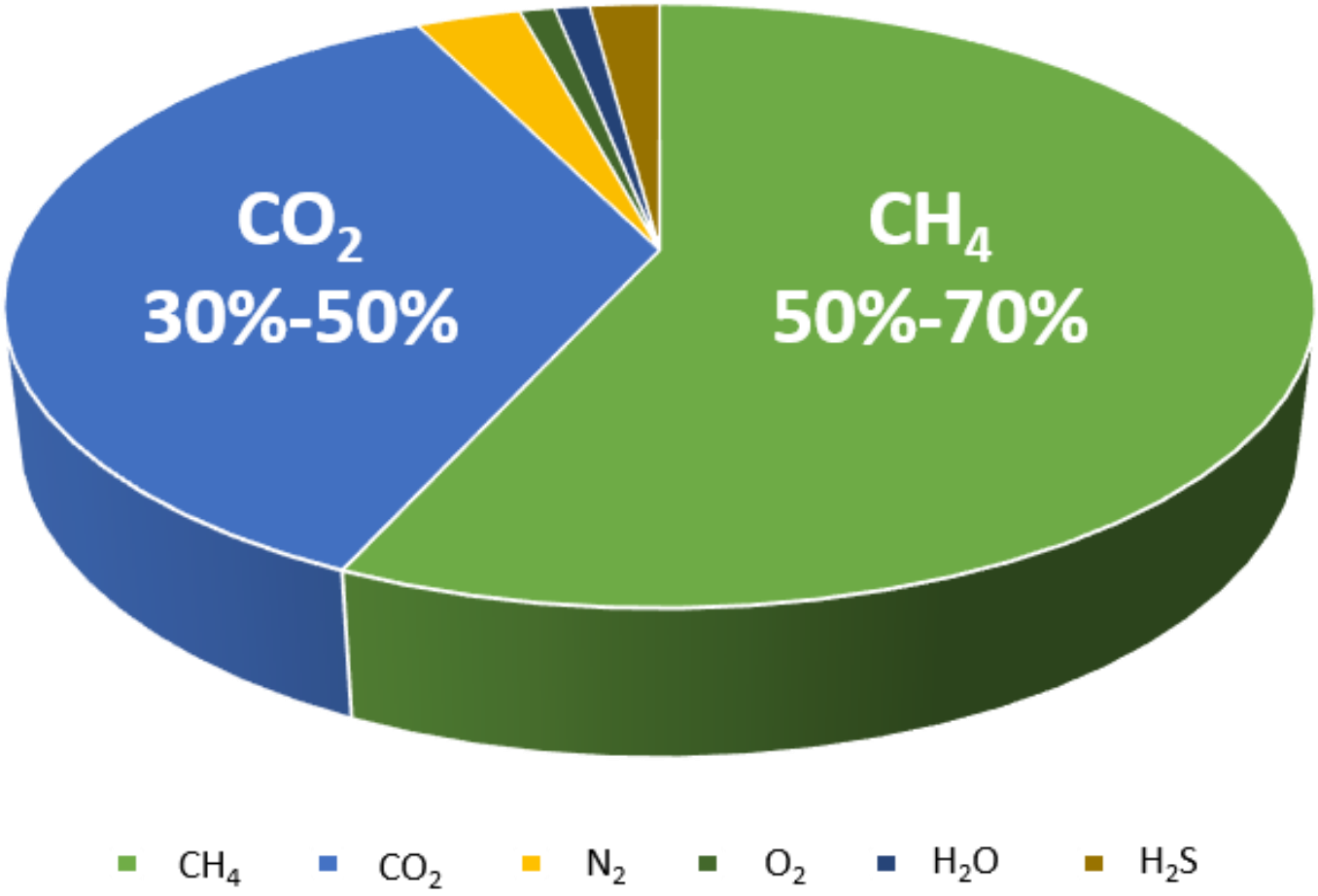
# Anaerobic digesters


# Biogas constituents




**bi·o·gas, ˈbīōˌgas/, *noun,* gaseous fuel, especially methane, produced by the fermentation of organic matter.**

- Methane, $CH_4$
- Carbon Dioxide, $CO_2$
- Nitrogen, $N_2$
- Oxygen, $O_2$
- Hydrogen Sulfide, $H_2S$
- Moisture
- Particulates
- Siloxanes
- Volatile Organic Compounds

# Gas sampling and shipping supplies

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Box with limited quantity label

Metal can, lid, and sealing ring

Flexible tubing

Hose barb fitting

Tedlar bag with valve

Chain of custody


Summa canister with fittings

**Before starting a project, we recommend the following biogas tests be performed:**

# Biogas testing

- **Major components:**
  Methane, Nitrogen, Oxygen, Carbon Dioxide, and Btu calculation
- **Siloxanes, by speciation:**
  Up to 8 compounds common to biogas
- **Sulfur compounds, by speciation:**
  Includes hydrogen sulfide, mercaptans, and other sulfide compounds
- **Volatile Organic Compounds, (VOC) by speciation:**
  Follows EPA TO-15 protocol

