As U.S. drilling plummets to 122-year low, losses may intensify in second half

The catastrophic demand decline initiated by coronavirus lockdowns significantly damaged the U.S. oil industry, with oversupply, historically low storage capacity, and low prices. Operators responded by stacking rigs and shuttingin production.

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The spread of Covid-19 caused widespread disruption to financial and commodity markets during the first half of 2020. Extended government-sponsored lockdowns resulted in economic hardship and a dramatic decline in demand for jet fuel, gasoline and diesel. When the virus-induced disruption was at its peak in March/April, demand for gasoline fell 45%, with only partial recovery in May/ June. Jet fuel also took a major hit, with commercial flights down 80% in April, compared to January levels. The combination of oversupply and loss of demand led to a rapid and intense bust scenario, which was one of the most detrimental in the industry's history.

To revitalize crude markets, OPEC+ reduced oil production in June to its lowest level since the Gulf War in 1991. The reductions came after record cuts in May by Saudi Arabia and Russia, which slashed output by 29% and 17%, respectively. Production in the U.S., during the same timeframe, fell just 8%. The masterfully coordinated OPEC+ reduction strategy pushed WTI and Brent prices up 50% in just two months, to average \$38/bbl and \$41/bbl in June.

Despite the relatively rapid response from OPEC+, plunging oil prices forced 20 U.S. producers to file for bankruptcy protection since the first of this year. And since the beginning of 2015, more than 200 North American oil companies have failed, owing \$130 billion in debt. These firms include Chesapeake, Whiting, Extraction O&G and Ultra Petroleum. The second half of 2020 will be challenging, as companies search for a "new normal" in oil markets and attempt to balance lower commodity prices with their short- and long-term objectives.

MACRO U.S. PICTURE

The Baker Hughes rotary rig count stood at 254 active units during the week ending Sept. 11, 2020. That total is 76% less, or 821 rigs fewer than were working on Jan. 4, 2019, Fig. 1. U.S. drilling activity fell to an all-time low of 244 rigs during the week of Aug. 14, but rebounded to 254/256 the following three weeks, indicating a bottom may have been established. In August, the number of rigs targeting oil in the U.S. fell to 176, the lowest since 1940, according to Baker Hughes.

The extremely weak energy demand, caused by Covid-19, is more dramatic than the U.S. experienced after other major downturns, and hopes for a quick recovery have dimmed. The drop in jet fuel consumption has been twice as deep and substantially more prolonged than when U.S. flights were grounded after the attack on the World Trade Center on Sept. 11, 2001 (EIA). And while U.S. petroleum demand has begun to rebound, the current decrease is four times larger than after the 2008 financial crisis and could take years to return to the pre-crash trajectory.

To offset weaker market fundamentals, Saudi Arabia and Russia combined to play the role of swing producer, reducing production steadily, starting in April. After reaching an all-time high of 12.0 MMbopd in April, the Saudis cut back to 8.48 MMbopd by July. In April, Russia was producing 11.35 MMbopd, but the

Fig. 1. As of September, U.S. rig activity was down 76% from Jan. 4, 2019, as exemplified by Ensign rig T223, drilling for Parsley Energy at Pecan State Unit 4303JH, as it targets the Lower Wolfcamp formation. The site is near the town of Coyanosa, in Pecos County Texas. For another view of this site, please see this issue's front cover. Image: Parsley Energy.



country reduced output to 9.37 MMbopd by July. The reductions, along with continued economic recovery and demand rebound in China, helped push oil prices higher in August, with WTI (\$42.10/bbl) and Brent (\$44.50/bbl) posting gains of 3.5% and 3%, m-o-m.

OVERALL U.S. FORECAST

Against this dire backdrop, World Oil forecasts a major drilling slowdown for the remainder of the year, projecting just 10,821 total wells for 2020—a 51% reduction from the 2019 count of 22,140, Table **1.** *If this forecast is realized, it will be the low*est U.S. total since 1898, when just 8,644 wells were tallied, Fig. 2. Total footage is projected to decline from 285.1 MMft in 2019 to just 142.9 MMft in 2020—an alarming decrease of 50%. During 2020, 6,809 wells are estimated to have been drilled during the first six months, while only 4,012 are expected to spud in the second half of the year, for a half-to-half decline of 41%. A 44% decrease in footage is expected in the last six months. In any case, the authors are certain that the 2020 well total will be the lowest in more than 80 years. (Caveat - with the U.S. Presidential election approaching, a Democratic win could cause additional panic in the industry, mitigating a slight increase in activity that the authors predict in the 4th quarter. If that happens, the 2020 total well count may be even worse than the 10,821 projected.)

