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FLARING IN THE OILFIELD: A CLOSER LOOK

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Western Environmental Law Center

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I. INTRODUCTION

Governor Michelle Lujan Grisham and her Administration has made a commitment to adopt new nation-leading rules to prevent methane waste and pollution in 2020.[1] The governor early on recognized the multiple and significant costs that poor oil and gas industry practices impose on New Mexicans—lost state revenues, health threats to neighboring communities, and massive amounts of climate pollution.

There are many sources of waste including leaks, outdated equipment and practices, piecemeal infrastructure planning and investment, and deliberate venting and flaring. Flaring, the practice of burning off natural gas rather than putting it to use, is under intense scrutiny and increasingly recognized as a major problem.[2]

This report takes a close look at how much natural gas is being flared in New Mexico, which companies operating here are responsible, and what might be causing the problem. Based on our analysis, the report calls for specific, effective, and pragmatic solutions the Lujan Grisham administration should adopt and enforce to reduce and prevent flaring in the future.

New information continues to emerge indicating that methane waste and pollution is a far more significant problem than previously understood. According to data recently released by the Environmental Defense Fund (EDF), "the methane leak rate we observed in the Permian is roughly three times EPA's national average, and total annual emissions from the [New Mexico] Permian are over 1.4 million metric tons. That's enough wasted gas to meet the needs of every home in New Mexico for the next two years."[3] It is also equal to the annual carbon dioxide emissions of nine coal-fired power plants.[4]

Industry has argued that flaring is necessary for producing oil and gas. But is the amount of flaring and waste that is occurring in the state today really an unavoidable cost of doing business?

1 Our Environment is Endangered, My View by Governor Michelle Lujan Grisham, The Santa Fe New Mexican, November 19, 2019: "But to reach the emission levels we know we must reach in a limited amount of time, we must start with rules to reduce oil and gas methane emissions while also moving to more and broader climate pollution reduction efforts, including economy-wide, market-based mechanisms. And the rules my administration will enact to protect New Mexicans from methane pollution will serve as an example to the rest of the country." Available at https://www.santafenewmexican.com/opinion/my_view/our-environment-is-endangered/article_198077df-4e69-5dd4-a8c8-3a4027212f23.html

2 Groundbreaking data is a wake-up call in the Permian, call to action for New Mexico. Jon Goldstein, EDF Blog, April 8, 2020. Available at http://blogs.edf.org/energyexchange/2020/04/08/groundbreaking-data-is-a-wake-up-call-in-the-permian-call-to-action-for-new-mexico/

3 Ibid

4 EPA Greenhouse Gas Equivalencies Calculator. Available at https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

In May 2020, the New Mexico Oil and Gas Association (NMOGA) released a report titled "Flaring in the Oilfield." The impetus for this report was that "NMOGA's members have recognized that there is a need to provide greater clarity as to why natural gas is flared. Therefore, NMOGA's members prepared this report to closely examine the issue of flaring [and] educate the public about this important process."[5] The report seeks to describe why oil and gas companies flare under different circumstances, and "how, in each setting, limited flaring is essential to provide a safe work environment."[6]

FLARING AT
OXY PATTON WELL
NEW MEXICO PERMIAN
1/11/2019

5 Flaring in the Oilfield, New Mexico Oil and Gas Association, May 19, 2020 at 2. Available at https://d3n8a8pro7vhmx.cloudfront.net/nmoga/pages/1255/attachments/original/1589833111/Flaring_in_the_Oilfield_05.19.20_FINAL.pdf?1589833111
6 Id at 4

However, the NMOGA report ignores a critical piece of the flaring story; i.e., that a significant amount of flaring is long-term and virtually unlimited, the direct result of deliberate choices by some companies to simply dispose of gas co-produced with oil by flaring it, rather than planning and investing in the means to get that gas to a market.[7,8,9]

NMOGA ignored a critical piece of the flaring story—that a significant amount is due to company decisions to avoid spending on gas pipelines leading to long-term flaring instead.

While the NMOGA report describes the different types of flaring in general terms, it fails to offer any information about how much each type contributes to the total volumes of gas flared by oil and gas companies in the state.

Current regulations require producers to obtain authorization before flaring can occur and to report all volumes flared (and vented) monthly to the state's Oil Conservation Division (OCD). But while the current reporting system does not require producers to indicate which types of flaring account for how much they flare, state records do make it possible to identify the producers responsible for the lion's share of statewide flaring. These data raise serious questions about whether these volumes are truly the result of "limited, temporary, or short-term" flaring, and provide numerous examples of wells that have been flaring consistently for most of their operating lifetimes.

A recently released report on best practices by major oil and gas companies to prevent flaring in the Permian concludes that "flaring has reached such a sufficient scale that the premise of ' burning gas to allow oil extraction' is really ' wasting one resource to produce another.'"[10] The Lujan Grisham administration has committed to nation-leading rules to put an end to this waste. This report offers evidence of widespread routine flaring by New Mexico producers and provides recommendations for how it can be stopped. We urge the governor and her senior policy-makers to consider this evidence as they finalize the new rules and adopt our recommendations.

7 The World Bank, in its global initiative to reduce flaring, distinguishes between routine flaring and flaring for safety reasons or non-routine flaring. It defines routine flaring as "flaring during normal oil production operations in the absence of sufficient facilities or amenable geology to re-inject the produced gas, utilize it on-site, or dispatch it to a market." Zero Routine Flaring by 2030. Available at https://www.worldbank.org/en/programs/zero-routine-flaring-by-2030

8 Methane is the main constituent of natural gas. In this report the terms "methane," "natural gas," and "gas" are used interchangeably.

9 Natural gas produced from wells that are classified as oil wells (because they produce more oil than gas) is typically referred to as "associated gas."

10 Tackling Flaring: Learnings from the Leading Permian Operators, GaffneyCline, June 2020 at 5. Available at https://www.gaffneycline.com/sites/g/files/cozyhq681/files/2020-06/Tackling%20Flaring_Final.pdf

RECOMMENDATIONS TO END ROUTINE FLARING

1. BAN ROUTINE FLARING UPON THE EFFECTIVE DATE OF THE RULE
2. CONDITION APPROVALS OF NEW WELL DRILLING PERMITS ON FIRM, ENFORCEABLE GAS CAPTURE PLANS
3. COMMIT TO WELL SHUT-INS AS AN ENFORCEMENT TOOL

FLARE IN CHACO CANYON, NEW MEXICO 1/30/2017

II. WHY DO COMPANIES FLARE?

The NMOGA flaring report identifies six main reasons why oil and gas producers flare, each of which the report describes as "short-lived," "limited," or "temporary."

