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2026 IOGCC Orphan Well Update

Lessons from a 2025 Article on Estimating Undocumented Orphan Wells



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Article of Concern





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Data-driven estimates of undocumented orphan oil and gas wells with implications to the environment

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Article of Concern

Highlights

- A novel workflow estimates number of wells drilled in a state through its lifetime.
- It estimates undocumented orphan and unplugged non-producing wells in PA and OK.
- The geospectral distribution of wells is crucial for prioritizing areas in future.
- Our estimated wells emit 14 times more methane than IOGCC's estimate for all states.

(From first page of printed article)



Corrections Pending

Post-publication conversation between IOGCC and the authors:

- IJA requires DOE to cooperate with IOGCC on UOW research and development. (Sec. 40601(h)(2))
- This article was not fully vetted due to miscommunication.
- Authors are working to correct or clarify statements in the article.

Lessons learned:

- DOE will consult with IOGCC on future UOW work.
- IOGCC will clarify material on UOWs in future reports.



Troublesome References

On methane:

- “Our estimated wells emit 14 times **more methane than IOGCC’s estimate** for all states.” (Highlights)





IOGCC response:

- IOGCC never estimated methane emissions for orphan wells or any other type of wells.

Troublesome References

On estimates of UOWs:




- “According to [IOGCC], the number of UOWs across the U.S. is between 300,000 – 800,000 ([IOGCC], 2021).” (Page 3, lines 45-47) 
- “However, the IOGCC number of UOWs is based on expert opinion and there are no data-driven estimates of UOW numbers for the U.S.” (Page 3, lines 47-48) 

IOGCC response:

- IOGCC published the state estimates of UOWs when provided by the states.
- The states would have to say whether their estimates are data-driven.
- IOGCC did not make independent estimates of UOWs by state.
- IOGCC did not estimate the numbers of UOWs nationwide.
- IOGCC published more recent state estimates of UOWs in 2024.

Troublesome References

On estimates of UOWs in PA and OK:

- “. . . in Pennsylvania and Oklahoma . . . , where 80% of estimated UOWs are located according to the IOGCC” (Page 16, lines 333-334) 
- “According to the IOGCC 2021 report, Pennsylvania has 67% and Oklahoma contained only 13% of all UOWs in the U.S.” (Page 38, lines 708-709) 
- “Our UOW counts (309,462) [for OK] are 3-times higher than the current IOGCC estimates of 105,907 UOWs.” (Pages 28-29, lines 535-536) 

IOGCC response:

- IOGCC published estimates of UOWs provided by PA and OK.
- Six states declined to provide an estimate.
- IOGCC did not make independent estimates or extrapolate nationwide.
- IOGCC published more recent state estimates in 2024.

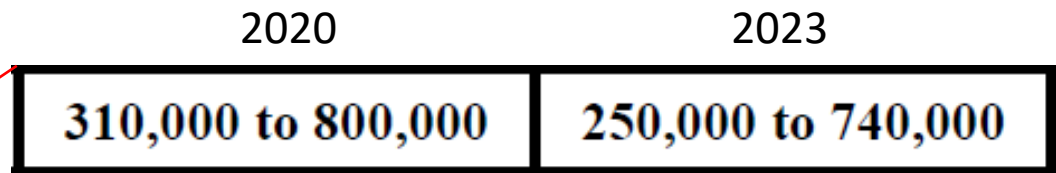


IOGCC Supplemental Report (2024)

