

DEPARTMENT OF THE INTERIOR
Bureau of Ocean Energy Management (BOEM)

2019 Annual Price Threshold Determination Technical Documentation

This documentation explains in detail how BOEM calculates the annual oil and gas prices and applicable price thresholds used to determine whether royalty relief applies in calendar year 2019 for our various deepwater and deep drilling royalty relief programs. The data and methodology used for making the 2019 calculations and determinations, as well as additional information and notes to help understand this document, are included in the discussion below. The calculation for all years since 1996 is available at the Economics Division's Web site, <https://www.boem.gov/Current-Price-Thresholds-Determination/>

Methodology for Calculation of the Actual Annual Average New York Mercantile Exchange (NYMEX) Nearby Delivery Price

1. We use the NYMEX price for the nearby delivery month or front month. This is the price on that exchange for the first contract or earliest month that you can get the delivery/inventory for buying and selling today's product. For example, on October 1, 2019, the nearby delivery month was November 2019. There are prices for other delivery months that could have been bought and sold on October 1, 2019, such as December 2019, January 2020, etc., but the "nearby delivery month" would be November 2019. However, the nearby delivery month is not always the next month. NYMEX trading rules for oil and natural gas are different:
 - a. Crude Oil: Trading terminates 3 business day prior to the 25th calendar day of the month prior to the contract month. If the 25th calendar day is not a business day, trading terminates 4 business days prior to the 25th calendar day of the month prior to the contract month. For example, on May 21, 2019 the nearby delivery month for crude oil was June 2019 (May 25th was a Saturday). However, on May 22, 2019 the nearby delivery month became July 2019.
 - b. Natural Gas: Trading terminates on the 3rd business day prior to the end of the month. This means that on the 2nd business day prior to the end of the month, the nearby delivery month is now two months away. For example, unlike crude oil, on May 22, 2019 the nearby delivery month for natural gas was still June 2019. The nearby delivery month for natural gas didn't shift to July 2019 until May 30, 2019.
2. The daily NYMEX closing price is listed as the settle price at the end of business trading hours for each commodity. These are listed at <https://www.cmegroup.com/>.
3. The daily closing average is used to calculate the monthly average. For holidays and weekends, we use the previous business day's closing average. For example, Table A illustrates the calculation of the average NYMEX oil price for the month of September 2019. Our analysis indicates that inclusion or exclusion of weekends

and holidays does not bias the annual average price calculation in either direction. We chose to include the weekends and holidays, as highlighted in Table A, to avoid the necessity to keep track of actual trading days each month all year.

Table A - Example of Monthly Average Price Calculation

Day	Date	Daily closing price (\$/bbl)	Day	Date	Daily closing price (\$/bbl)
Sunday	9/1/2019	55.10	Monday	9/16/2019	62.90
Monday	9/2/2019	55.10	Tuesday	9/17/2019	59.34
Tuesday	9/3/2019	53.94	Wednesday	9/18/2019	58.11
Wednesday	9/4/2019	56.26	Thursday	9/19/2019	58.13
Thursday	9/5/2019	56.30	Friday	9/20/2019	58.09
Friday	9/6/2019	56.52	Saturday	9/21/2019	58.09
Saturday	9/7/2019	56.52	Sunday	9/22/2019	58.09
Sunday	9/8/2019	56.52	Monday	9/23/2019	58.64
Monday	9/9/2019	57.85	Tuesday	9/24/2019	57.29
Tuesday	9/10/2019	57.40	Wednesday	9/25/2019	56.49
Wednesday	9/11/2019	55.75	Thursday	9/26/2019	56.41
Thursday	9/12/2019	55.09	Friday	9/27/2019	55.91
Friday	9/13/2019	54.85	Saturday	9/28/2019	55.91
Saturday	9/14/2019	54.85	Sunday	9/29/2019	55.91
Sunday	9/15/2019	54.85	Saturday	9/30/2019	54.07
				Average	\$56.68

- The monthly average is used to calculate the annual average. For example, Table B illustrates the calculation of the NYMEX oil price for 2019. The dollar amount of the result is rounded to the nearest hundredth decimal point (i.e., cents). We do not weight the average each month by the number of days in that month, because our analysis indicates that this simplification does not introduce a systematic bias in the calculation.