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# End use

- Flare/oxidizers
- Boiler/dryer
- Linear generators
- CHP
- Turbines
- Direct vehicle fuel
- Pipeline injection


# Getting the most out of your biogas


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# Biogas Conditioning System

Digester or landfill

## Biogas Conditioning System

$H_2S$ removal

Gas compression/ moisture removal

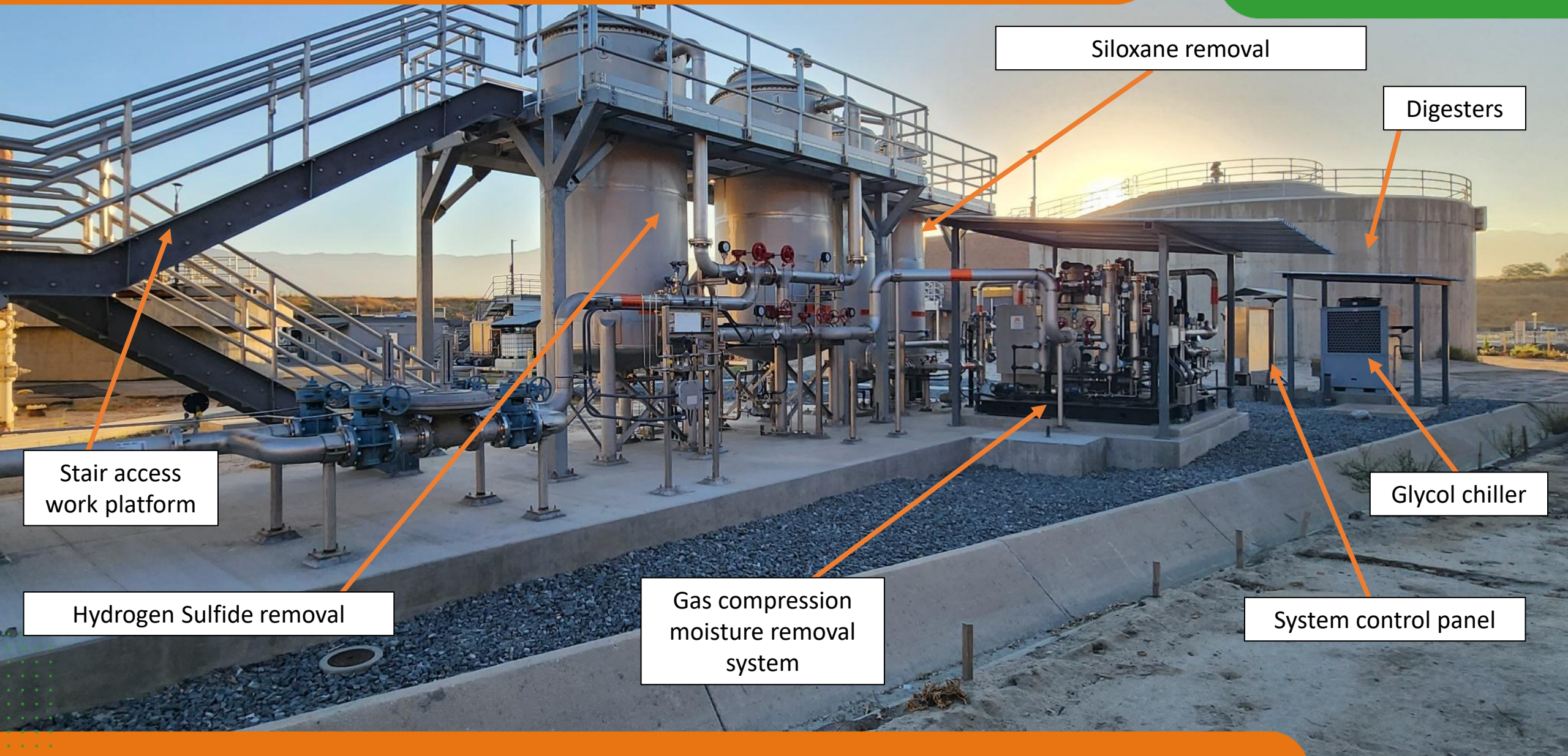
Siloxane/VOC removal

Turbines

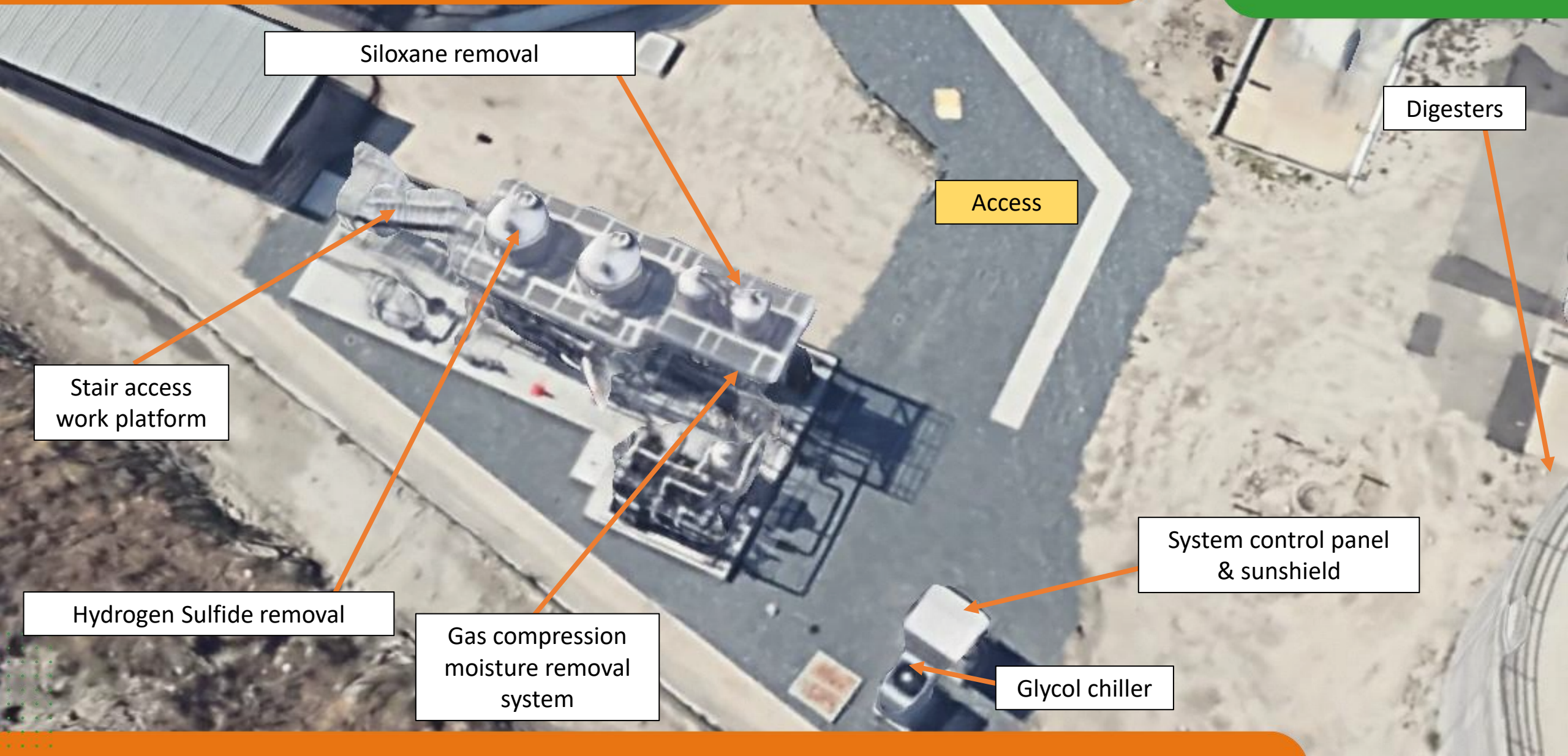
IC engines

Boilers

# Redlands WWTF, CA



# Redlands WWTF, CA



# Redlands WWTF, CA

- Warm weather installation
- Sound attenuation for blowers
- Analyzer for Hydrogen Sulfide monitoring
- Horizontal fire tube boilers

# Getting the most out of your biogas


Upgrading biogas to natural gas quality & injecting into the grid

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# Biogas Upgrading System: Process Flow Diagram

Digester or landfill

## Biogas Conditioning System

$H_2S$ removal

Gas compression/ moisture removal

Siloxane/VOC removal

$CO_2$ removal


CNG vehicle fueling station

IC engines

MicroTurbines

Boilers

Vehicle fuel/pipelines

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# Theresa Street WWTP, Lincoln

