

Methane Regulation Update



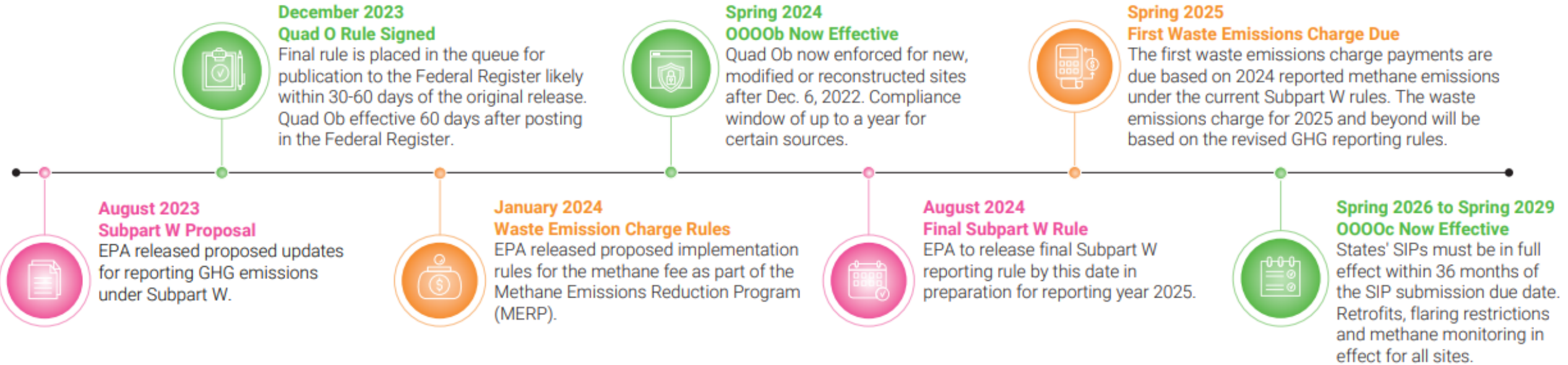
Association of Air Pollution Control Agencies Spring Meeting



- David Uhlmann delivered lunch address
 - Assistant Administrator, U.S. EPA Office of Enforcement & Compliance Assurance.
 - Director of the Environmental Law and Policy Program at the University of Michigan Law School from 2007 to 2022.
 - Served at the U.S. Department of Justice, the last seven years as chief of the Environmental Crimes Section from 1990 to 2007.
 - Focused on increasing Civil and Criminal enforcement for companies violating environmental laws.
 - Intent of reducing the time from initiating an investigation to closing through the court system.
- Many other states are concerned about implementation of OOOOc because resources are not available.
 - Ohio expected to need to hire 100 inspectors and increase their budget by \$16M/yr.



Federal Methane Actions



Source | Enverus Intelligence® Research

- Expectation is high producing wells will absorb cost; marginal wells will be plugged.
- ~300,000 marginal wells will be plugged.
- Upgrading flares and controllers is estimated to cost \$11.2B.
- Fugitive emissions monitoring is expected to cost \$765M/yr.
- Reporting and recordkeeping is expected to cost \$94M/yr.
- \$350M is available to support plugging wells; estimated cost to plug marginal wells is \$32B.



Methane Tax Summary (Waste Emission Charge)



- On January 12th, 2024, EPA released the “Methane Tax”
- KOGA submitted comments to identify areas of concern.
- The Methane Tax was created in 2021 by the US Congress in the Inflation Reduction Act (IRA).
- Methane Tax fee structure is based on the mass of methane released above the regulatory threshold of 25,000 metric tons of carbon dioxide equivalents per year:
 - 2024 - \$ 900
 - 2025 - \$1,200
 - 2026 - \$1,500 (and beyond)
- EPA has estimated that the program will result in \$390 million in compliance costs and tax payments after accounting for methane mitigation
- EPA is estimating that taxes paid will decline year-over-year, even with an increasing tax rate, because operators will be reducing emissions from their facilities.
- Part of the IRA provides \$1 billion for EPA and the Department of Energy (DOE) to support operators through the reduction of emissions.
- EPA has updated their reporting process (Subpart W) with information about how the emissions are to be calculated from each facility.
- All information will be reported through the Green House Gas Reporting Program (GHGRP).
- WEC is due on the same day that your report is due.



What Does the OOOOabc Cover?