We have some confidence in this forecast, given that our recent survey of U.S. operators constitutes 29% of national activity, which is a very good sample. And in some areas, it is even higher. For instance, in Texas District 8, our survey covers 50% of the well total that we expect. Similarly, our operator survey covers the following shares of activity we expect in these key states/areas: Pennsylvania, 57%; Texas District 1, 45%; Texas District 7C, 44%; California, 53%; Texas District 4, 37%; Colorado, 27%; and North Dakota, 27%.

Shale companies on life support. The latest bust comes just as U.S. shale players were starting to recover from the devastating oil price collapse experienced during 2015-2016. "The shale players have had a near-death experience," said Raoul LeBlanc, IHS Markit. "It will take some time to get themselves back in a better position." Occidental Petroleum says it will have one rig working in the Permian basin during the second half of the year. Excessive debt from the Anadarko Petroleum purchase has crippled the company. Although the deal was supposed to consolidate Oxy's position as the largest oil producer in the Permian, it has had the opposite effect. In May 2019, Oxy was running 12 rigs in West Texas and New Mexico, while Anadarko had 10 units making hole. This means Oxy's forecast for the second half of 2020 represents a 95% reduction in drilling activity.

Diamondback Energy intends to maintain its current oil output level for the remainder of the year, which is dramatically lower than 2019. Diamondback CEO Travis Stice said "growth in today's world is pretty much off the table." Concho Resources expressed similar intent. Centennial Resource Development plans to employ a single rig during second-half 2020. Callon Petroleum slashed its production forecast for the year by 15%, to

100,000 bopd and announced a maintenance capital plan that includes no more than 95,000 bopd in 2021. Callon said, "we believe that this program at current prices will yield meaningful additional free cash flow."

Major service companies exit. Schlumberger's exit from the U.S. frac market is a clear sign that activity in the U.S. shale plays is on a protracted downturn. Schlumberger agreed to sell its U.S. and Canadian fracing business to rival Liberty Oilfield Services, after similar exits by Baker Hughes and Weatherford. Halliburton is now the sole global provider of well completions for shale in the U.S., but is looking overseas for better growth. The Schlumberger deal is a substantial reversal from its North American buying binge over the past few years, which added frac sand mines and artificial lift technology, and purchased Weatherford's frac fleet for \$430 million.

For Liberty, buying Schlumberger's OneStim unit in exchange for a 37% stake in the company means the contractor will double the size of its frac fleet in a market that has sidelined three-fourths of U.S. crews this year. The Liberty deal is the latest move by Schlumberger CEO Olivier Le Peuch to adjust to the new global business environment, which also includes a 21,000-person reduction in the company's workforce.

Canceled infrastructure projects. The major decline in drilling activity indicates that the U.S. E&P industry is in survival mode, with many projects either

canceled or postponed. In the Permian

Table 1. Mid-year revision, 2020 U.S. drilling forecast.

	2020 v	wells	2020 footage, 1,000 ft						
State or area	First half	Second half	9 Year	% difference, 1st half vs. 2nd half	First half	Second half	Year	2019 wells ³	2019 footage, 1,000 ft ³
Texas ¹	2,934	1,402	4,336	-52.2	41,829.2	19,132.4	60,961.6	9,670	133,991.8
Southeast ^{1,4}	240	230	470	-4.2	2,694.1	2,496.5	5,190.6	704	7,883.5
Northeast ⁵	584	471	1,055	-19.3	8,562.1	6,848.4	15,410.5	1,914	26,104.6
Midwest ⁶	133	127	260	13.0	412.4	357.9	770.3	328	863.9
Mid-Continent ⁷	1,220	931	2,151	-23.7	17,812.8	11,751.5	29,564.3	4,111	55,470.1
Rocky Mountains ⁸	1,206	596	1,802	-50.6	17,797.5	8,774.1	26,571.6	3,773	52,507.3
West Coast ⁹	416	189	605	-54.6	1,381.7	675.7	2,057.4	1,424	4,712.1
Alaska-offshore ²	0	2	2		0.0	19.0	19.0	7	66.9
California-offshore ²	0	1	1		0.0	6.1	6.1	18	109.8
Gulf of Mexico ²	76	63	139	-17.1	1,262.9	1,069.7	2,332.6	191	3,358.7
Total U.S.	6,809	4,012	10,821	-41.1	91,752.7	51,131.3	142,884.0	22,140	285,068.7

¹ Excludes state and federal offshore wells, which are included in the GOM total.