1. Companies flare for very short periods of time when components exceed design parameters such as exceeding allowable pressures (commonly called "upset conditions") causing emergency relief or fail-safe devices to kick in and route natural gas to a flare to maintain safety, usually for a period of minutes or hours;[11]
2. Companies also flare during scheduled maintenance, or when equipment breaks down and needs to be repaired, which can take days, weeks, or even longer depending on the extent of the work;
3. They may also flare during drilling, completion and flowback activities, sometimes to dispose of gas contaminated by natural or introduced impurities, which can take days or weeks;
4. Companies can obtain permission from the state under current rules to flare for up to 60 days during well production testing;[12]
5. Companies also flare when there is insufficient wellbore pressure to force gas onto a pipeline system and compressors have not been installed to provide additional pressure; and
6. Companies flare when they face what NMOGA describes as "temporary infrastructure capacity constraints." According to NMOGA, this is "the major obstacle challenging the oil and gas industry as operators try to achieve even greater reductions in volumes of flared natural gas."[13]

The report explains that:

> the unprecedented development pace, especially in southeast New Mexico, has led gas production rates to **temporarily** exceed the capacity of existing midstream and downstream pipelines and facilities … These investments are only built after upstream development (drilling and completion) has proven that a minimum necessary natural gas volume has been developed to warrant the investment. Therefore, economic necessity creates **limited periods of time** where a shortage of infrastructure exists until gas capture, processing and transportation facilities can be permitted and constructed.[14] [emphasis added]

11 These components are typically "control devices" that manage liquids levels, flow rates, and gas pressures in tanks, pumps, compressors, and other equipment commonly found at production, transmission, and processing sites.
12 NMSA 19.15.18.12.
13 Flaring in the Oilfield at 10
14 Id at 11

The NMOGA report characterizes flaring due to infrastructure shortages as "temporary" and occurring for "limited periods of time." But what is the reality? Do some companies flare wells for very long periods of time as they choose not to invest in pipeline, compression, or processing infrastructure or wait for others to do it? Are some of them indefinitely seeking to avoid spending money on gas pipeline and processing capacity in favor of deploying scarce capital towards more profitable investments in oil production? And should the "unprecedented development pace" be better regulated to prevent waste and safeguard the public interest? As shown below, there is compelling evidence that the answers to each of these questions is "yes."

The consequences of routine, long-term flaring are dire for shale wells because virtually all of the gas from a well can end up being wasted. Research has shown that in the Permian, first-year average oil well production declines from 250 barrels per day to just over 50 barrels per day,[15,16] and over the first three years of its life average well production declines by 86%.[17,18]

The consequences of long-term flaring are dire for quickly-declining shale wells because virtually all of the gas from a well can end up being wasted.

Given these rapid declines, how much of a well's production will be lost to flaring as the owner waits for infrastructure to be built? Below, we provide examples of companies and wells where, for co-produced associated gas, "temporary" is in fact forever.

The NMOGA report essentially ignores routine flaring, a consequence of deliberate decisions by companies to drill for and produce oil without first ensuring that the associated gas will find its way to market as well.

WHY DOES THIS HAPPEN?

Oil and gas producers, midstream gas pipeline and processing companies, landowners, and state and federal regulators collectively, but not necessarily in coordination, determine the timing, location, and magnitude of drilling, pipeline systems, compressor stations, and processing plants. Currently, planning for this infrastructure occurs within individual organizations and results in piecemeal decision making by multiple, disparate individual entities, with some, but often limited, information exchange and coordination.

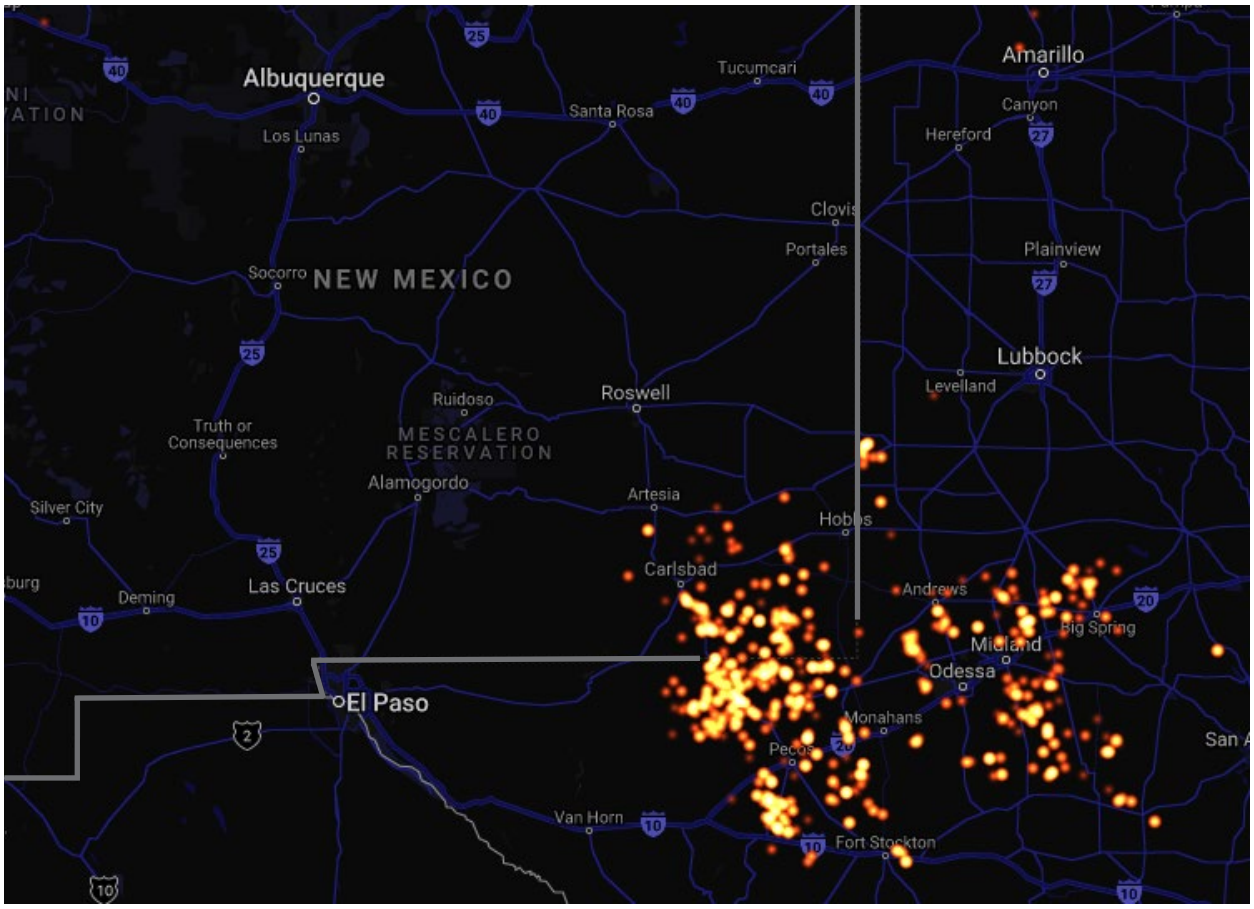
Production companies make decisions to acquire new leases, drill new wells, operate and maintain existing wells, and invest in flow lines and sometimes compressors, while midstream companies

15 While the gas to oil ratio may shift over the life of a well, production of both in shale wells generally declines over time.
16 Today in Energy, February 11, 2016, available at: https://www.eia.gov/todayinenergy/detail.php?id=24932
17 How Long Will the Shale Revolution Last?, David Hughes, Post Carbon Institute, 2019 at 97. Available at: https://www.postcarbon.org/publications/how-long-will-the-shale-revolution-last/
18 Base Decline Rate of Oil and Gas Output in Permian Basin has Increased Dramatically Because of Recent Growth; Operators Must Drill More Wells to Maintain Production Levels, IHS Markit Says, Businesswire, December 12, 2019. Available at https://www.businesswire.com/news/home/20191212005134/en/%E2%80%9CBase-Decline%E2%80%9D-Rate-Oil-Gas-Output-Permian

build or expand gathering systems, boosting stations, and processing plants to serve targeted concentrations of gas production. Federal and state land management agencies offer public lands for lease for oil and gas development based on expressions of interest by companies without comprehensive planning in the public interest. And state and federal regulators routinely give approvals for individual projects without considering the larger context in which they are occurring. In practice, in the New Mexico Permian, this disjointed decision making leaves large amounts of gas production without a path to market.