- Leak Detection and Repair
- Associated Gas from Oil Wells
- Storage Tanks
- Closed Vent Systems and Control Devices
- Compressors
- Liquids Unloading
- Process Controllers and Pumps
- Record Keeping and Reporting



Areas of Concern



- Facility/wellsite definitions
 - EPA's definitions are so broad that many production wells will require more rigorous monitoring.
 - All wells will require monitoring.
- Pneumatic controllers and pneumatic pumps (Process Controllers and Pumps)
 - EPA eliminated controllers and pumps that vent to a combustion system because they still create emissions.
 - Many controllers have been converted to "low bleed" systems over the past 5-10 years, new regulation requires replacement of these devices.
- Eliminating the ability to flare associated gas
 - There is no economic consideration provided, only technical infeasibility.
- The Super Emitter program
 - Considers operators guilty until they prove themselves innocent through an investigation.
 - Industry is concerned with the response time by EPA.
 - Company's name published to an EPA website.

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Monitoring Requirements

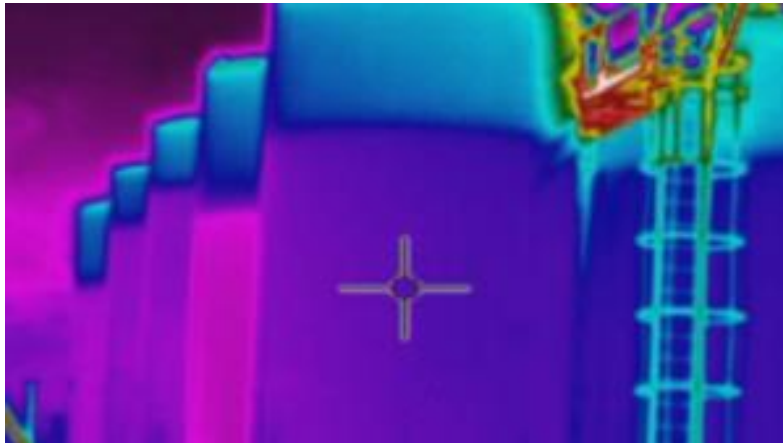
Affected Source	Monitoring Requirement	Performance Standard
<u>Single Wellhead Only Well Sites and Small Well Sites</u>	<u>Quarterly AVO</u> monitoring surveys	Quarterly AVO surveys. First attempt at repair within 15 days. Final repair within 15 days. Fugitive monitoring continues for all well sites until the site has been closed, including plugging the wells at the site and submitting a well closure report.
<u>Multi-wellhead Only Well Sites</u> (2 or more wellheads)	<u>Quarterly AVO</u> monitoring surveys <u>AND</u> Monitoring and repair based on <u>semiannual monitoring using OGI</u>	Quarterly AVO surveys. First attempt at repair within 15 days. Final repair within 15 days. Semiannual OGI monitoring (Optional semiannual Method 21). First attempt at repair within 30 days. Final repair within 30 days. Fugitive monitoring continues for all well sites until the site has been closed, including plugging the wells at the site and submitting a well closure report.
<u>Well Sites with Major Production and Processing Equipment and Centralized Production Facilities</u>	<u>Bimonthly AVO</u> (OOOOB) and <u>Monthly AVO</u> (OOOOC) monitoring surveys (every other month) <u>AND</u> Monitoring and repair based on <u>quarterly monitoring using OGI</u>	Bimonthly (OOOOB) and Monthly (OOOOC) AVO surveys. First attempt at repair within 15 days . Final repair within 15 days. AND Well sites with specified major production and processing equipment: Quarterly OGI monitoring. (Optional quarterly Method 21). First attempt at repair within 30 days. Final repair within 30 days. Fugitive monitoring continues for all well sites until the site has been closed, including plugging the wells at the site and submitting a well closure report.
Compressor Stations	<u>Monthly AVO</u> monitoring surveys <u>AND</u> Monitoring and repair based on <u>quarterly monitoring using OGI</u>	Monthly AVO surveys. First attempt at repair within 15 days. Final repair within 15 days. AND Quarterly OGI monitoring. (Optional quarterly Method 21). First attempt at repair within 30 days. Final repair within 30 days.