² Includes state and federal offshore wells.

^{3 2018} estimates are based on well counts furnished by state

and federal regulatory agencies, and API.

Includes Alabama, Arkansas, Florida, Louisiana, Mississippi and Tennessee

Includes New York, Ohio, Pennsylvania, Virginia and West Virginia.

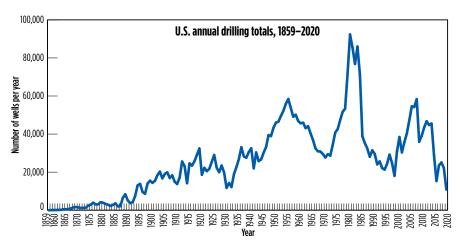
⁶ Includes Illinois, Indiana, Kentucky, Michigan and Missouri.

⁷ Includes Kansas, Nebraska, North Dakota, Oklahoma and South Dakota.

⁸ Includes Colorado, Idaho, Montana, Nevada, New Mexico, Utah and Wyoming.

⁹ Includes Alaska-onshore, California-onshore and Oregon,

Fig. 2. As this chart readily shows, U.S. drilling has been through many ups and downs over the last 161 years. The 2020 wells drilled total may be the lowest since 1898. Chart: *World Oil* current and archival data.



basin, Enterprise Products Partners abandoned a major crude pipeline in West Texas. With the extended nationwide lockdowns eviscerating fuel demand, Enterprise shelved plans to add 450,000 bopd of capacity to a system that carries oil from the Permian to the U.S. Gulf Coast. Enterprise joins scores of oil explorers, contractors and pipelines that have slashed billions in investments amid a swelling supply.

In the Marcellus play, intense pressure from investors, customers and climate activists led to the cancellation of three interstate gas pipelines, worth \$10 billion. The actions will choke-off Appalachian producers' access to new customers in the northeastern and southeastern U.S. More than 30 cities have banned natural gas in new buildings since July 2019.

Job cuts. Approximately 103,000 oil and gas jobs have been lost in the U.S. during the economic downturn, brought on by the coronavirus event. An analyzed report of U.S Federal Bureau of Labor Statistic data found that 44,550 jobs have been eliminated from oilfield service companies; 23,050 jobs from drilling and extraction companies; 16,000 jobs from pipeline companies; and 20,000 jobs in the oil and gas supply chain have been lost since the outbreak of Covid-19. The energy research firm said the job cuts are attributed mainly to low oil prices driven by a sharp contraction in domestic oil demand. This resulted in an unprecedented demand-supply imbalance. In response to the weakened demand, operators and OFS companies have been frantically cutting jobs to survive.

Drilled-but-uncompleted wells. As of August 2020, operators working the U.S. shale plays had archived 7,665 DUCs, with 46% of that total in the Permian basin (EIA). Realistically, it will take several years to pare-down the 7,665-well logiam, and the extended downtime could damage boreholes and negatively impact project economics. And some wells may never be completed, especially considering the current business climate. It is certain that the U.S. E&P industry will undergo significant changes over the next several years, especially in the shale plays. Against this backdrop of unprecedented demand disruption, World Oil presents its 2020 U.S. mid-year forecast.

CAPEX REDUCTION

With no accurate prediction of when demand might recover, timed with a Covid-19 vaccine, North American operators are expected to significantly reduce capital expenditures. According to James West, senior managing director at Evercore ISI, "the devastation brought forth to the U.S. and Canadian industry cannot be overstated, as three years of painfully slow singledigit growth from 2017-2019 have been eliminated." In March, the decline in oil prices and Covid-19 logistical challenges drove completion activity to a halt, as the U.S. land rig count pulled back sharply. Evercore is forecasting U.S. capex to decline 43%, to \$58 billion in 2020. This is lower than 2016 U.S. capex spending of \$60 billion.

Evercore estimates the 2020 U.S. land rig count will decrease 58%, year-over-

year, and average 389 units. In the second quarter, U.S. land rigs declined 46%, but recently the losses have started to bottom out. NAM E&P capex has now fallen 5% below the 2016 trough and is 71% below the 2014 peak, reverting back to 2003/2004 levels before the U.S. shale revolution blossomed. Overall, NAM capex has contracted during 12 of the last 36 years by an average 24%.