The outcome of all of this activity is, ultimately, the alignment or misalignment between the volumes and locations of gas produced and the capacity of gathering and processing systems to bring that gas to market. Where takeaway capacity is inadequate for the amount of gas produced, companies must handle the gas through other means—using it on-site, finding non-pipeline transportation options, or simply venting or flaring it. As we shall see in the next section, in recent years this dynamic has led to a surge in flaring in New Mexico's oilfield.

FLARING IN THE PERMIAN BASIN: NEW MEXICO AND TEXAS



SkyTruth's online flaring map (https://tinyurl.com/y4txc3o8) centered over New Mexico and the Permian Basin. This shows typical flaring for a day in 2019, with brighter colors representing larger clusters of flaring. The visualization is based on data captured by Visible Infrared Imaging Radiometer Suite (VIIRS) instruments aboard National Oceanic and Atmospheric Administration satellites, and is collected by the Earth Observation Group, Payne Institute for Public Policy (Elvidge, Christopher D., Mikhail Zhizhin, Feng-Chi Hsu, and Kimberly E. Baugh. "VIIRS nightfire: Satellite pyrometry at night." Remote Sensing 5, no. 9 (2013): 4423-4449).

III. FLARING IN NEW MEXICO

The state collects data on the amount of gas that is vented or flared by companies as part of their overall production reporting for taxation and royalty purposes. Companies are required to report how much oil and gas they produce and the ultimate destination of these volumes on an Operators Monthly Report (Form C-115).[19]

Beginning in 2016, OCD began to require producers to report vented and flared volumes separately on the C-115 Form (prior to this, vented and flared volumes were reported together). OCD makes these vented and flared volumes available to the public on their website.[20]

The data is self-reported by companies with up to a two-month lag. While there are reporting inconsistencies discussed below and companies are allowed to retroactively adjust their reported volumes, the C-115 volumes are the best source of information we have on which companies are flaring gas and how much they flare.

Enough gas was flared in 2019 to supply the home heating and cooking needs of 80% of New Mexico households for the year.

As shown in Table 1 below and reflecting the emergence of the shale boom in the New Mexico Permian, flaring reported to OCD by New Mexico oil and gas producers more than doubled from 2017 to 2018, from 14.9 to 33.4 billion cubic feet (Bcf). Last year, flaring declined slightly to 30.8 Bcf. Still, this was enough gas to supply the home heating and cooking needs of 80% of New Mexico households for the year.[21]

Last year's drop in flaring is not surprising given the decline in the number of new wells that were drilled in 2019. According to OCD statistics, wells spud declined by about 30% from the prior year (914 vs. 1260).[22] Since wells produce at their maximum volume during their initial months of production, the decline in flaring in 2019 is likely explained by the drop in new drilling activity. Flaring volumes can be expected to drop even more significantly this year due to the twin supply and demand shocks currently hitting the industry and the big pullback in company drilling programs.[23]

New Mexicans, however, cannot rely on a continued hiatus in the drilling of new wells and the depletion of existing wells to drive down high flaring rates, because without new rules, flaring is likely to rebound with any uptick in new drilling.

19 Excel C-115 Template, fields 14 (Mcf Gas Produced) and 22 (Non Transported Disposition). Available at http://www.emnrd.state.nm.us/OCD/documents/C115_Instructions2019.pdf
20 http://www.emnrd.state.nm.us/OCD/statistics.html
21 Natural Gas Consumption by End Use by State, U.S. Energy Information Administration. Available at https://www.eia.gov/dnav/ng/NG_CONS_SUM_A_EPG0_VRS_MMCF_A.htm. Number of Natural Gas Customers by State, U.S. Energy Information Administration. Available at https://www.eia.gov/dnav/ng/ng_cons_num_a_EPG0_VN3_Count_a.htm
22 OCD Well Statistics—Well numbers by land status, well types, permits, and pluggings by year, OCD Data and Statistics. Available at http://www.emnrd.state.nm.us/OCD/statistics.html
23 The rig count stood at 51 at the end of July 2020, versus 109 at the same time last year. Baker Hughes North America Rig Count. Available at https://rigcount.bakerhughes.com/na-rig-count

TABLE 1. TOTAL REPORTED VENTING AND FLARING 2017-2019 (THOUSAND CUBIC FEET (MCF))

	2017	2018	2019	PERCENT CHANGE 2017-2018	PERCENT CHANGE 2018-2019
FLARED	14,886,176	33,421,502	30,782,507	125%	-8%
VENTED	2,123,438	3,115,734	2,115,448	47%	-32%
VENTED + FLARED	17,009,614	36,537,236	32,897,955	115%	-10%
GAS PRODUCTION	1,305,868,647	1,508,677,191	1,653,441,866	16%	10%
% OF GAS PRODUCTION	1.30%	2.42%	1.99%		

Source: OCD C-115 data. Available at http://www.emnrd.state.nm.us/OCD/statistics.html

WHICH COMPANIES ARE RESPONSIBLE FOR ALL OF THIS FLARING?

Table 2 shows New Mexico's top 25 oil producers, ranked by oil production volumes, and the amount of natural gas they flared for 2017-2019. While there is considerable variation in the amount of gas that different companies flare, most of these top oil producers flare significant amounts of gas, while companies that primarily produce natural gas reported relatively little flaring.[24]

Exxon, through its subsidiaries XTO and Bopco, tops the list, flaring 4.5 Bcf of gas in 2019. This would have provided the home heating and cooking needs of 71,600 New Mexican households for the year.[25] Devon Energy flared 4.1 Bcf and Ameredev flared 3.6 Bcf. Three other top oil producers, Marathon, Oxy, and Cimarex, each flared over 2 Bcf. An additional eight top oil producers flared more than 1 Bcf of gas apiece.

CLICK ON THIS LINK TO VIEW A FLARING MAP CENTERED OVER NEW MEXICO'S PERMIAN BASIN:

https://tinyurl.com/yy3eafy4

24 See Exhibit 1 for complete listing of oil producers reporting flared volumes in 2019.
25 U.S. Energy Information Administration, supra note 21