# Theresa Street WRRF, Nebraska

CITY OF LINCOLN NEBRASKA

BioCNG™

# Theresa Street WRRF, Nebraska

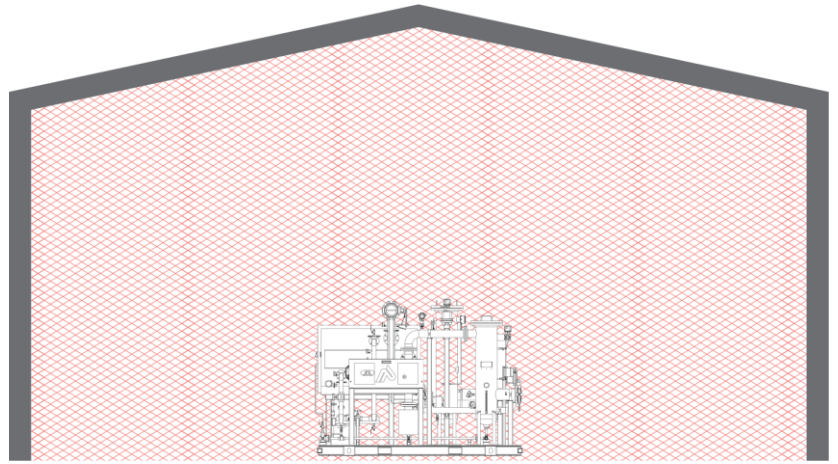
# NFPA 820 - Hazardous locations

Class I Division 1 Classified Area

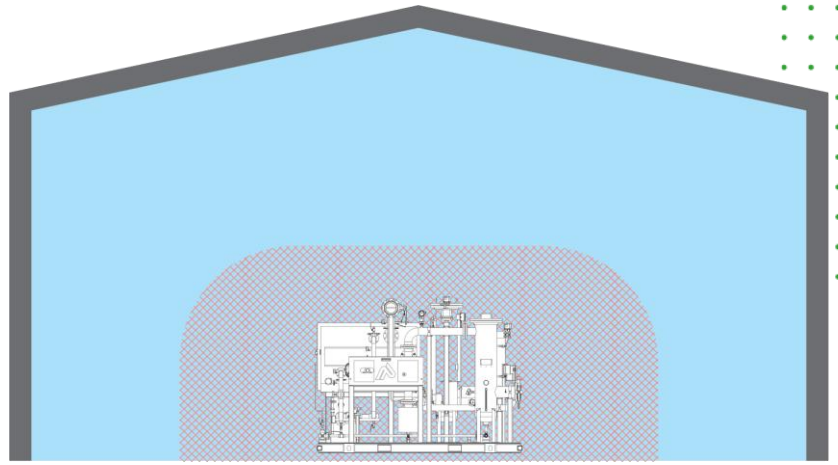
Class I Division 2 Classified Area

## Standard for Fire Protection at Wastewater Treatment Facilities

This room has no ventilation or is ventilated with less than 12 air changes per hour.



This room is continuously ventilated at 12 air exchanges per hour.
Class I Division 1 Classified area
(5’ envelope around gas processing equipment)



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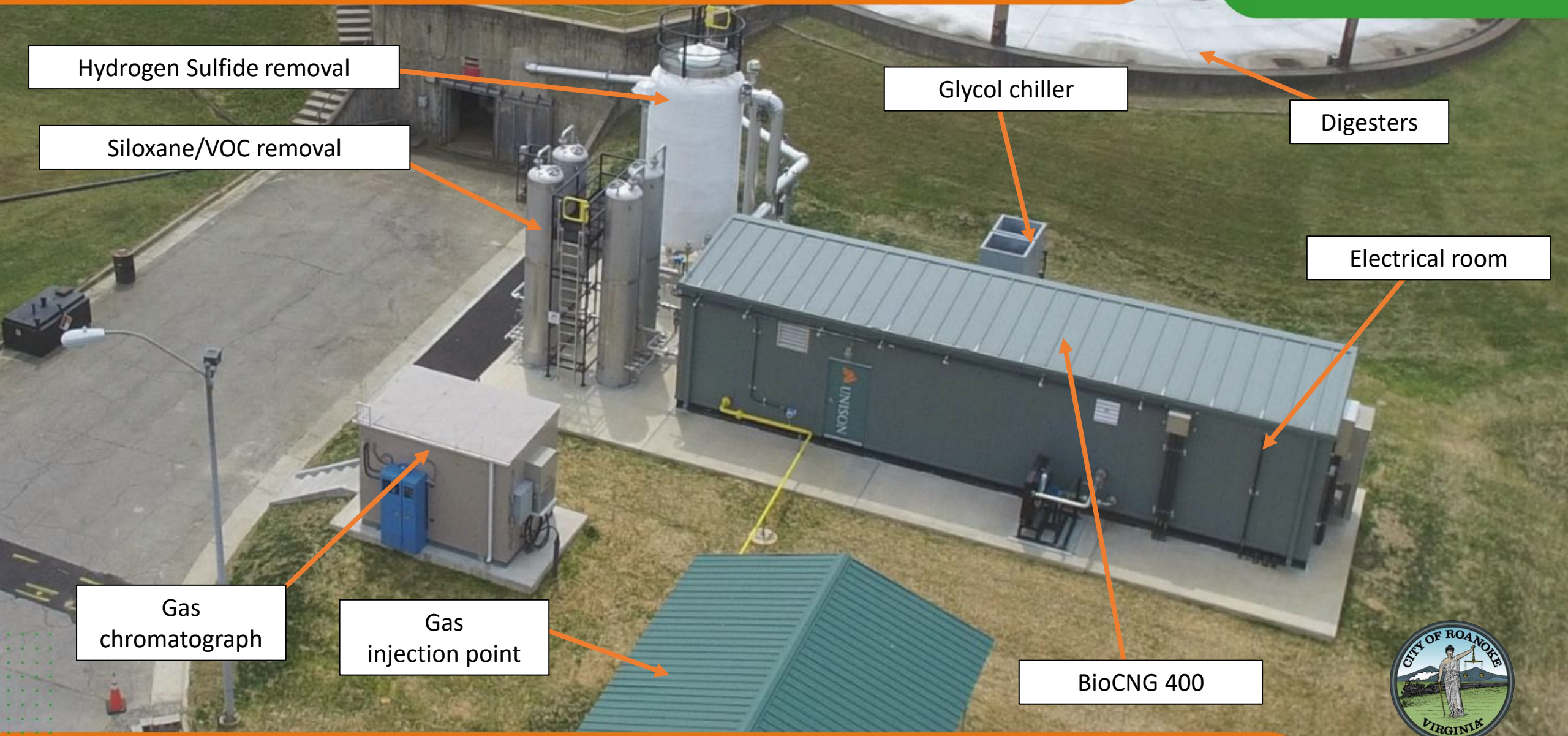
# Class I, Division 1 locations