Monitoring Method Comparison



Optical Gas Imaging (OGI)

- Detection Limit: 10,000 ppm
- Monitoring Time: Low-Moderate
- Cost: High
- Technical Competence: High



Method 21

- Detection Limit: 500 ppm
- Monitoring Time: High
- Cost: Low-Moderate
- Technical Competence: Moderate



Emissions Controls

Affected Source	Monitoring Requirement	Performance Standard
A Single Storage Vessel or Tank Battery with PTE of 6 tpy or more of VOC or PTE of 20 tpy or more of methane	Capture and route to a control device	95 percent reduction of VOC and methane.
Process Controllers: Natural Gas-driven	Use of zero-emissions controllers	VOC and GHG (methane) emission rate of zero.
Pumps: Natural gas-driven	Use of zero-emissions pumps	GHG (methane) and VOC emission rate of zero.
Pumps: Natural gas-driven (at sites where onsite power is not available and there are fewer than 3 diaphragm pumps)	Use of an existing VRU or control device	Route pump emissions to a process if VRU is onsite, or to control device if onsite.
Liquids Unloading	Best management practices to minimize or eliminate methane and VOC emissions to the maximum extent possible	Perform best management practices to minimize or eliminate methane and VOC emissions to the maximum extent possible from liquids unloading events that vent emissions to the atmosphere.

Pneumatic Pumps and Process Controllers:

Colorado ... defines a “non-emitting” controller as “a device that monitors a process parameter such as liquid level, pressure or temperature and sends a signal to a control valve in order to control the process parameter and does not emit natural gas to the atmosphere.

Examples of non-emitting controllers include but are not limited to no-bleed pneumatic controllers, electric controllers, mechanical controllers and routed pneumatic controllers.” A routed pneumatic controller is defined as “a pneumatic controller that releases natural gas to a process, sales line or to a combustion device instead of directly to the atmosphere.

EPA defines the difference between non-emitting and zero emissions as process controllers that capture and route emissions to a combustion device do not have zero emissions. Therefore, routing emissions to a combustion device is not an option for compliance with this standard.

Associated Gas

Affected Source	Monitoring Requirement	Performance Standard
OOOOb: New Wells with Associated Gas <u>after</u> <u>May 7, 2026</u>	Route associated gas to a sales line	1.) Route associated gas to a sales line 2.) Used for another useful purpose that a purchased fuel, chemical feedstock or raw material would serve 3.) Recovered from the separator and reinjected into the well or injected into another well
OOOOb: New wells with Associated Gas <u>between May 7, 2024, and May 7, 2026</u>	Route associated gas to a sales line	1.) Route associated gas to a sales line; 2.) Used for another useful purpose that a purchased fuel, chemical feedstock, or raw material would serve 3.) Recovered from the separator and reinjected into the well or injected into another well. If <u>demonstrated, and documented annually</u> , that routing to a sales line and the alternatives are not technically feasible, the associated gas can be <u>routed to a flare or other control device</u> that achieves at least 95 percent reduction in GHG (methane) and VOC emissions. A second infeasibility determination <u>may not extend beyond 24 months</u> from effective date.

Associated Gas

Affected Source	Monitoring Requirement	Performance Standard
OOOOb: New Wells with Associated Gas <u>after December 6, 2022, and before May 7, 2024</u>	Route associated gas to a sales line	1.) Route associated gas to a sales line 2.) Used for another useful purpose that a purchased fuel, chemical feedstock, or raw material would serve 3.) Recovered from the separator and reinjected into the well or injected into another well. If <u>demonstrated, and documented annually</u> , that routing to a sales line and the alternatives are not technically feasible, the associated gas can be <u>routed to a flare or other control device</u> that achieves at least 95 percent reduction in GHG (methane) and VOC emissions.
OOOOb: Wells with Associated Gas Reconstructed or Modified <u>after December 6, 2022</u>	Route associated gas to a sales line	1.) Route associated gas to a sales line 2.) Used for another useful purpose that a purchased fuel, chemical feedstock, or raw material would serve 3.) Recovered from the separator and reinjected into the well or injected into another well. If <u>demonstrated, and documented annually</u> , that routing to a sales line and the alternatives are not technically feasible, the associated gas can be <u>routed to a flare or other control device</u> that achieves at least 95 percent reduction in GHG (methane) and VOC emissions.