COMMODITY PRICES/OUTPUT

On April 20, panicked selling of oil futures—initiated by plummeting demand caused by Covid-19 and fears over dwindling U.S. storage capacity—triggered a 300% drop in the WTI futures price to minus \$37.63/bbl. The negative price event, and subsequent collapse of spot prices, forced the world's three largest oil producers to reduce output to balance oil markets. Saudi Arabia and Russia jointly played the role of swing producer after the negative price event. The Saudis reduced output by 4.52 MMbopd between April and June, settling at 7.48 MMbopd in June before increasing to 8.48 MMbopd in July. During the same timeframe, Russia cut its output by 2.03 MMbopd, dropping to 9.32 MMbopd in June, then back up to 9.37 MMbopd in July. U.S. operators shut in more than 2.0 MMbopd during the three-month period, ending at 10.44 MMbopd in June, after reaching an alltime high of 13.01 MMbopd in February.

The supply reductions had the desired effect. With Saudi Arabia and Russia adhering to cuts, WTI recovered during second-quarter 2020, averaging \$28/bbl, after bottoming at \$16.55/bbl in April. Brent also recovered quickly in the second quarter, averaging \$29.30/bbl, gaining \$10.92/bbl from April's low of \$18.38/bbl. The price difference between WTI and Brent is partially due to the higher shipping costs required to move product from Midland to the Gulf Coast.

EIA forecast. The EIA's Short-Term Energy Outlook, published September 2020, reports that reduced economic activity related to Covid-19 has caused changes in energy demand and supply patterns during 2020. This STEO assumes U.S. gross domestic product declined by 4.6% in first-half 2020 from the same period a year ago and will rise, beginning in the third quarter, with year-over-year growth of 3.1% in 2021. Brent crude oil spot prices averaged \$45/bbl in August, up \$2/bbl

from the July average. Brent prices in August were up \$26/bbl from the multi-year low monthly average in April. EIA forecasts monthly Brent spot prices will average \$44/bbl during the fourth quarter and rise to an average \$49/bbl in 2021, as oil markets become more balanced.

Crude oil production. U.S. production has risen in recent months after declining from 12.7 MMbopd in first-quarter 2020 to a recent low of 10.02 MMbopd in May. EIA estimates that U.S. crude oil production increased to 10.8 MMbpd in August. Production has risen, as tight oil operators have brought wells back online in response to rising prices after curtailing production amid low oil prices in the second quarter. The increase in total U.S. production occurred despite shut-in output in the Gulf of Mexico, resulting from Hurricane Laura. EIA expects production to rise to 11.2 MMbopd, as GOM output returns.

Natural gas prices. In August, Henry Hub natural gas spot price averaged \$2.39/MMBtu, up from an average \$1.84/MMBtu in July. Higher spot prices reflect rising demand for natural gas from the U.S. electric power sector, as a result of warmer-than-normal temperatures during August and rising demand for U.S. LNG exports amid declining U.S. natural gas production. EIA expects that rising domestic demand and demand for LNG exports heading into winter, combined with reduced production, will push spot prices to rise to a monthly average of \$3.53/ MMBtu in January 2021.

Natural gas production. EIA forecasts U.S. dry natural gas production will average 89.9 Bcfd in 2020 and monthly average output will fall from a record-high 96.2 Bcfd in November 2019 to 85.5 Bcfd in February 2021, before increasing slightly. Natural gas production declines the most in the Permian region, where EIA expects low crude oil prices will reduce volumes of associated casinghead gas. EIA's forecast of U.S. dry natural gas production averages 86.6 Bcfd in 2021. EIA expects production to begin rising during second-quarter 2021, in response to higher natural gas and crude oil prices.

LNG exports. EIA estimates that U.S. LNG exports averaged 3.7 Bcfd in August, a 19% increase from July. This gain occurred amid rising spot and forward natural gas prices in Europe and Asia, which had fallen to record lows in late May and June, as Covid-19 mitigation efforts reduced global natural gas consumption. Higher global forward prices indicate improving netbacks for buyers of U.S. LNG in European and Asian markets for the upcoming fall and winter seasons, amid expectations of natural gas demand recovery and potential LNG supply reduction, because of maintenance at the Gorgon LNG plant in Australia. EIA forecasts that U.S. LNG exports will return to pre-Covid levels by November and will average more than 9 Bcfd from December 2020 through February 2021.