State or Province	Documented orphan wells			Estimated undocumented orphan wells	
	2018	2020	2023	2020	2023
Alabama	3	26	52	0	700
Alaska	14	14	43	0	4
Arkansas	484	418	443		
California	10	2,777	3,333	17,980	0
Colorado	252	213	650	200	200
Idaho	0	0	0	0	0
Illinois	4,253	4,355	3,946		
Indiana	1,028	1,439	1,258	~100	~300
Kansas	5,709	5,632	5,713		5,285
Kentucky	13,266	14,367	15,870	3,000	3,000
Louisiana	3,621	4,260	4,786		
Michigan	98	134	388	0	0
Mississippi	21	11	24	0	1,000
Missouri	327	327	4,896	2,000	500
Montana	231	222	94		
Nebraska	75	103	366	120	120
Nevada	6	6	7	0	0
New Mexico	374	3,375	3,158		
New York	4,043	7,073	7,375	34,000	34,000
North Dakota	0	341	80	0	0
Ohio	910	972	21,308	30,342 to 80,400	34,300 to 65,100
Oklahoma	1,372	2,799	21,684	105,907	61,049
Pennsylvania	8,703	27,972	27,240	100,000 to 560,000	100,000 to 560,000
Tennessee		446	775	54	81
Texas	6,980	6,514	9,313		
Utah	33	41	34		0
Virginia	10	9	11	0	0
West Virginia	6,302	6,309	6,042	9,000	9,000
Wyoming	3,083	1,907	780	0	0
Totals - States	61,223	92,202	141,959	310,000 to 800,000	250,000 to 740,000
Alberta	3,127	2,983	1,955	0	0
British Columbia	326	754	824	0	0
Northwest Territories	0	0	0	0	0
Saskatchewan	609	1,043	3,268	0	0
Totals - Provinces	4,062	4,780	6,047	0	0

IOGCC totaled the number of estimated UOWs in the 23 states that provided an estimate. As noted in the report:

- Six states did not provide an estimate.
- Seven states . . . reported zero UOWs.
- Sixteen states reported an estimate of two to 100,000 or more UOWs.





Inaccurate Regulatory Histories

On oil and gas regulatory history generally:

- “We understand that data is very limited before the 1950s, as there was no requirement to report wells in most states.” (Page 15, lines 319-320)






IOGCC response:

- Oklahoma and other major oil and gas producing states required well reporting earlier.



Inaccurate Regulatory Histories

On OK regulatory history:

- “. . . the data from OCC does not specify the well type (oil, gas or dry) for each well before 1957.” (Page 13, lines 272-273) 
- “[T]he well type (i.e., oil and/or gas) is undefined in state records before 1957.” (Page 16, line 343) 
- “It was not mandatory to register an oil well until 1947 for Oklahoma.” (Page 26, line 501) 

Major omissions:

- The OK Legislature enacted comprehensive bills to prevent waste of oil and natural gas in 1915.
- OCC issued a series of oil and gas orders culminating in Order No. 1299 dated July 16, 1917.



OK Oil and Gas Legislation

House Bill 168 (February 15, 1915).

- To conserve crude oil and petroleum.

Granted OCC broad authority to make rules and regulations to:

- Prevent waste of crude oil or petroleum, including economic waste, underground waste, surface waste, and waste incident to production in excess of transportation or marketing facilities or reasonable market demands.
- Provide for ratable take from common sources of supply and prevent discrimination by purchasers.
- Protect fresh water strata and oil and gas bearing strata.



OK Oil and Gas Legislation

House Bill 395 (March 30, 1915)

- To conserve natural gas.

Granted OCC broad authority to make rules and regulations to:

- Prevent waste of natural gas, including escape of natural gas in commercial quantities into the open air, the intentional drowning with water of a gas stratum capable of producing gas in commercial quantities, underground waste, the permitting of any natural gas well to wastefully burn and the wasteful utilization of gas.
- Provide for ratable take from common sources of supply and prevent discrimination by purchasers.
- Protect natural gas, fresh water, and oil bearing strata.



Early OCC Regulations

Order No. 1299 (July 16, 1917):

- Rule 13. Notice of Intention to Drill , Deepen or Plug.
- Rule 14. Plugging Dry and Abandoned Wells.
- Rule 15. Log and Plugging Record to be Filed with Commission.
 - Upon completion of any well, file a complete record or log.
 - Upon plugging, file a complete record.
- Rule 20. Strata to be Sealed Off.
- Rule 25. Fresh Water to be Protected.
- Rule 30. Shooting of Wells.
 - Reports shall be made to the Commission on all wells shot.
- Rule 37. Drilling Records to be Kept at Wells.