Associated Gas

Affected Source	Monitoring Requirement	Performance Standard
OOOOC: Wells with Associated <u>Gas greater than 40 tpy methane</u>	Route associated gas to a sales line	1.) Route associated gas to a sales line 2.) Used for another useful purpose that a purchased fuel, chemical feedstock, or raw material would serve 3.) Recovered from the separator and reinjected into the well or injected into another well. If <u>demonstrated, and documented annually</u> , that routing to a sales line and the alternatives are not technically feasible, the associated gas can be <u>routed to a flare or other control device</u> that achieves at least 95 percent reduction in GHG (methane) and VOC emissions.
OOOOC: Wells with Associated Gas <u>40 tpy methane or less</u>	Route associated gas to a flare or other control device that achieves at least 95 percent reduction in methane emissions	1.) Route associated gas to a sales line. 2.) Used as an onsite fuel source or used for another useful purpose that a purchased fuel or raw material would serve 3.) Injected into the well or another well. Alternatively, the gas can be routed to a flare or other control device that achieves at least 95 percent reduction in methane emissions.

Well Site Definition

The fourth subcategory, small well sites, includes single wellhead well sites that do not contain any controlled storage vessels, control devices, natural gas-driven process controllers, or natural gas-driven pumps and contain only one piece of certain major production and processing equipment. Major production and processing equipment that would be allowed at a small well site would include a SINGLE separator, glycol dehydrator, centrifugal or reciprocating compressor, heater/treater, or A storage vessel that is not controlled.



Financial Impact Without Methane Rules



WTI Price:	\$80.00/bbl
ILB Crude Price:	\$73.00/bbl
Daily Production:	1 bbl
Net Revenue Interest:	80%
Net Revenue to Owner:	\$58.40
Taxes:	\$ 2.66
Gross Revenue:	\$55.74
Expenses	
Lifting Cost:	\$35.00
Selling, General, & Admin.:	<u>\$15.00</u>
Total Expenses:	\$50.00
Non-Routine Costs:	\$ 1.00
Taxable Income:	\$ 4.74
Income Tax Due (22%):	<u>\$ 1.04</u>
After Tax Income:	\$ 3.70

Financial Impact With Methane Rules

WTI Price:	\$80.00/bbl
ILB Crude Price:	\$73.00/bbl
Daily Production:	1 bbl
Net Revenue Interest:	80%
Net Revenue to Owner:	\$58.40
Taxes:	\$ 2.66
Gross Revenue:	\$55.74
Expenses	
Lifting Cost:	\$35.00
Selling, General, & Admin.:	\$15.00
Compliance Costs:	<u>\$ 5.10</u>
Total Expenses:	\$55.10
Non-Routine Costs:	\$ 1.00
Taxable Income:	\$ (0.36)
Income Tax Due (22%):	<u>\$ (0.08)</u>
After Tax Income:	\$ (0.28)



What is in the Compliance Cost?



WTI Price:	\$80.00/bbl
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Reporting and Record Keeping:

Annual Cost = \$94,000,000/yr

Number of Companies = 9,000 (source: IPAA)

$\$94,000,000 / 9,000 \text{ companies} = \$10,444 / \text{company per yr}$

Assume each company operates 10 wells

Annual Production = 3,650 barrels

$\$10,444 \text{ reporting cost} / 3,650 \text{ barrels} = \mathbf{\$2.86/bbl}$

Fugitive Emissions Monitoring:

Annual Cost = \$765,000,000/yr

Number of Producing Wells = 937,000 (Source: EIA)