TABLE 2. 2017-2019 FLARING BY TOP 25 OIL PRODUCERS, IN DESCENDING ORDER BY 2019 OIL PRODUCTION

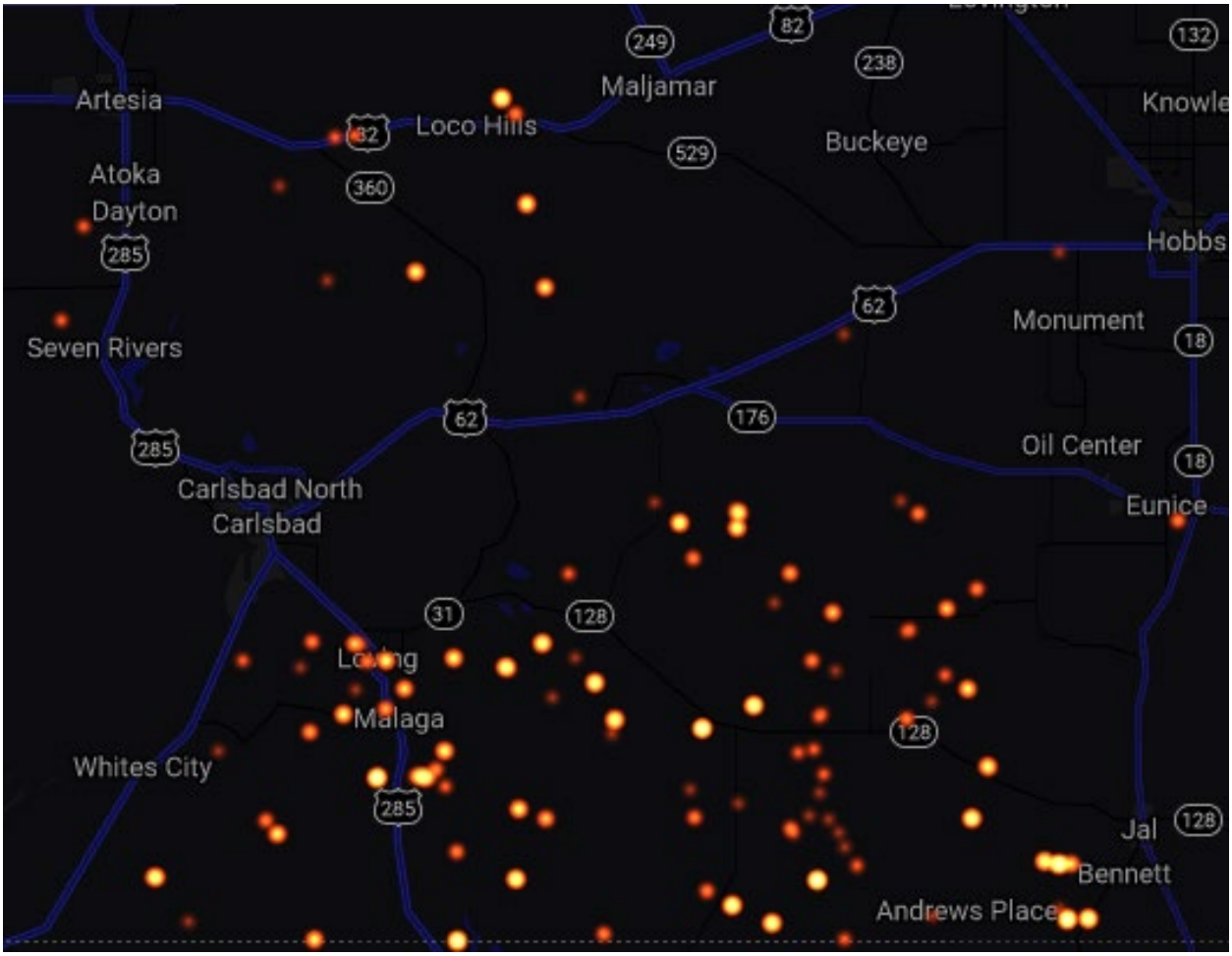
	OIL PRODUCED (BARRELS)			FLARED (MCF)		
COMPANY	2017	2018	2019	2017	2018	2019
EOG RESOURCES INC	22,851,054	37,769,210	56,030,820	1,107,870	2,076,136	1,709,131
OXY USA/OCCIDENTAL PERMIAN	15,005,682	32,487,241	43,737,641	1,025,356	2,962,087	2,174,278
COG OPERATING/COG PRODUCTION	30,449,894	35,018,641	34,225,110	4,254,340	3,249,902	1,905,262
DEVON ENERGY PRODUCTION COMPANY	14,277,914	21,567,170	30,312,177	981,131	4,009,862	4,082,241
XTO ENERGY/XTO PERMIAN OPERATING/BOPCO, L.P.	6,996,173	11,480,489	21,175,868	625,818	5,081,880	4,467,296
CIMAREX ENERGY	8,469,203	11,300,063	12,537,851	832,567	2,223,657	2,062,078
MATADOR PRODUCTION COMPANY	6,260,640	10,719,041	10,479,222	701,798	1,613,244	1,527,662
CHEVRON USA INC	7,386,903	7,274,617	9,555,530	32,715	50,932	27,114
APACHE CORPORATION	7,549,856	8,407,753	7,017,184	1,024,154	1,596,817	992,751
MARATHON OIL PERMIAN, LLC	1,356,663	5,630,590	6,606,003	1,098,142	2,929,539	2,252,093
BTA OIL PRODUCERS, LLC	2,658,325	3,168,173	4,947,053	343,694	1,199,375	1,040,554
ENDURING RESOURCES, LLC	3,134	3,179,099	3,966,870		44,699	37,208
CONOCOPHILLIPS COMPANY	4,397,092	3,967,516	3,753,413	522,547	513,205	331,961
CENTENNIAL RESOURCE PRODUCTION	375,024	1,900,319	3,513,851	60,258	831,827	1,350,926
CHISHOLM ENERGY OPERATING, LLC	346,214	2,111,713	2,994,675			489,190
WPX ENERGY PERMIAN, LLC	1,877,112	3,093,332	2,823,387	542,933	1,371,421	1,820,509
ADVANCE ENERGY PARTNERS HAT MESA	93,818	964,944	2,685,487			47,339
TAP ROCK OPERATING, LLC	5,507	808,174	2,145,094			1,051,638
MACK ENERGY CORP	839,440	1,144,182	1,618,554	3,829	5,339	6,963
DJR OPERATING, LLC	10,097	191,319	1,550,643		404	9,591
PERCUSSION PETROLEUM OPERATING	341,241	2,030,645	1,456,427		878,059	785,810
AMEREDEV OPERATING, LLC		331,310	1,400,859		1,793,187	3,591,068
SPUR ENERGY PARTNERS, LLC			1,045,617			891,471
LIME ROCK RESOURCES II-A, L.P.	1,069,286	1,318,333	955,160	132,138	191,616	85,508
LOGOS OPERATING, LLC	289,167	706,304	941,015	995	145,301	77,066

Sources: OCD C-115 data and Gas/Oil Production by Operator 2019. Available at http://www.emnrd.state.nm.us/OCD/statistics.html

There is also tremendous variation across companies in the share of gas production that is flared. Table 3 takes the same top 25 oil producers, ranks them by the amount of gas they flared in 2019, and shows the percent of their total gas production that they flared. Some major producers like OXY, COG, and EOG flared relatively little of their overall gas production. Other major producers flared significantly more gas. Exxon, Devon, Marathon, and WPX flared between 4% and 12% of total production. Still other major producers flared extremely large shares of their gas production, led by Ameredev at a shocking 78%, Spur at 38%, Percussion at 27%, and Centennial at 24%.[26]

For companies flaring relatively large percentages of their gas production, these data suggest they are engaged in routine, chronic, and sustained flaring since short-term, temporary flaring events would not be expected to drive such high flaring rates. It is less clear to what extent companies with relatively smaller shares of flared production engage in routine flaring, but their large absolute volumes still suggest that they are engaged in some routine flaring.

A CLOSER LOOK: FLARING IN THE NEW MEXICO PERMIAN



SkyTruth's flaring map close-up of the Permian Basin in New Mexico. Brighter colors indicate larger clusters of flaring.