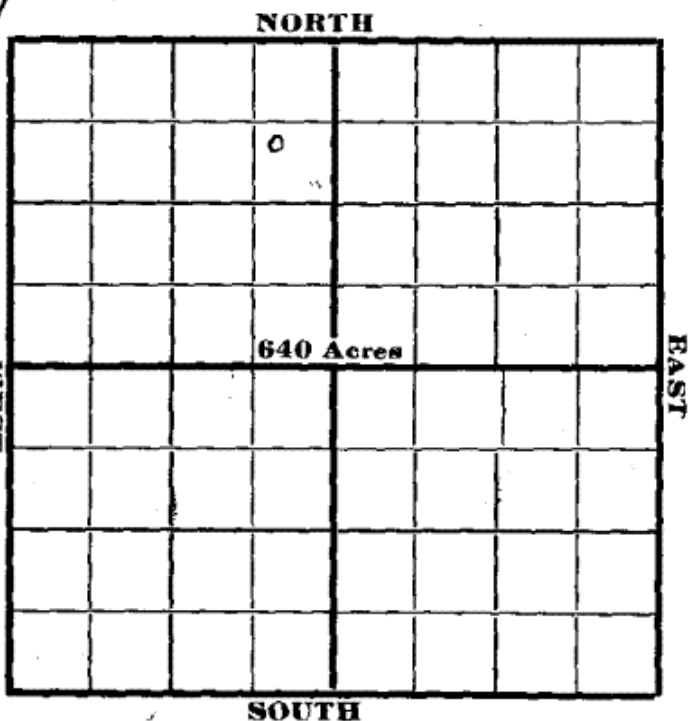
Intent to drill (1927)

FORM 1001

Notification of Intentions to Drill Deepen or plug

(To Comply with Orders of the Corporation Commission, Governing Oil and Gas Operations in Oklahoma.)

Bond



Spot well accurately on section plat and show location of off-set wells.

IMPORTANT NOTICE—This card must be mailed and bond furnished before drilling is begun, and in case a well is to be plugged, must be accompanied by a complete log of the well in forms prescribed by the Corporation Commission.

79926

Date 9/20/27

County Pawnee Well No. 1

Sec. 31 T. 21 R. 9

Farm Name Findley

Lessee J. H. Edwards

Location of well in Sec. SE NE NW

Date you expect to start drilling now

Date you wish to plug

Correspondence regarding well should be sent to

Name J. H. Edwards

Box or St. Address Box 743

City Okla City Okla



Completion report (1919)—oil well

FORMATION RECORD

Spot Well Correctly

Form 1002-20M-5-15

WELL RECORD

Mail to Corporation Commission, Oklahoma City, Okla.

00250050017
 Caddo County, Company The Horton Trust
 Farm Wade Lot A E 4 Section 2 Township 5 N Range 9 W Well No. 2
 Drilling Commenced June 10th 1919 Drilling Completed October 17th 1919
 Correspondence regarding this well should be sent to Name The Horton Trust Address Cement, Okla

EAST 27-2
 CEMENT

OIS 36952

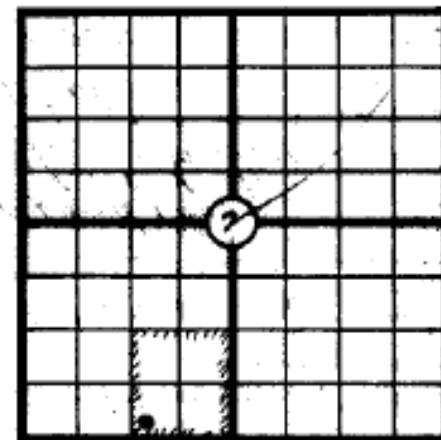
CASING RECORD

SIZE	PUT IN WELL		PULLED OUT		LEFT IN WELL		PACKERS AND SHOES
	Ft.	In.	Ft.	In.	Ft.	In.	
8 1/4"	22	35			22	35	
6 5/8"	23	13			23	13	6 5/8" shoe

Character of well Oil Well
 Oil Well, initial production 150 Bbls
 Remarks: Drilled with Rotary to 2235 ft - 8 1/4" casing set in cement and finished with cable tools -

Show all Formations, especially all sands and character and contents thereof.