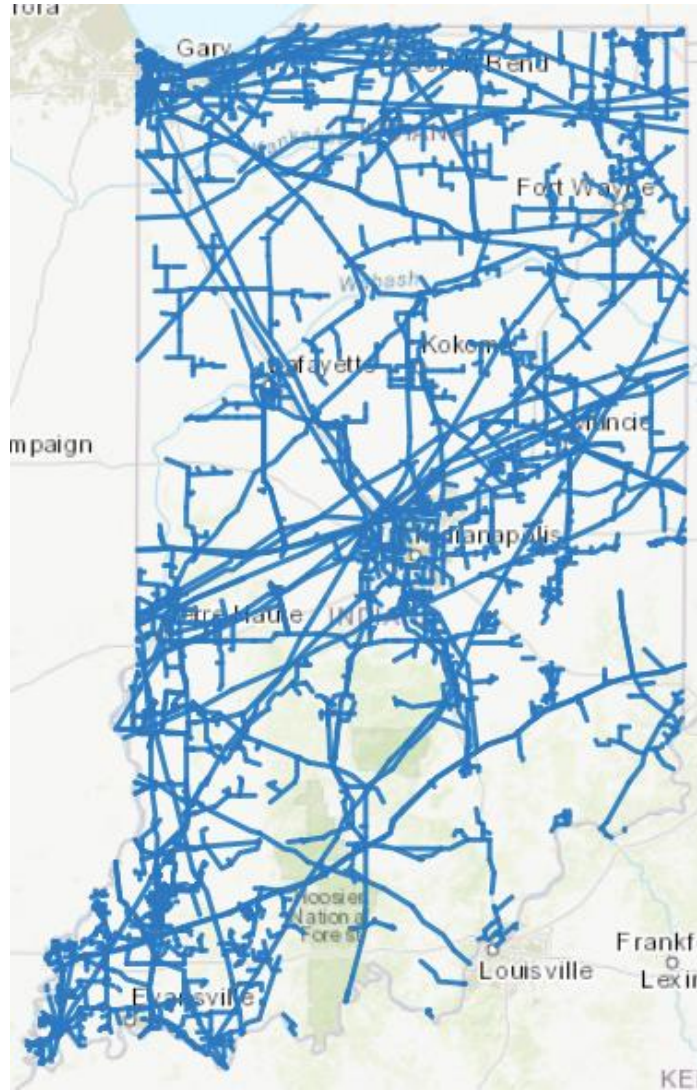
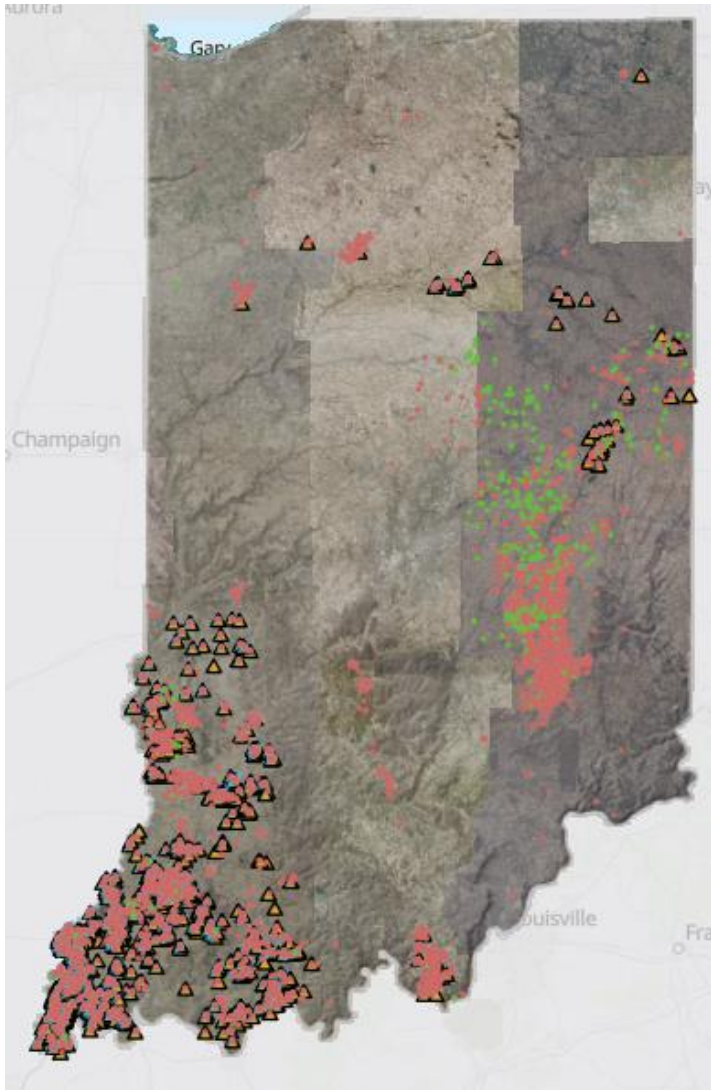
$\$765,000,000 \text{ per yr} / 937,000 \text{ wells} = \$816 / \text{well per yr}$