- Locations where fire or explosion hazards exist due to flammable gases
  - Per NFPA 820, gas processing equipment shall be rated Class I Division 1 and located in a classified area


# Roanoke Gas


Hydrogen Sulfide removal
Siloxane/VOC removal
Glycol chiller
Digesters
Electrical room
Gas chromatograph
Gas injection point
BioCNG 400

# Enclosure benefits

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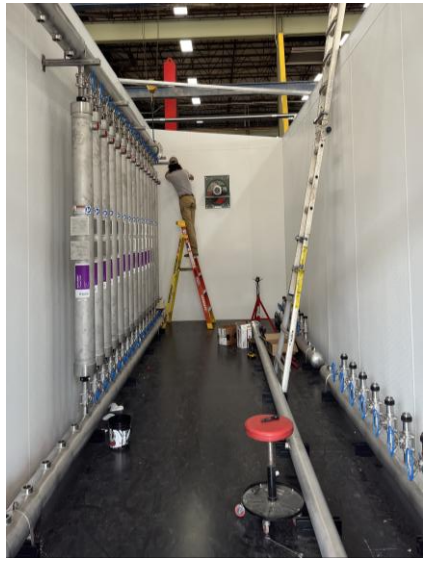
**Advantages of purpose-built enclosures**

- **Customization**
- **Higher quality cold weather protection**
- **Higher quality sound attenuation**
- **Ease of assembly**
- **Consistent quality control of product**
- **Price competitive**



# Enclosure options available

- Thermostatically controlled heater
- Ventilation fan and intake louvers to prevent overheating or for continuous ventilation per NFPA requirements
- Combustible gas detector (LEL) inside enclosure for gas detection and warning
- Explosion proof light fixtures
- Multiple points of entry

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# Enclosures with electrical rooms