U.S. FORECAST

Given the heightened level of uncertainty related to low demand/low oil prices, operators working the various U.S. plays plan to drastically reduce drilling activity for the remainder of 2020. The Permian and other oil-rich shale plays will all take a major hit in the second half of the year. However, drilling on the Texas side of the Haynesville is projected to remain surprisingly stable. Offshore activity will decrease, but not as drastically as the shale plays.

Gulf of Mexico. The high return potential associated with offshore reservoirs

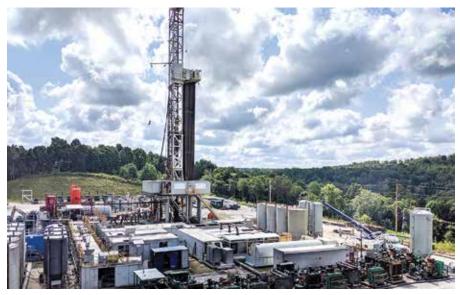
Fig. 3. Exemplified by Shell's Appomattox platform, which went onstream in 2019, deepwater projects continue to comprise the lion's share of Gulf of Mexico development work. Image: Shell.



Fig. 4. Transportation issues associated with North Dakota's remote location, along with mediocre oil demand, have pushed the state's production down to just 60% of its level in January 2020. Image: ConocoPhillips.



Fig. 5. Although Marcellus shale activity in the Northeast has waned, it has not fallen as far as some other U.S. shale plays, thanks to its gas-focused nature. Image: CNX Resources Corporation.



will mitigate activity losses in the Gulf of Mexico during the second half of the year, Fig. 3. According to *World Oil's* survey results and federal officials' outlook, well counts will dwindle slightly during second-half 2020. *World Oil* forecasts that GOM activity totaled 76 wells in the first half of the year, with another 63 scheduled to be drilled during second-half 2020. The projected 139-well total will be 27% lower than 2019's figure of 191.

In April, Equinor announced it discovered GOM oil at its Monument exploration well, Walker Ridge Block 316. The well encountered 200 ft of net oil pay, with good characteristics, in a Paleogene sandstone reservoir. The well was drilled using the *Pacific Khamsin* rig to total footage of 33,348 ft. Equinor said determining the discovery's full potential will require further appraisal drilling.

STATE-BY-STATE OUTLOOK

Texas. The shale boom in the Lone Star State is winding down. In June 2020, the Texas RRC issued just 312 drilling permits, compared to 1,001 in June 2019, a 69% decline. The June total includes 262 permits to drill new wells, three to re-enter plugged wellbores and 21 for re-completions of existing wells. These statistics are strong evidence that operators will significantly reduce activity during the second half.

On a half-over-half basis, World Oil predicts Texas wells will drop 52%, with

the 2020 total being only 45% of the 2019 figure. In the Permian basin, District 8 will be down 60% in the second half, and its total will only be 44% of the 2019 total. Districts 7C and 8A are down similarly, particularly compared to their 2019 totals. The Eagle Ford is down in the same magnitude, with District 1 off 59% in the second half, and for the year, will total only 42.5% of the 2019 figure. District 2 is similar. However, District 4 in the Eagle Ford is even between the two halves, although down 74% from 2019's level. The reason that District 4 is bottoming out and staying even through the rest of this year is more gas-related activity. Other bright spots in Texas are Districts 5 (up, but very little activity), and 6 and 7B, staying even. Again, more gas drilling is a factor, especially in RRC 6, with the Haynesville down just 1% y-o-y.

Activity also will be hampered by the relentless drive to stack multiple well-bores into ever-shrinking sweet spots that has resulted in a DUC count of 3,532 in the Permian and 1,177 in the Eagle Ford, as of August. These two Texas plays account for 61% of the total U.S. DUC tally of 7,665.

Oklahoma. Although the SCOOP and STACK plays appeared to have significant potential, the region's inconsistent geology has produced unpredictable results, reducing ROI. Another disappointment has been poor output from secondary, or

"child wells" that produce less oil than the original. Devon has reduced activity in the area and downsized its spending in the region. Based on these facts, it's no surprise that Oklahoma's drilling will be down 50%, compared to 2019, with half-on-half activity down 50% too.