Table B - Example of Annual Average Price Calculation

Month	Average closing price (\$/bbl)
January	51.48
February	55.07
March	58.09
April	63.79
May	60.89
June	54.86
July	57.50
August	54.84
September	56.68
October	54.13
November	57.08
December	59.84
Average	57.02

Methodology for Calculation of the Applicable Oil and Natural Gas Price Thresholds

1. The price thresholds are estimates until they are locked-in based on complete inflation data for a calendar year which is not available until several months after the close of the year. In conjunction with the calculation of the annual market prices for oil and gas above, once the price thresholds are “locked in,” BOEM makes an official determination regarding whether these market prices have exceeded the applicable price thresholds for the calendar year for a given vintage of lease and royalty relief program. This locked-in price threshold also becomes the base from which we calculate the price threshold for the next year for each vintage of leases. After this official BOEM determination is made, any subsequent revisions in the underlying source of the inflation figures will not affect the locked-in price thresholds or the determination of eligibility for royalty relief for that calendar year. We lock in the price threshold determination using the best information available before March 31 of the following year because that is the date by which lease documents and regulations stipulate that make-up royalty payments are due if prices exceed the threshold. This procedure prevents subsequent revisions of the inflation measure for the year from altering the royalty payment obligation.
2. The source for inflation data is the Department of Commerce, Bureau of Economic Analysis (BEA) <http://www.bea.gov>: The U.S. Economic Accounts—Gross Domestic Product (GDP), National Income and Products Account (NIPA) Table 1.1.9. The 4th quarter implicit price deflator is not available from BEA until late March of the subsequent calendar year.
3. BOEM uses the implicit price deflator for GDP to calculate the applicable annual inflation rate, as illustrated in Table C. This is the inflation measure the Deep Water Royalty Relief Act directs be used to adjust its price thresholds and we have adopted it for use with other price thresholds for consistency purposes. We calculate the inflation rate by dividing the deflator from the applicable year by the deflator from the previous year and subtract one. For example, the inflation rate used to set the 2019 price threshold is calculated as $\{(112.345/ 110.420) - 1 = 1.7\}$.

**Table C—Inflation Rates (Current and Locked-in)
[Derived from BEA Data]**

Calendar year	Current Implicit price deflator for GDP (base = 2012)	Current annual inflation rate (%)	Locked-in annual inflation rate (%)
1994	70.392		
1995	71.868	2.1	2.6
1996	73.183	1.8	2.0
1997	74.445	1.7	2.0
1998	75.283	1.1	1.0
1999	76.370	1.4	1.5
2000	78.078	2.2	2.1
2001	79.790	2.2	2.2
2002	81.052	1.6	1.1
2003	82.557	1.9	1.7
2004	84.780	2.7	2.1
2005	87.421	3.1	2.8
2006	90.066	3.0	2.9
2007	92.486	2.7	2.7
2008	94.285	1.9	2.2
2009	95.004	0.8	1.2
2010	96.111	1.2	1.0
2011	98.118	2.1	2.1
2012	100.000	1.9	1.8
2013	101.755	1.8	1.5
2014	103.638	1.9	1.5
2015	104.717	1.0	1.0
2016	105.801	1.0	1.3
2017	107.794	1.9	1.8
2018	110.420	2.4	2.3
2019	112.345	1.7	1.7

4. Because BEA periodically updates its estimates of previous years' rates of inflation, the levels of inflation from those years as currently shown on the BEA Web site will diverge somewhat from the original inflation rates posted by BEA and used by BOEM to lock in the updated price thresholds (see Table C above). For example, the GDP deflator posted on the BEA Web site in March 2011 shows an inflation rate for 2004 of 2.7 percent. However, back in March 2005, when BOEM chose to lock in the 2004 price threshold to avoid subsequent recalculations that might change the determination of whether certain royalties were due and payable for 2004, the BEA Web site showed an inflation rate of 2.1 percent. BOEM used that level of the inflation rate in making the annual change in the deepwater oil price thresholds. This can be seen in the first price threshold column of the Deepwater Table on the Web site, in which the threshold price for selected leases increased from \$32.81/bbl in 2003 to \$33.50/bbl in 2004, equal to 2.1 percent.

In summary, BOEM uses the figures that were originally shown on the BEA website in March of each year to make the adjustments and reach finality in the price thresholds

from year to year. Rounding explains any remaining small differences between calculated locked-in inflation rates and those rates depicted on BOEM's website. Therefore, except for minor rounding considerations, BOEM's actual price thresholds for previous years are taken directly from the locked-in inflation rates. The estimated price thresholds depicted on BOEM website, prior to March of the subsequent year, rely on an estimate of the current inflation rate but do not become official until BEA releases its annual measure of inflation for the entire year at the end of March of the subsequent year.