26 See Exhibit 1 for complete listing of oil producers reporting flared volumes in 2019.

TABLE 3. PERCENT OF PRODUCTION FLARED BY TOP 25 COMPANIES, RANKED BY 2019 FLARING VOLUMES

COMPANY	2019 GAS PRODUCTION (MCF)	2019 FLARED (MCF)	PERCENT OF PRODUCTION FLARED
XTO ENERGY/XTO PERMIAN OPERATING/BOPCO, L.P.	72,028,232	4,467,296	6%
DEVON ENERGY PRODUCTION COMPANY, L.P.	110,174,749	4,082,241	4%
AMEREDEV OPERATING, LLC	4,600,491	3,591,068	78%
MARATHON OIL PERMIAN, LLC	27,338,268	2,252,093	8%
OXY USA/OCCIDENTAL PERMIAN	155,501,254	2,174,278	1%
CIMAREX ENERGY	78,995,491	2,062,078	3%
COG OPERATING/COG PRODUCTION	151,328,114	1,905,262	1%
WPX ENERGY PERMIAN, LLC	15,706,022	1,820,509	12%
EOG RESOURCES INC	157,968,423	1,709,131	1%
MATADOR PRODUCTION COMPANY	40,232,961	1,527,662	4%
CENTENNIAL RESOURCE PRODUCTION, LLC	5,742,344	1,350,926	24%
TAP ROCK OPERATING, LLC	6,050,693	1,051,638	17%
BTA OIL PRODUCERS, LLC	25,363,851	1,040,554	4%
APACHE CORPORATION	31,669,356	992,751	3%
SPUR ENERGY PARTNERS, LLC	2,333,468	891,471	38%
PERCUSSION PETROLEUM OPERATING, LLC	2,950,123	785,810	27%
CHISHOLM ENERGY OPERATING, LLC	9,832,639	489,190	5%
BURNETT OIL CO INC	3,809,527	439,480	12%
MURCHISON OIL AND GAS, LLC	2,710,429	344,418	13%
CONOCOPHILLIPS COMPANY	16,091,164	331,961	2%
IMPETRO OPERATING, LLC	808,641	244,726	30%
STEWARD ENERGY II, LLC	645,320	203,494	32%
FASKEN OIL & RANCH LTD	1,770,362	124,446	7%
RIDGEWAY ARIZONA OIL CORP.	129,739	91,789	71%
POGO OIL & GAS OPERATING, INC	915,939	86,607	9%

Sources: OCD C-115 data and Gas/Oil Production by Operator 2019. Available at http://www.emnrd.state.nm.us/OCD/statistics.html

Table 4 shows the share of total flaring in New Mexico that is accounted for by these top oil producers. Just three companies, Exxon, Devon, and Ameredev, are responsible for over one-third of all reported flaring. The top 10 flaring companies account for 71%, and the top 20 account for 95% of all flaring statewide. This data indicates that flaring is concentrated in just a handful of New Mexico oil and gas companies. It also suggests that changes in the business practices of this handful of companies driven by new rules could largely solve the flaring problem in the state and prevent companies from flaring in this manner down the line.

TABLE 4. 2019 FLARING BY OPERATOR AS A PERCENT OF TOTAL STATE FLARING

COMPANY	FLARED (MCF)	PERCENT OF TOTAL FLARING
XTO ENERGY/XTO PERMIAN OPERATING/BOPCO, L.P.	4,467,296	13%
DEVON ENERGY PRODUCTION COMPANY, L.P.	4,082,241	12%
AMEREDEV OPERATING, LLC	3,591,068	10%
MARATHON OIL PERMIAN, LLC	2,252,093	6%
OXY USA/OCCIDENTAL PERMIAN	2,174,278	6%
CIMAREX ENERGY	2,062,078	6%
COG OPERATING/COG PRODUCTION	1,905,262	5%
WPX ENERGY PERMIAN, LLC	1,820,509	5%
EOG RESOURCES INC	1,709,131	5%
MATADOR PRODUCTION COMPANY	1,527,662	4%
TOP 10	**25,591,618**	**74%**
CENTENNIAL RESOURCE PRODUCTION, LLC	1,350,926	4%
TAP ROCK OPERATING, LLC	1,051,638	3%
BTA OIL PRODUCERS, LLC	1,040,554	3%
APACHE CORPORATION	992,751	3%
SPUR ENERGY PARTNERS, LLC	891,471	3%
PERCUSSION PETROLEUM OPERATING, LLC	785,810	2%
CHISHOLM ENERGY OPERATING, LLC	489,190	1%
BURNETT OIL CO INC	439,480	1%
MURCHISON OIL AND GAS, LLC	344,418	1%
CONOCOPHILLIPS COMPANY	331,961	1%
TOP 20	**33,309,817**	**96%**

Source: OCD C-115 data. Available at http://www.emnrd.state.nm.us/OCD/statistics.html

How much did each type of flaring described in the NMOGA report and discussed above contribute to these companies' flaring track records? The answer to this question remains unknown. However, these tables suggest the outsize role that routine flaring of associated gas plays in driving overall flaring volumes in New Mexico.

The largest gas producer in the state, Hilcorp, with more than double the gas production of the next nearest competitor, reported no flaring to OCD in 2019. Other top gas producers that did not produce large quantities of oil also did not report large volumes of flaring, including BP, Mewbourne, and Chevron, the 6th, 7th and 8th largest gas producers respectively. This suggests that companies primarily engaged in the business of producing gas have found a way to get most of their product into pipelines, as opposed to the major oil producers, who top the list of companies that flare.[27]

It is also likely that venting and flaring is under-reported to OCD, although the magnitude is uncertain. According to the OCD data, only 75 companies reported any venting or flaring volumes in 2019 out of a total of approximately 400 operators reporting oil or gas production statewide in 2019 (although almost all of the states major oil producers were reporting). Reporting non-compliance is a longstanding problem. In a Notice to Operators in 2017, OCD:

> "determined that not all Operators are following the requirement to report flared and vented volumes. Out of 603 well Operators active in the state, only 51 Operators are reporting volumes using the 'V' and 'F' code. It is very important that all Operators in New Mexico report flared and vented volumes since part of the evaluation will help determine any policy or requirements setting goals for reduction of flared gas. We urge all companies to work with their operations and production accounting groups to ensure proper production reporting."[28]

Anomalies in reporting are also suggestive of continuing problems. Several companies among the top oil producers in 2019 reported strikingly small volumes of flared gas. Among the top 20 producers, most reported flaring well over 1 Bcf of gas in 2019. However, a small group reported a tiny fraction of these amounts.

As can be seen in Table 2, Chevron, Enduring Resources, Advance Energy, Mack Energy, and DJR reported minuscule volumes in comparison to other companies producing comparable amounts of oil. And several major oil producers did not report any flaring in 2019, including Mewbourne, the fifth-largest oil producer, and smaller oil producers Legacy, Kaiser-Francis, and Caza. Again, while this may reflect a commitment on the part of these companies to engage in minimal or no flaring, it is also possible that they have been less than rigorous in complying with OCD's venting and flaring reporting requirements. Nevertheless, the large volumes of gas being flared over time by the state's top oil producers is highly suggestive that routine flaring is a key driver of New Mexico's flaring problem.

27 It also may reflect company reporting practices, the basin where these companies' operations are concentrated, or a low incidence of other reasons for flaring. The vast majority of flaring is reported in the New Mexico Permian Basin, while very little is reported in the San Juan Basin.

28 Notice to Oil and Gas Operators, Vented & Flared Volumes Reporting Communication, March 8, 2017. Available at http://www.emnrd.state.nm.us/OCD/documents/20173-8NoticetoOperators.pdf

Another important indicator of routine flaring is information on how long companies have flared at a given well. If companies have routinely sought authorization to flare over very long periods of time, it would indicate that they had proceeded to produce oil regardless of their ability to market associated gas and perhaps never intended to obtain takeaway capacity.[29]

Again, current rules allow companies to flare for up to 60 days following well completion. After that, companies are required to obtain an exemption to the No-Flare Rule from their OCD District Office. The application to flare is Form C-129,[30] which, according to the agency, has historically been submitted in paper form and filed as hard copy.

Several major oil producers have submitted serial applications for flaring for wells that span years.

A request made to OCD in 2019 for electronic records of these forms yielded a very limited sample of scanned forms—from the Hobbs District, one consisting of 87 records from March 2019 and a second consisting of 46 records from September 2019. An examination of just this small snapshot of flaring applications turned up numerous examples of wells that have been flaring gas for very long periods of time, continuing to the present.[31]

As shown in Table 5, several major oil producers have submitted serial applications for flaring at wells that span years.