Louisiana. In the state's northern portion, operators developing Haynesville shale gas will drill 30% fewer wells in 2020 (313), then they did in 2019 (446), with total footage down approximately 32%. With natural gas prices gaining in the second quarter, the decrease in activity could subside, similar to the Haynesville play in Texas RRC District 6. In the mature, shallow oil plays of southern Louisiana, activity is slowing, with footage forecast to decrease 34%, and well spuds dropping 40%, y-o-y.

North Dakota. Transportation issues associated with the oil-rich Bakken play's remote location continue to plague the region, Fig. 4. Additionally, the cost of drilling 11,000-ft laterals is also a suppressing factor, with some wells reaching an MTD of 21,000 ft. Considering these factors, along with data from state officials and World Oil operator surveys, we forecast that drilling and footage will both decline 45%, y-o-y, in the Peace Garden State.

Continental Resources announced it would curtail 70% of its Bakken oil production in May, with continued reductions of 50% into July. In June, total production averaged 150,000 boed and is expected to average 200,000 boed during second-half 2020. CEO Bill Berry said, "we elected to defer production to preserve shareholder value over volume, to maximize economics of barrels we produce. However, if oil prices rise, we will continue restoring production in subsequent months."

Northeast (Pa./W.V./Ohio). In the Northeast, Marcellus activity is waning, similar to other U.S. shale plays, Fig. 5. But improving natural gas prices and LNG exports from Dominion Energy's massive Cove Point facility could help mitigate losses in the region, eventually. However, according to survey results, operators tapping the high-quality reservoir in Pennsylvania will reduce the number of wells drilled this year by 43% to just 544, compared to 953 drilled in 2019. Total footage for 2020 is forecast to drop 41%.

In **West Virginia**, *World Oil* forecasts a 48% decrease in drilling, with a 57%

drop in total footage, suggesting operators will drill shorter laterals in 2020. Operators working the shale fields of Appalachia added 146 DUCs in July on a y-o-y basis, a 35% increase. In Ohio, operators working the Utica play are struggling too, with this year's total well count expected to finish 34% lower than last year's level. Footage is forecast to drop 31%.

Rocky Mountains. In Colorado, state officials are seeking to ban, or severely limit, drilling in the state. In 2019, the state passed Senate Bill 118, "which fundamentally altered the oil and gas industry's future in the state," according to Colorado Governor Jared Polis. It appears the legislation is having the desired effect, as World Oil expects Colorado activity to decline 59% on a half-over-half basis, with the 2020 total 46% less than the 2019 well count.

In March 2019, a federal judge ordered a halt to exploration on 300,000 acres in Wyoming, saying the government must account for its cumulative effect on global climate change. The ruling came in a lawsuit filed by a pair of environmental conservation groups, challenging the BLM's

decision to lease federal lands for energy development in the state. If the ban is enacted, Wyoming could lose 33,000 jobs, in addition to \$640 million in state federal revenue. Given that nearly 50% of all lands in Wyoming are owned by the federal government, a ban on federal leasing would decimate the natural gas industry and Wyoming's economy along with it, according to Petroleum Association of Wyoming President Pete Obermueller. The threat of legislation appears to have driven off many operators, as the state's activity is projected to plummet 74% in 2020, both in well count and total footage drilled.

New Mexico was late to join the Permian shale boom, and that situation will help insulate the state from more dramatic losses. Increased completion efficiencies in the Bone Springs formation also will help mitigate losses, as drilling activity in the Land of Enchantment is forecast to drop just 35% in 2020, with a 33% decrease in total footage.

In California, we expect onshore operators to spud 59% fewer wells in 2020, compared to 2019. With no new discoveries, operators working the Golden State are forced to survive by maintaining lessattractive heavy oil fields and residual acreage from previous successful excursions. These facts, combined with downward pressure on oil prices, should cause a 60% decline in onshore footage. Drilling offshore California has essentially stopped, with only one well expected in 2020. The situation in the state has deteriorated to the point, where virtually all activity is conducted by just four companies.

In Alaska, onshore activity on the North Slope is projected to decrease 46%, with total footage also down 46%%. Offshore work in the Cook Inlet will plummet 71%, with just 2 wells forecast for 2020, five less than the number spudded in 2019.

Others. Despite the catastrophic decline, there are a few bright spots. Drilling will increase on a half-over-half basis in Alabama (gas), Arkansas, Kansas (shallow, vertical oil wells and some gas drilling), Kentucky, Montana and New York (gas drilling). But these states have low volumes, and their combined increase is offset by just the loss in Texas District 8, alone. WO

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