Annual Production = 365 barrels

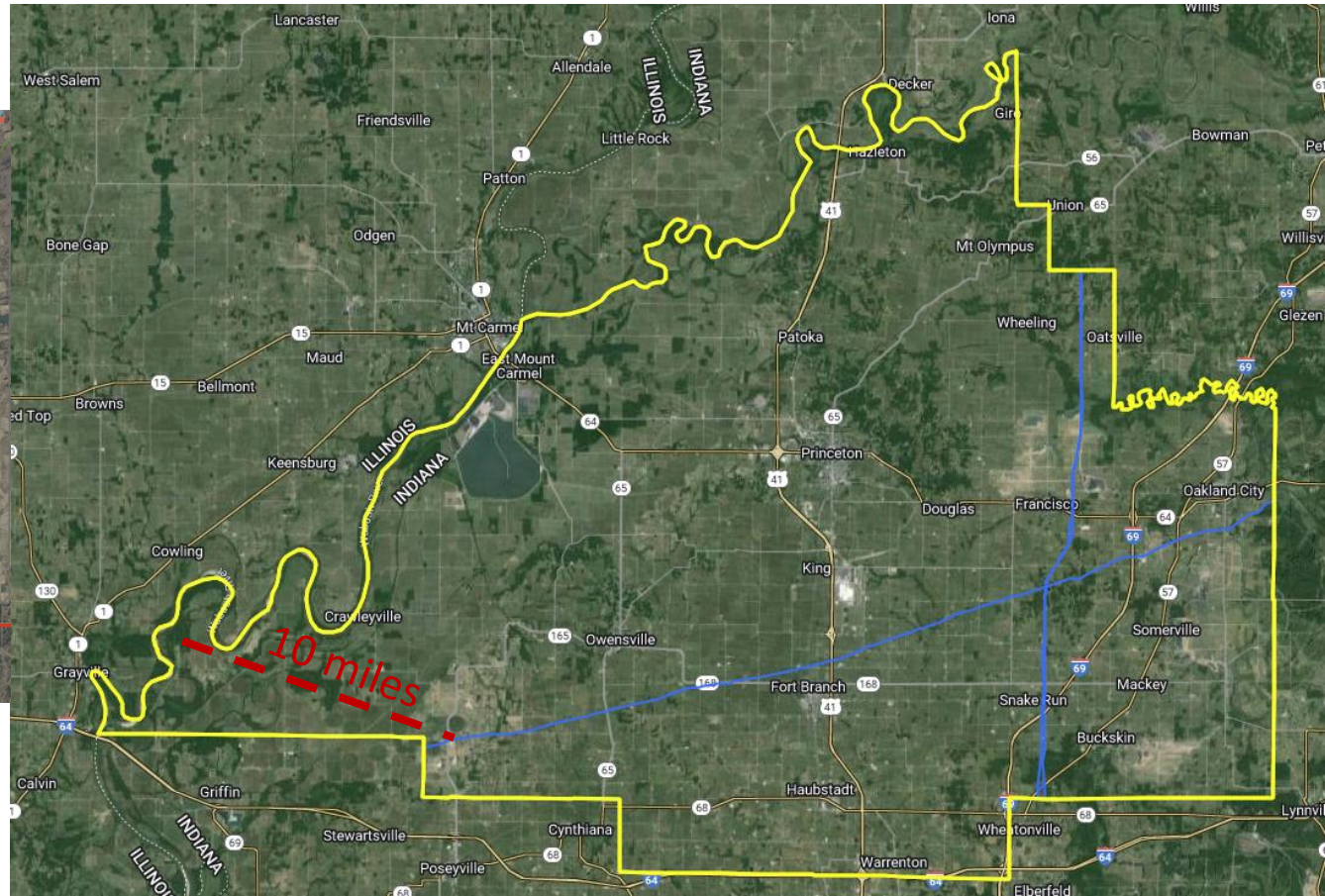
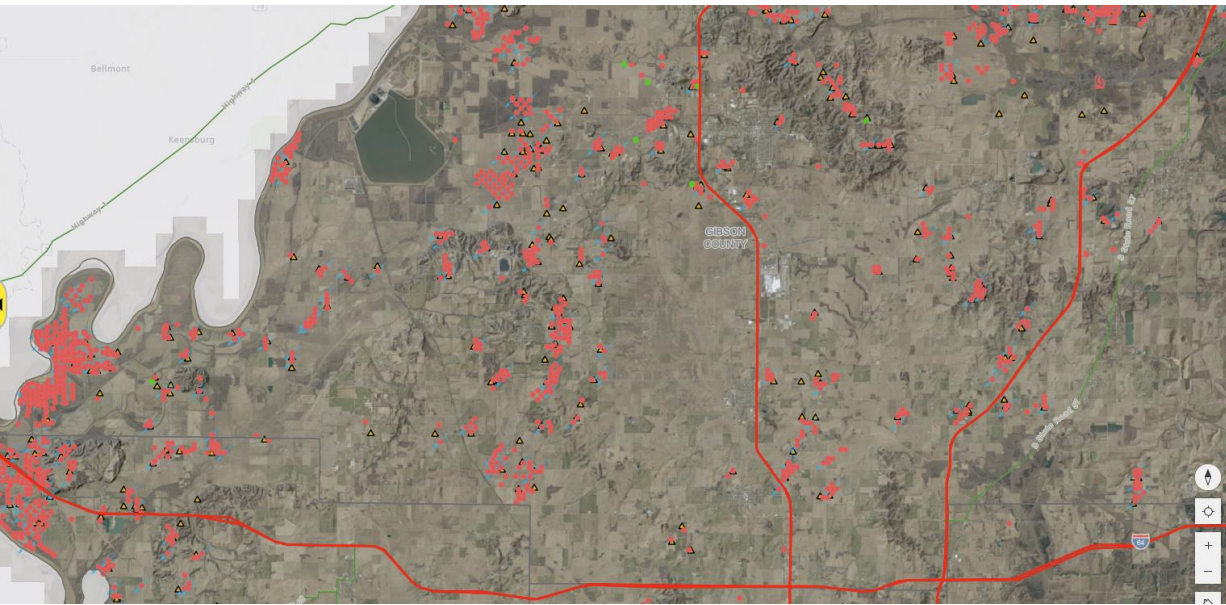
$\$816 \text{ monitoring cost per well} / 365 \text{ barrels} = \mathbf{\$2.24/bbl}$