- EOG and XTO began seeking authorizations to flare at several wells beginning in 2015 and running continuously through June and July 2020, respectively. EOG has submitted 19 applications spanning four years and two months for two wells in the sample. XTO has submitted 16 applications spanning three years and four months for four wells. Each company gave similar reasons in each application: midstream volatility, compressor issues, and pipeline constraints. While these conditions may have occurred occasionally over this five-year period, it is not credible that they would have occurred continuously, beyond these producers' control, throughout.

- COG is the owner of two wells for which 14 applications have been submitted over three years and six months, from February 2016 to May 2020, citing line pressure issues and unplanned midstream curtailment.

- For Matador well 30-025-43013, the first production date was January 26, 2018 per its Completion Report (C-105) submitted in March of that year. Matador began seeking exemptions to the No-Flare Rule for this well on March 15, 2018, and has submitted nine requests subsequently over two years and two months—essentially the well's entire lifetime—with the latest application submitted on March 23, 2020. The reasons given for flaring are pipeline and gas plant issues.

29 Although conceivably it could also reflect situations in which there are very long delays in the construction and commissioning of new infrastructure projects or long-term repeated upset conditions or maintenance problems at existing facilities.
30 Available at http://www.emnrd.state.nm.us/OCD/documents/C-12920110801.pdf
31 The history of C-129s filed for any individual well is available via OCD well files at https://wwwapps.emnrd.state.nm.us/ocd/ocdpermitting//Data/Wells.aspx

➔ Marathon well 30-025-44165 has been flaring continuously since early in its life, with a completion report on November 5, 2018, a first application to flare on March 11, 2019, and, six applications later, a recent application on June 10, 2020, covering a period of one year and four months based on claims of high sales line pressure and gas plant problems.

While the records obtained from OCD and depicted in Table 5 constitute a very limited sample and provide only a snapshot of flaring activity over time, the 15 wells engaged in serial flaring shown here serve as clear evidence of routine flaring adopted as standard business practice by major oil and gas producers. This strongly suggests that analysis of a larger sample of flaring applications would reveal the practice to be widespread. These examples also suggest that this practice has been fully tolerated by regulators. The new rules provide an opportunity to end it.

TABLE 5. SNAPSHOT OF SERIAL FLARING AT NEW MEXICO OIL WELLS

COMPANY	WELL API NUMBER	FIRST APPLICATION DATE	LAST APPLICATION DATE	TOTAL NUMBER OF APPLICATIONS	TIME PERIOD FLARING APPROVED	REASONS GIVEN
XTO	30-025-41003 30-025-40590 30-025-41002 30-025-40591	April 6, 2015	July 2, 2020	16	3 years 4 months	Midstream compressor issues Third party pipeline constraints
EOG	30-025-41546 30-025-41907	August 8, 2015	June 17, 2020	19	4 years 2 months	Third party compressor trouble Midstream volatility
COG	30-025-40688 30-025-42742	February 25, 2016	May 7, 2020	14	3 years 6 months	Line pressure issues Unplanned midstream curtailment
Matador	30-025-44013 30-025-41841 30-025-45223 30-025-44361 30-025-44649 30-025-45760	March 15, 2018	March 23, 2020	9	2 years 2 months	Gas plant issues Pipeline issues
Marathon	30-025-44165	March 3, 2019	June 10, 2020	6	1 year 4 months	Gas plant problems High sales line pressure

Source: OCD Well Files.
Note: Each of the wells shown is not included in every application by the producer, but most wells are included in most applications. In most cases, applications and approvals run continuously during the periods shown.

IV. POLICY IMPLICATIONS AND RECOMMENDATIONS

In "Flaring in the Oilfield," NMOGA avoided the topic of routine flaring in its recommendations, calling only for (1) "more consistency in how flared gas volumes are determined and reported," (2) gas capture plans that require "the operators and the pipeline company to more formally plan for projected volumes and schedules ahead of drilling," and (3) reduction in the number of days producers can flare after completion without authorization from 60 to 30."[32]

NMOGA's effort to dodge the issue of routine flaring is in clear contrast to the approach of the Texas Methane and Flaring Coalition, consisting of seven state trade associations and over 40 Texas operators, which has stated that "The Coalition agrees we should strive to end routine flaring."[33]

In order to adequately address the problem of routine flaring, New Mexico policymakers cannot leave the door open to promises by companies that "we'll get to it," exemptions that swallow the rule, or enforcement actions that are simply absorbed as a cost of doing business. To have teeth and end routine flaring, the New Mexico methane waste rule must (1) ban routine flaring upon the effective date of the rule, (2) condition approvals of new well drilling permits on firm, enforceable gas capture plans, and (3) commit to well shut-ins as an enforcement tool.

1 BAN ROUTINE FLARING UPON THE EFFECTIVE DATE OF THE RULE

New Mexicans have shouldered the burden of unnecessary methane waste and pollution for long enough and it is now past time for companies to step up. The rule should conclusively ban routine flaring upon the effective date of the rule and leave it up to companies whose current disposition is routine flaring to figure out what to do with the gas.

There are many feasible options, including acquiring existing available takeaway capacity, aggregating production to draw investment in new pipelines and processing facilities, gas reinjection, and on-site alternatives such as, power generation, transport of compressed or liquified natural gas to market,[34] or, as discussed further below and practiced by the leading Permian operators, curtailment of production and shut-in of wells until a solution to conform to the prohibition against routine flaring is available.

The new rule should be clear that serial applications to flare will not be tolerated, and OCD should establish procedures to carefully monitor company requests and deny approvals constituting routine flaring; for example, no longer than 90 days for any well in a one-year period.

32 Flaring in the Oilfield at 14-15
33 Flaring Recommendations and Best Practices, Texas Methane and Flaring Coalition, June 16, 2020 at 2. Available at https://texas-methaneflaringcoalition.org/wp-content/uploads/2020/06/6-16-20-TMFC-Flaring-Recommendations-Best-Practices-Report.pdf
34 Alternatives to flaring were detailed in the Methane Advisory Panel Report.

2 CONDITION APPROVALS OF NEW WELL DRILLING PERMITS ON FIRM, ENFORCEABLE GAS CAPTURE PLANS

Gas capture planning provides the state with an opportunity to intervene in a classic market failure. At present, there are harmful inefficiencies in the flow of information between natural gas producers and midstream companies. Better front-end planning—completed before new wells are approved and drilled—would greatly improve this information flow, helping drillers schedule well development based on available takeaway capacity and helping midstream companies schedule system expansion to accommodate forecast aggregate gas production. The report from the state's Methane Advisory Panel provides a comprehensive set of recommendations on what information should be included in these plans.[35]

To support OCD's duty to prevent waste, augmenting the APD approval process by requiring plans to be firm and enforceable by the agency would provide a critical tool to ensure that producers implement their plans in a timely manner. In other words, it would ensure that these plans are not merely aspirational but actually result in delivering gas to market or disposing of gas through means other than venting or flaring. For operators seeking APD approvals for wells without firm drilling schedules or sufficient information to forecast production, the rule could establish a process for conditional APD approval, with requirements to update plans when the required information is available before final drilling approval is granted. Where approved plans are not adhered to, the rule should require suspension or revocation of the underlying permit pending compliance.