# Kansas Ag Digester

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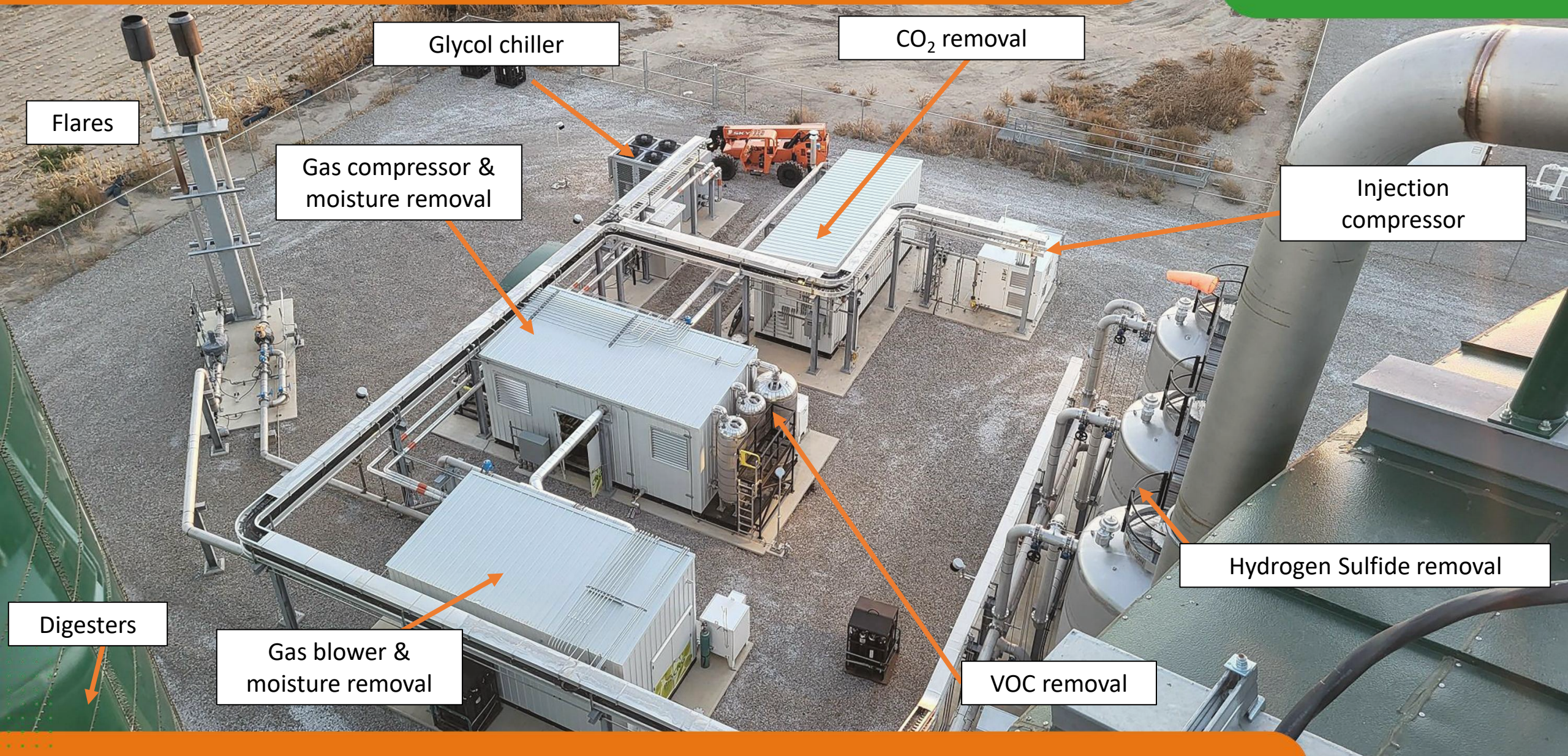
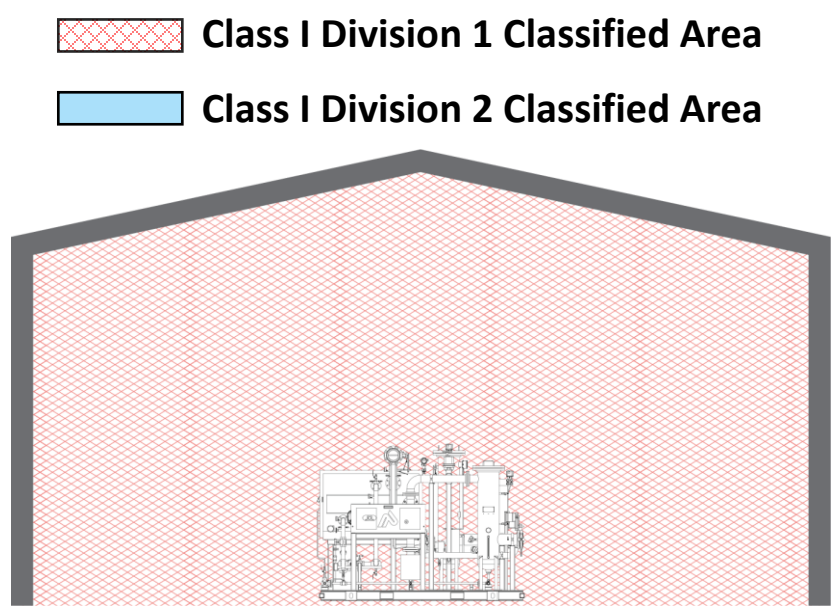


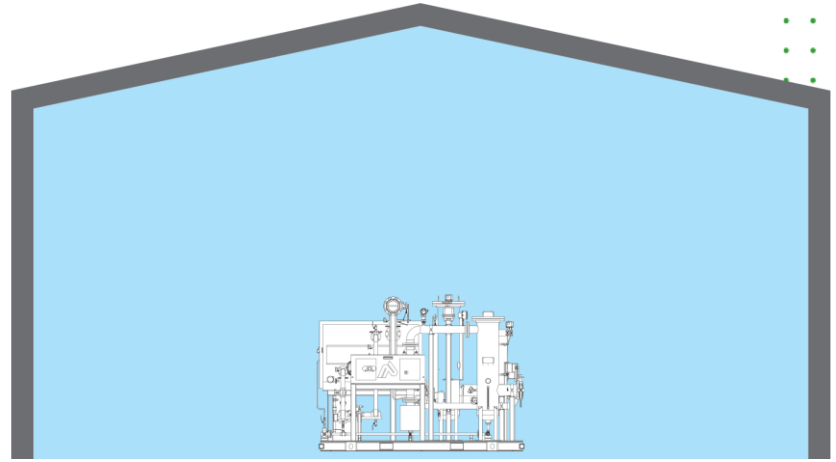
# NFPA 70 – Article 500

## National Electric Code

Class I, Division 1
Where gases exist under normal operating conditions




Class I, Division 2
Where gases are contained or prevented by positive mechanical ventilation



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# Meeting site requirements: explosion proof panels


698A

# RNG system with elevated levels of Hydrogen Sulfide

- Manure digester with elevated levels of Hydrogen Sulfide
- Lead/lag/polish assembly