Compliance Cost: **$\$5.10 = \$2.24/bbl + \$2.86/bbl$**

Oil Wells and Commercial Gas Lines



Construct a New Gas Pipeline



Pipeline Cost

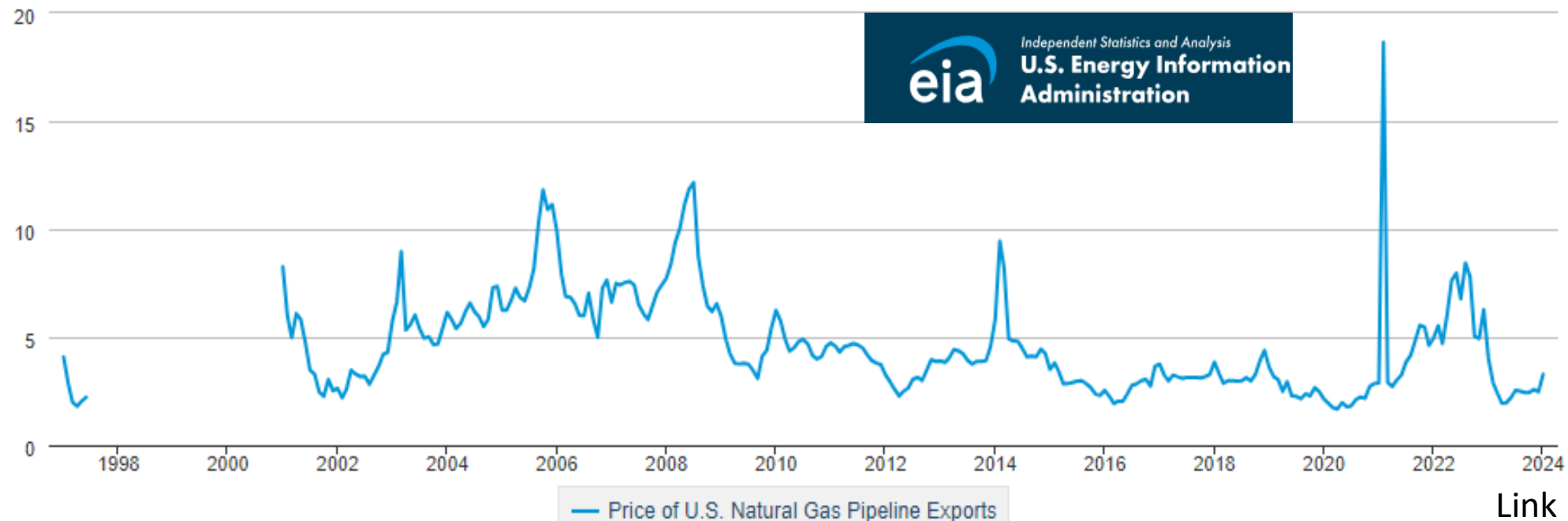
- Leasing: \$ 100,000
- Survey: \$ 250,000
- Permitting: \$ 25,000
- Design: \$ 125,000
- Construction: \$ 400,000
- Processing Plant: \$ 200,000
- Tie-in: \$ 250,000
- Compliance: \$ 25,000
- Commissioning: \$ 25,000
- Total: \$1,400,000



Pipeline Economics

- Tariff: \$0.50 / MCF
- Pipeline Flow Rate: 50 MCF/day
- Annual Gross Revenue: ~\$9,000
- Payback (ignore OpEx): 155 years

Dollars per Thousand Cubic Feet



Thank you

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What Is In the Expenses?