Industry analysts have also found that these policies are reasonable and necessary. In "Tackling Flaring: Learnings from Leading Permian Operators," the companies profiled by global oil and gas consultancy GaffneyCline clearly recognize these dynamics and have already adopted these policies.[36] The companies include EOG, Oxy, Chevron, Pioneer, and Parsley. The new waste rule should adopt them too, for all companies producing oil and gas in New Mexico. Here are the report's telling findings:

> "Each producer we spoke to attributes their top-tier performance with the strategic decision to require a gas line be connected on all new wells, eliminating the need to flare associated gas in the first place. Thus, each producer mandates that infrastructure takeaway be in place before a well comes online. This is coupled with the willingness to shut in wells if the infrastructure is not in place."[37]
>
> "Interestingly, these producers don't consider the lack of takeaway as a barrier but a constraint, i.e., a condition that needs to happen before a project is successful. One producer offered an insightful analogy: Just as permitting is built into the process as an additional

35 New Mexico Methane Advisory Panel Technical Report, December 19, 2019. Available at https://www.env.nm.gov/new-mexico-methane-strategy/methane-advisory-panel/
36 Tackling Flaring: Learnings from Leading Permian Operators, supra note 10 at 8. Available at https://www.gaffneycline.com/sites/g/files/cozyhq681/files/2020-06/Tackling%20Flaring_Final.pdf
37 Id at 12

constraint, meaning a producer would not drill a well without a permit, a producer should not drill a well without takeaway." [38]

"Another important point is that necessity of takeaway is in no way an unexpected event. It takes planning, communication, and coordination, which implies the need for time. However, producers suggested there is plenty of time, usually years in advance, considering the months it takes to create a production schedule and budget, construct a pad, and then drill and complete the well."[39]

"Although the terms of these [takeaway] contracts are confidential, producers shared with us that they provide timing and location of well development and projected production volumes well enough in advance to enable midstream companies to respond with adequate gathering and processing capacity. In the spirit of partnership, midstream companies share existing and planned future capacity additions and constraints to better align drilling schedules."[40]

Further, if properly incentivized, companies can also integrate their existing wells into systems to serve new wells to end routine flaring at both. This facilitates an holistic, rather than piecemeal, approach that rightly acknowledges that individual wells and other infrastructure projects are elements of a broader, integrated upstream and midstream production system. As the report notes:

Occidental cited a recent example where they completed a development program tying 395 wells into a single gathering system to prevent flaring from both infield development and existing wells. In this system, they installed both high and low pressure systems to maximize takeaway capacity and eliminate the need to flare gas.[41]

3 COMMIT TO WELL SHUT-INS AS AN ENFORCEMENT TOOL

A critical lesson from the twin crises that befell the oil and gas industry this Spring—a price crash resulting from too much oil supply and too little demand due to the pandemic —is that companies are all too eager to shut in production when it suits them, in this case to hold on to reserves in an historically low-price environment. In response to the crisis, the Lujan Grisham administration loosened rules on temporary shut-ins, allowing companies "flexibility in the number of wells that producers can temporarily shut-in due to economic hardship," including authorization to shut in wells for up to four years.[42,43] The response from industry to this policy change was swift and overwhelming.

38 Id at 13
39 Id at 13
40 Id at 14
41 Id at 14
42 Oil Conservation Division Operations During Declared Public Health Emergency, March 20, 2020. Available at http://www.emnrd.state.nm.us/OCD/documents/How_To_OCD_Business_Operations_During_Emergency_Declaration_3-20-20.pdf
43 Notice Update: Oil Conservation Division Operations During Declared Public Health Emergency, April 30, 2020. Available at http://www.emnrd.state.nm.us/OCD/documents/20-04-30UpdatetoOCDProceduresDuringPublicHealthEmergency.pdf

As of late July 2020, there were nearly 6,000 wells for which shut-in requests had been submitted by companies and approved by OCD.[44] This is roughly 12% of all active oil and gas wells in the state.[45]

It has been conventional wisdom that shutting in a well is a costly proposition for companies and risky for the reserves tapped by the well. However, the resulting mad dash to shut in wells raises doubts about how severe or widespread these risks in fact are.

Recent survey results from the Federal Reserve Bank of Dallas suggests that in an overwhelming majority of cases cost is not really a concern. In their Second Quarter Energy Survey, in response to a question on this topic, 82% of the exploration and production companies responding said that their firms had shut in or curtailed production in the second quarter, with 94% giving low wellhead prices as the reason. The Fed asked these companies if they expected "extra costs" when putting wells back online. Remarkably, 27% said no and 61% said that costs would be "minor;" that is, cost of restarting production was not significant for nine out of 10 firms. Only 11% expected significant costs.[46]

This industry-driven natural experiment in shut ins, while brought on by unprecedented and unfortunate circumstances, provides strong evidence that shutting in wells should be a legitimate tool of state policy to prevent routine flaring. Put simply, the public interest in the reasonable prevention of waste and pollution is at least as important as companies' private interests in maintaining profits. Accordingly, the new methane rule should adopt shut-ins as a compliance tool and OCD should not hesitate to use them.

FLARING IN REEVES COUNTY TEXAS PERMIAN 2019

44 Email communication from OCD, July 28, 2020.
45 OCD Well Statistics—Well numbers by land status, well types, permits, and pluggings by year.
46 Dallas Fed Energy Survey, Federal Reserve Bank of Dallas, Second Quarter June 24, 2020. Available at https://www.dallasfed.org/research/surveys/des/2020/2002.aspx

V. CONCLUSION

On July 20, 2020, the Oil Conservation Division of the New Mexico Department of Energy and Natural Resources released a preliminary discussion draft of its methane waste rule for public review and comment. The draft rule fails to adopt a ban on routine flaring, allowing this practice to continue, and missing the opportunity to drive reductions among major oil producers that are already at or close the 98% capture requirement but still flaring very large volumes of gas.

While the draft rule makes improvements to gas capture planning, it does not require companies to make firm commitments for getting gas to market or specific alternatives to flaring, and does not commit the agency to enforce the plans. And the draft rule does not commit OCD to require well shut-ins as an enforcement tool.

The agency has announced its intention to consider public input and make improvements prior to finalizing a proposed rule for formal rulemaking later this year. We sincerely hope that the state adopts the recommendations in this report and sets New Mexico on a path to lead other states and the nation in ending the wasteful and unnecessary oil and gas industry practice of routine flaring of associated gas.

NEW MEXICO
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EXHIBIT 1. FLARING BY COMPANY 2017-2019 RANKED BY 2019 OIL PRODUCTION

	OIL PRODUCED (BARRELS)			FLARED (MCF)		
COMPANY	2017	2018	2019	2017	2018	2019
EOG RESOURCES INC	22,851,054	37,769,210	56,030,820	1,107,870	2,076,136	1,709,131
OXY USA/OCCIDENTAL PERMIAN	15,005,682	32,487,241	43,737,641	1,025,356	2,962,087	2,174,278
COG OPERATING/COG PRODUCTION	30,449,894	35,018,641	34,225,110	4,254,340	3,249,902	1,905,262
DEVON ENERGY PRODUCTION COMPANY	14,277,914	21,567,170	30,312,177	981,131	4,009,862	4,082,241
XTO ENERGY/XTO PERMIAN OPERATING/ BOPCO, L.P.	6,996,173	11,480,489	21,175,868	625,818	5,081,880	4,467,296
CIMAREX ENERGY	8,469,203	11,300,063	12,537,851	832,567	2,223,657	2,062,078
MATADOR PRODUCTION COMPANY	6,260,640	10,719,041	10,479,222	701,798	1,613,244	1,527,662
CHEVRON USA INC	7,386,903	7,274,617	9,555,530	32,715	50,932	27,114
APACHE CORPORATION	7,549,856	8,407,753	7,017,184	1,024,154	1,596,817	992,751
MARATHON OIL PERMIAN, LLC	1,356,663	5,630,590	6,606,003	1,098,142	2,929,539	2,252,093
BTA OIL PRODUCERS, LLC	2,658,325	3,168,173	4,947,053	343,694	1,199,375	1,040,554
ENDURING RESOURCES, LLC	3,134	3,179,099	3,966,870		44,699	37,208
CONOCOPHILLIPS COMPANY	4,397,092	3,967,516	3,753,413	522,547	513,205	331,961
CENTENNIAL RESOURCE PRODUCTION	375,024	1,900,319	3,513,851	60,258	831,827	1,350,926
CHISHOLM ENERGY OPERATING, LLC	346,214	2,111,713	2,994,675			489,190
WPX ENERGY PERMIAN, LLC	1,877,112	3,093,332	2,823,387	542,933	1,371,421	1,820,509
ADVANCE ENERGY PARTNERS HAT MESA	93,818	964,944	2,685,487			47,339
TAP ROCK OPERATING, LLC	5,507	808,174	2,145,094			1,051,638
MACK ENERGY CORP	839,440	1,144,182	1,618,554	3,829	5,339	6,963
DJR OPERATING, LLC	10,097	191,319	1,550,643		404	9,591
PERCUSSION PETROLEUM OPERATING	341,241	2,030,645	1,456,427		878,059	785,810
AMEREDEV OPERATING, LLC		331,310	1,400,859		1,793,187	3,591,068
SPUR ENERGY PARTNERS, LLC			1,045,617			891,471
LIME ROCK RESOURCES II-A, L.P.	1,069,286	1,318,333	955,160	132,138	191,616	85,508
LOGOS OPERATING, LLC	289,167	706,304	941,015	995	145,301	77,066
BURNETT OIL CO INC	1,186,318	875,493	656,100	132,909	490,680	439,480
READ & STEVENS INC	225,050	254,323	544,695	9,034	16,211	77,641
MURCHISON OIL AND GAS, LLC	920,885	272,044	516,164	112,508	97,174	344,418
STEWARD ENERGY II, LLC	199,033	357,357	498,198	63,263	274,939	203,494