FORMATIONS	TOP	BOTTOM	REMARKS
Surface sand & clay	0	40	
Broken lime & sand	40	210	
Hard shell	210	437	
Sand Rock,	437	489	
Shell	489	495	
Hard Rock,	495	521	
Shell	521	528	
Hard Rock,	528	558	
Rock	558	560	Showing of fine
Hard Rock,	560	737	
Shell	737	763	
Rock	763	807	
Sandy Shell	807	852	Showing of Oil and Gas
Shell	852	938	
Sand	938	944	Showing of Oil
Gumbo-	944	971	
Sand			
Gumbo			
Shell			
Rock			
Shell			
Rock			
Hard shell			
Rock			
Shell & Gumbo			
Hard Rock			
Sandy Shell			
Hard Rock	1601	1652	



I, A. W. Cumming
 being first duly sworn on oath, state that I have knowledge of the facts and matters herein set forth and that the same are true and correct.
A. W. Cumming
 Representative of Company.
 Subscribed and sworn to before me this the 24th day of October 1919.
A. R. O'Leary
 Notary Public.
 My commission expires February 14 1923

Method of shutting off water Cased off Is water completely shut off? Yes
 Amount of water with oil _____ to oil cut? No
 I, A. W. Cumming
 being first duly sworn on oath, state that I have knowledge of the facts and matters herein set forth and that the same are true and correct.
A. W. Cumming
 Representative of Company.
 Subscribed and sworn to before me this the 24th day of October 1919.
A. R. O'Leary
 Notary Public.
 My commission expires February 14 1923

Questions on Methodology

Stated goal:

- “The goal of this research is to establish a straightforward workflow that can be **uniformly applied to all oil and gas-producing states.**” (Page 14, lines 288-290)
- “After developing the workflow in Pennsylvania, we implement it to estimate the number of UOWs in Oklahoma” (Page 14, lines 297-298)



IOGCC question:

- How does the methodology address differences between PA and OK?
 - Oil and gas development began forty years later in OK than in PA.
 - Oil and gas regulation began forty years earlier in OK than in PA.



Questions on Methodology

Underreporting factors:

- “[W]e estimate underreporting and ER well factors, considering the wells drilled in the boomtowns and the impact of laws and regulation over time. Regulations define distinct periods.” (Page 17, lines 345-347)
- “. . . applying varying underreporting factors based in Pennsylvania (1859-1924, 1925-1957) and Oklahoma (1891-1923, 1924-1931, 1932-1946).” (Page 17, lines 351-353)

IOGCC question:

- The OK underreporting factors appear to be based on an incomplete history of oil and gas regulatory development.



Questions on Methodology

Undocumented wells with some paper trace:

- “Since UOWs have no paper trace” (Page 3, line 44)

IOGCC comment:

- IOGCC defines UOWs to include wells of which the agency has some evidence, but which require further records research or field investigation for verification.
- OK had some documentation of the 105,907 UOWs estimated for 2020 and the 61,049 UOWs estimated for 2023.



Questions on Methodology

Undocumented wells with responsible operators:

- The article does not appear to address undocumented wells for which the state may identify a responsible operator.

IOGCC comment:

- Through records research, states identify the operator responsible for some previously undocumented wells.
- The OK estimate of UOWs fell from 105,907 in 2020 to 61,049 in 2023 in part because the OCC was able to match records and identify responsible operators for many wells. (The number now is less than 26,000.)



Questions for the E&S Committee

Should IOGCC discontinue publishing state estimates of UOWs?

- Limited data.
- High level of uncertainty.
- Risk of being misunderstood or used without appropriate context.

Should IOGCC continue to publish state UOW estimates but provide more context?

- Ask each state to briefly describe the source data and methodology.
- Explain the limitations or intended use.
- Do not sum the state estimates.

Other comments or suggestions about how to address UOWs?



THANK YOU!