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Gross Revenue:	\$55.74
Expenses	
Lifting Cost:	\$35.00
Selling, General, & Admin.:	<u>\$15.00</u>
Total Expenses:	\$50.00
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Taxable Income:	\$ 4.74
Income Tax Due (22%):	<u>\$ 1.04</u>
After Tax Income:	\$ 3.70

\$35/bbl x 365 bbl = ~\$12,750/yr

	\$/month	\$/yr
Utility bills	\$100	\$1,200
Chemicals	\$ 60	\$ 750
Maintenance	\$150	\$1,800
Operations Salary	<u>\$750</u>	<u>\$9,000</u> (\$25/day)
Total	\$1,200	\$12,750

\$15/bbl x 365 bbl = \$5,700/yr

	\$/month	\$/yr
Vehicles	\$250	\$3,000
Office Expenses	\$ 25	\$ 300
Insurance	\$ 25	\$ 300
Contract Support	<u>\$175</u>	<u>\$2,100</u>
Total	\$475	\$5,700

Compressor Requirements

Affected Source	Monitoring Requirement	Performance Standard
Wet Seal Centrifugal Compressors (except for those located at well sites)	OOOOb: Capture and route emissions from the wet seal fluid degassing system to a control device OOOO: Monitoring and repair to maintain volumetric flow rate at or below 3 scfm	OOOOb: 95 percent reduction of methane and VOC emissions. OOOOc: Monitoring and repair to maintain volumetric flow rate at or below 3 scfm per seal.
Wet Seal Centrifugal Compressors (except for those located at well sites): Self-contained centrifugal compressors and wet seal compressors equipped with a mechanical seal	Monitoring and repair to maintain volumetric flow rate at or below 3 scfm	Monitoring and repair to maintain volumetric flow rate at or below 3 scfm per compressor seal.
Dry Seal Centrifugal Compressors (except for those located at well sites)	Monitoring and repair to maintain volumetric flow rate at or below 10 scfm per seal	Monitoring and repair of seal to maintain volumetric flow rate at or below 10 scfm per compressor seal.
Reciprocating Compressors (except for those located at well sites)	Monitoring and repair or replace the reciprocating compressor rod packing in order to maintain volumetric flow rate at or below 2 scfm per cylinder	Monitoring and repair or replacement of rod packing to maintain volumetric flow rate at or below 2 scfm per cylinder.

Well Completions

Affected Source	Monitoring Requirement	Performance Standard
Non-wildcat and non-delineation wells	Combination of Reduced Emission Completion and the use of a completion combustion device	Applies to each well completion operation with hydraulic fracturing. REC in combination with a completion combustion device; venting in lieu of combustion where combustion would present demonstrable safety hazards. Initial flowback stage: Route to a storage vessel or completion vessel (frac tank, lined pit, or other vessel) and separator. Separation flowback stage: Route all salable gas from the separator to a flow line or collection system, reinject the gas into the well or another well, use the gas as an onsite fuel source or use for another useful purpose that a purchased fuel or raw material would serve. If technically infeasible to route recovered gas as specified, recovered gas must be combusted. All liquids must be routed to a storage vessel or well completion vessel, collection system, or be reinjected into the well or another well. The operator is required to have (and use) a separator onsite during the entire flowback period.
Exploratory, wildcat, and delineation wells and non-wildcat and non-delineation low-pressure wells	Use of a completion combustion device	Applies to each well completion operation with hydraulic fracturing. The operator is not required to have a separator onsite. Either: (1) Route all flowback to a completion combustion device with a continuous pilot flame; or (2) Route all flowback into one or more well completion vessels and commence operation of a separator unless it is technically infeasible for a separator to function. Any gas present in the flowback before the separator can function is not subject to control under this section. Capture and direct recovered gas to a completion combustion device with a continuous pilot flame. For both options (1) and (2), combustion is not required in conditions that may result in a fire hazard or explosion, or where high heat emissions from a completion combustion device may negatively impact tundra, permafrost, or waterways.