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# Grand Rapids, MI

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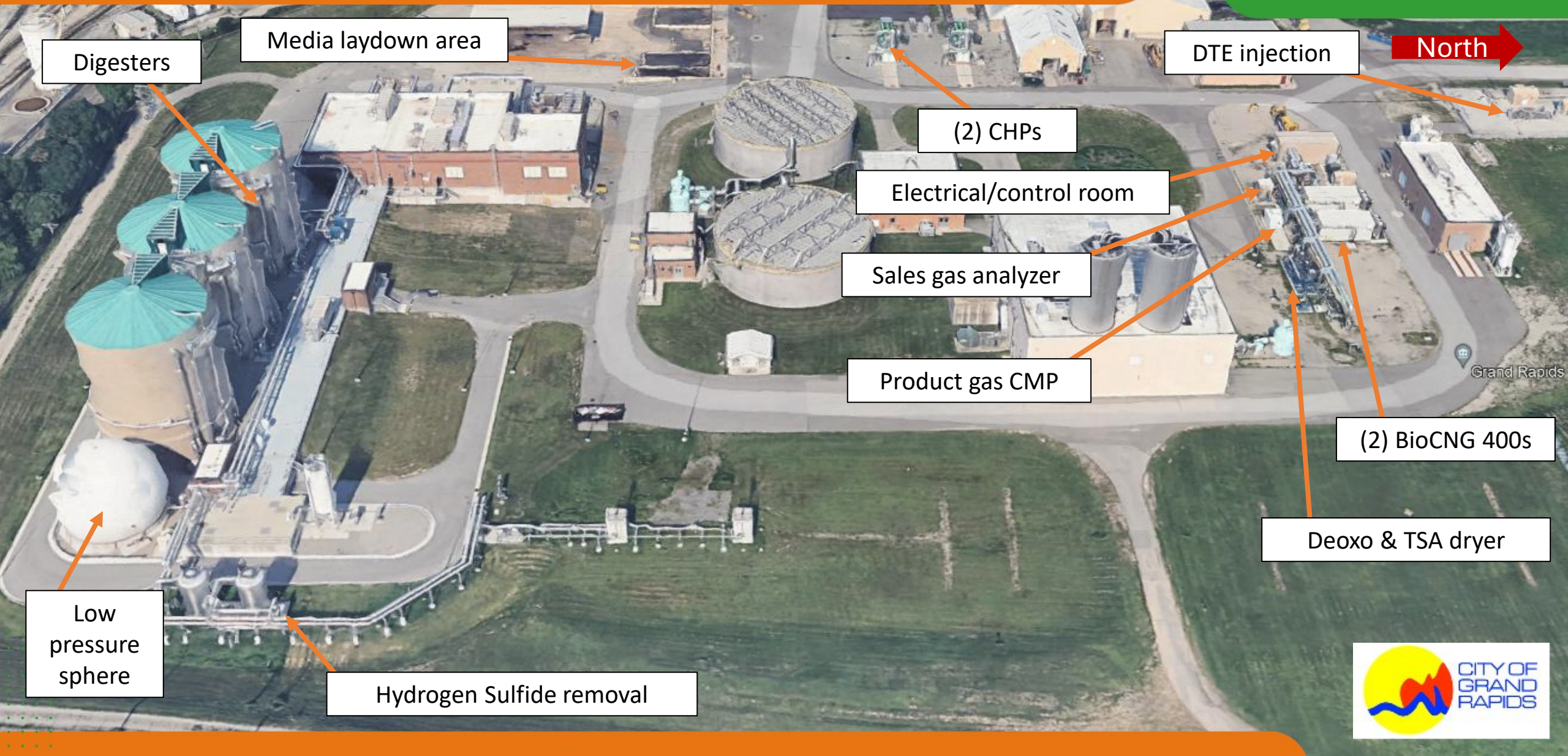


CITY OF GRAND RAPIDS

# Cold weather considerations

# Cold weather considerations

- Cold climates
  - Wet gas piping and vessels containing saturated gas should be insulated and heat traced

# Grand Rapids, MI

# System serviceability-system access


- Access to media removal vessels for media removal
- Vacuum truck & variable reach forklift for loading

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# Media changes


# System serviceability-media changes


- Laydown area – concrete
- Drain to assist dewatering media

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# Ongoing system services

- Operational assistance
- Service and maintenance
- Media change-outs and optimization
- Gas testing



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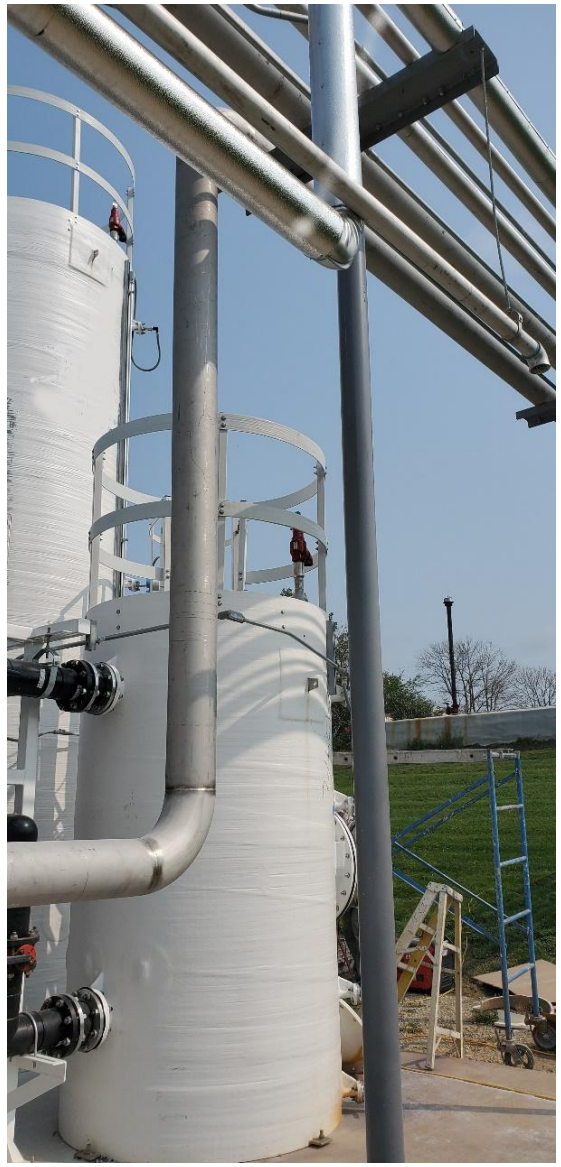
# Field evaluation services