(EXHIBIT 1 CONTINUED)

	OIL PRODUCED (BARRELS)			FLARED (MCF)		
COMPANY	2017	2018	2019	2017	2018	2019
POGO OIL & GAS OPERATING, INC	95,720	461,553	460,726		77,276	86,607
FASKEN OIL & RANCH LTD	719,109	508,280	448,730	70,208	41,215	124,446
COLGATE OPERATING, LLC	403,968	364,083	264,576	5,664	74,546	19,356
MANZANO, LLC	78,923	181,514	264,068	35,336	79,266	69,015
MCELVAIN ENERGY, INC	251,240	446,804	238,102	49,785	67,736	42,621
MARSHALL & WINSTON INC	225,640	285,711	209,299		165	9,898
STRATA PRODUCTION CO	182,834	209,964	190,937		54,636	52,092
IMPETRO OPERATING, LLC		180,550	185,257		503,094	244,726
RIDGEWAY ARIZONA OIL CORP.	17,239	19,768	167,747			91,789
CATENA RESOURCES OPERATING, LLC			95,713			29,569
SPECIAL ENERGY CORP	27,960	72,738	43,640		19,890	19,884
MULLOY OPERATING, INC	756	2,093	20,281			618
WHITING OIL AND GAS CORPORATION	11,997	8,881	12,982	166		45
TAMAROA OPERATING, LLC			11,593			6,105
RG EXPLORATION, LLC		19,678	11,418		30,954	10,764
ASCENT ENERGY, LLC	2,376	8,599	9,436			5,733
D.W.R. OIL PROPERTIES, INC			7,153			10,111
BAM PERMIAN OPERATING, LLC			3,241			47
MNA ENTERPRISES LTD CO	11,421	7,444	2,637	90	33	9

*Includes all companies with non-zero production and non-zero flaring in 2019.

EXHIBIT 2. FLARING BY OPERATOR RANKED BY 2019 FLARING WITH PERCENT OF COMPANY PRODUCTION FLARED*

COMPANY	2019 GAS PRODUCTION (MCF)	2019 FLARED (MCF)	PERCENT OF TOTAL FLARING
XTO ENERGY/XTO PERMIAN OPERATING/BOPCO, L.P.	72,028,232	4,467,296	6%
DEVON ENERGY PRODUCTION COMPANY, L.P.	110,174,749	4,082,241	4%
AMEREDEV OPERATING, LLC	4,600,491	3,591,068	78%
MARATHON OIL PERMIAN, LLC	27,338,268	2,252,093	8%
OXY USA/OCCIDENTAL PERMIAN	155,501,254	2,174,278	1%
CIMAREX ENERGY	78,995,491	2,062,078	3%
COG OPERATING/COG PRODUCTION	151,328,114	1,905,262	1%
WPX ENERGY PERMIAN, LLC	15,706,022	1,820,509	12%
EOG RESOURCES INC	157,968,423	1,709,131	1%
MATADOR PRODUCTION COMPANY	40,232,961	1,527,662	4%
CENTENNIAL RESOURCE PRODUCTION, LLC	5,742,344	1,350,926	24%
TAP ROCK OPERATING, LLC	6,050,693	1,051,638	17%
BTA OIL PRODUCERS, LLC	25,363,851	1,040,554	4%
APACHE CORPORATION	31,669,356	992,751	3%
SPUR ENERGY PARTNERS, LLC	2,333,468	891,471	38%
PERCUSSION PETROLEUM OPERATING, LLC	2,950,123	785,810	27%
CHISHOLM ENERGY OPERATING, LLC	9,832,639	489,190	5%
BURNETT OIL CO INC	3,809,527	439,480	12%
MURCHISON OIL AND GAS, LLC	2,710,429	344,418	13%
CONOCOPHILLIPS COMPANY	16,091,164	331,961	2%
IMPETRO OPERATING, LLC	808,641	244,726	30%
STEWARD ENERGY II, LLC	645,320	203,494	32%
FASKEN OIL & RANCH LTD	1,770,362	124,446	7%
RIDGEWAY ARIZONA OIL CORP.	129,739	91,789	71%
POGO OIL & GAS OPERATING, INC	915,939	86,607	9%
LIME ROCK RESOURCES II-A, L.P.	4,413,660	85,508	2%
READ & STEVENS INC	1,217,183	77,641	6%

(EXHIBIT 2 CONTINUED)

COMPANY	2019 GAS PRODUCTION (MCF)	2019 FLARED (MCF)	PERCENT OF TOTAL FLARING
LOGOS OPERATING, LLC	34,034,746	77,066	0%
MANZANO, LLC	168,321	69,015	41%
STRATA PRODUCTION CO	390,698	52,092	13%
ADVANCE ENERGY PARTNERS HAT MESA, LLC	3,403,758	47,339	1%
MCELVAIN ENERGY, INC	360,269	42,621	12%
ENDURING RESOURCES, LLC	28,772,265	37,208	0%
CATENA RESOURCES OPERATING, LLC	67,275	29,569	44%
CHEVRON USA INC	78,954,941	27,114	0%
SPECIAL ENERGY CORP	943,392	19,884	2%
COLGATE OPERATING, LLC	637,633	19,356	3%
RG EXPLORATION, LLC	10,764	10,764	100%
D.W.R. OIL PROPERTIES, INC	10,111	10,111	100%
MARSHALL & WINSTON INC	693,655	9,898	1%
DJR OPERATING, LLC	7,406,411	9,591	0%
MACK ENERGY CORP	2,866,085	6,963	0%
TAMAROA OPERATING, LLC	6,105	6,105	100%
ASCENT ENERGY, LLC	35,708	5,733	16%
MULLOY OPERATING, INC	19,143	618	3%
BAM PERMIAN OPERATING, LLC	47	47	100%
WHITING OIL AND GAS CORPORATION	46,273	45	0%
MNA ENTERPRISES LTD CO	9	9	100%

*Includes all companies with non-zero production and non-zero flaring in 2019.

FLARING IN THE OILFIELD: A CLOSER LOOK

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