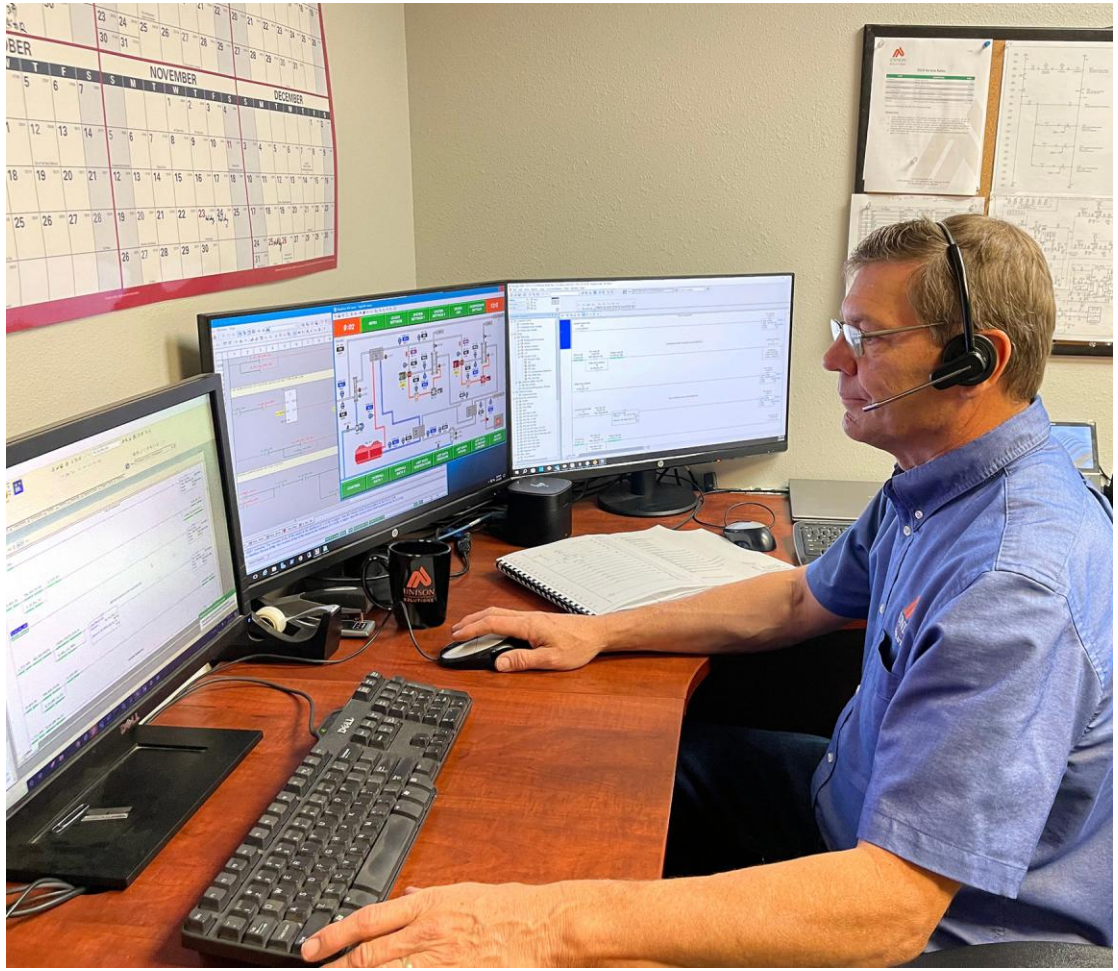


- System review
- Refurbish older systems

# Maintenance

- Chiller fan cleaning
- Oil cooler fan cleaning
- Maintain gas & oil filters
- Clean strainers
- Compressor oil changes
- Calibrate gas analyzers

# Remote & onsite support services





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# On-site training

- Classroom overview
- P&ID review
- System walk-through
- Live system run
- System maintenance


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*Thank you*

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**SEPTEMBER 23-25**

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# Questions?

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