



# Yale SCHOOL OF MANAGEMENT

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Company Report

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## Whiting Petroleum Corp. (NYSE: WLL)

**RECOMMENDATION - BUY**

### HIGHLIGHTS

- **Decreasing absolute value of debt:** Management has a debt target of \$2 B. They plan to prioritize paying down debt with cash flows
- **Increasing capital efficiencies:** with adaptation of new drilling technologies, including multivariate analysis of individual areas in the Williston Basin
- **Reducing capital expenditures (CAPEX):** by managing the asset portfolio to maximize capital efficiency<sup>1</sup>. Management target CAPEX for 2019 is \$820M, representing a 17% drop from the previous year.
- **Hedging with derivatives contracts:** the company has hedged 57% of commodity prices for 2019 and 10% for the first half of 2020 (Business Wire)<sup>2</sup>

### COMPANY METRICS

<b>Ticker</b>	<b>Exchange</b>
WLL	NYSE
<b>Market Cap</b>	<b>Price</b>
2.161B	\$23.53
<b>PE Ratio</b>	<b>Date of Price</b>
8.4	5/3/2019
<b>EPS (TTM)</b>	<b>Price Target</b>
2.22	\$33.4
<b>52 Week Range: \$18.37 – 56.47</b>	

Source: Factset, Yahoo Finance and Stockrow

### VALUATION SUMMARY

We use APV valuation method, with our best assessment of industry and company factors to estimate the fair equity value for the company. Our valuation of Whiting's equity value as of May 3, 2019 is **\$3.34 billion USD**, with a fundamental share price of **\$36.6** and an upside of 56%. We therefore recommend a **BUY** for Whiting Petroleum.

<sup>1</sup> <https://whitingpetroleumcorp.gcs-web.com/static-files/05a4995e-221e-496b-9d9d-736c1880c88f>

<sup>2</sup> <https://www.businesswire.com/news/home/20190501005921/en/>

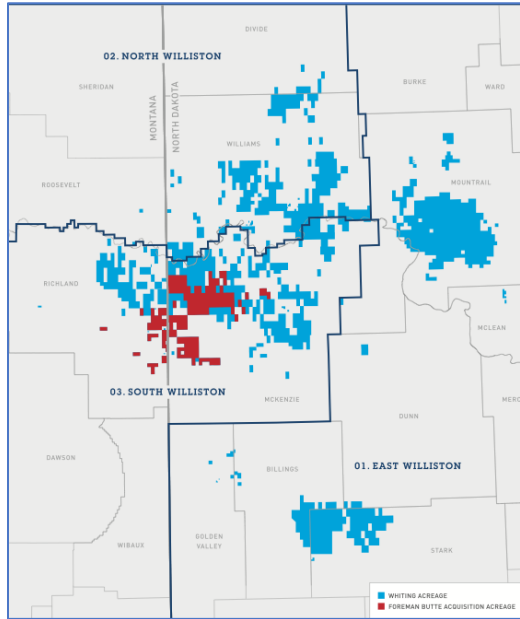


Figure 1: Map of Whiting's Williston Basin Reserve areas (Source: WLL 2018 10-K<sup>1</sup>, Factset)

## BUSINESS OVERVIEW

Whiting Petroleum Corporation (Ticker: WLL) is an independent oil and gas exploration and production company focused on the development, production, acquisition, and exploration of oil and gas reserves. It was founded in 1980 with headquarters in Denver, Colorado<sup>3</sup> and became publicly traded in 2003. Whiting operates exclusively in the United States and focuses on developing reserves in the Rocky Mountain region with fields in North Dakota and Montana.

## MARKET SEGMENTATION

The main source of revenue for Whiting is oil, followed by natural gas liquids (LNG) and natural gas (NG). Since 2015, Whiting has decreased their proportion of total sales of oil and natural gas while increased in the segment of natural gas liquids.

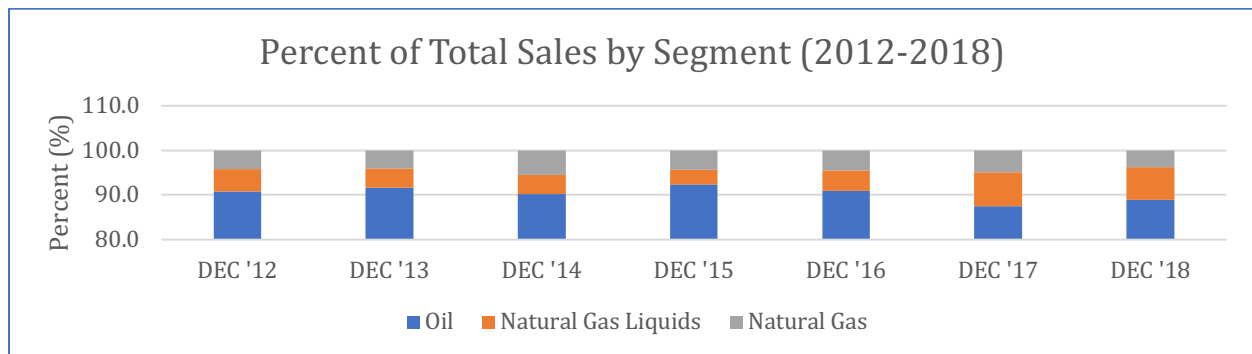
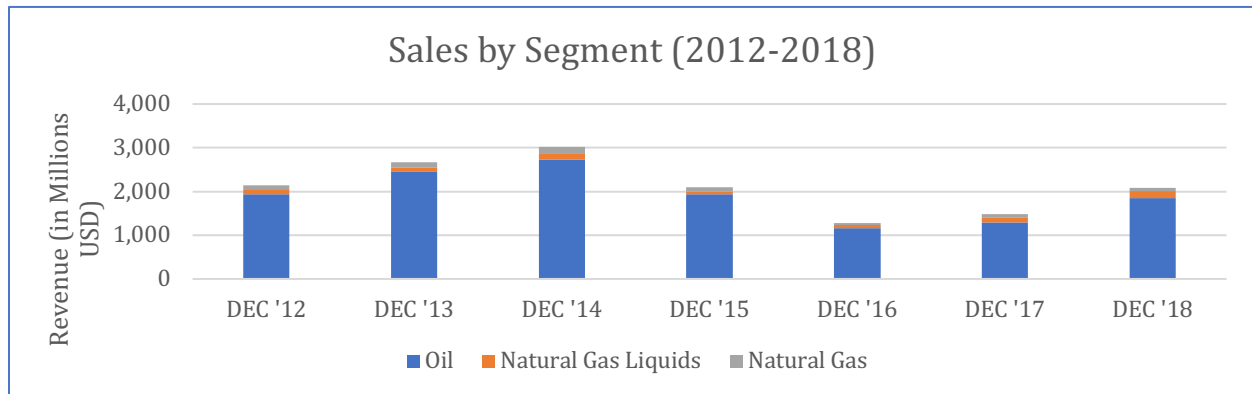


Figure 2: Graphs of Whiting Petroleum's business segments (Sources: WLL 2018 Annual Report<sup>1</sup>; Other Sources: WLL 2018 10-K<sup>1</sup>, Factset)

<sup>3</sup> <https://finance.yahoo.com/quote/WLL/profile?p=WLL>

## WHITING PETROLEUM CORPORATION'S REVENUE EXPOSURE

Whiting Petroleum's operations are all in the United States and all of its revenues are exposed to the US market. This presents the company with both advantages and disadvantages. On the one hand, the company has zero international geographical diversification. On the other hand, it is not exposed directly to international geopolitical risks.

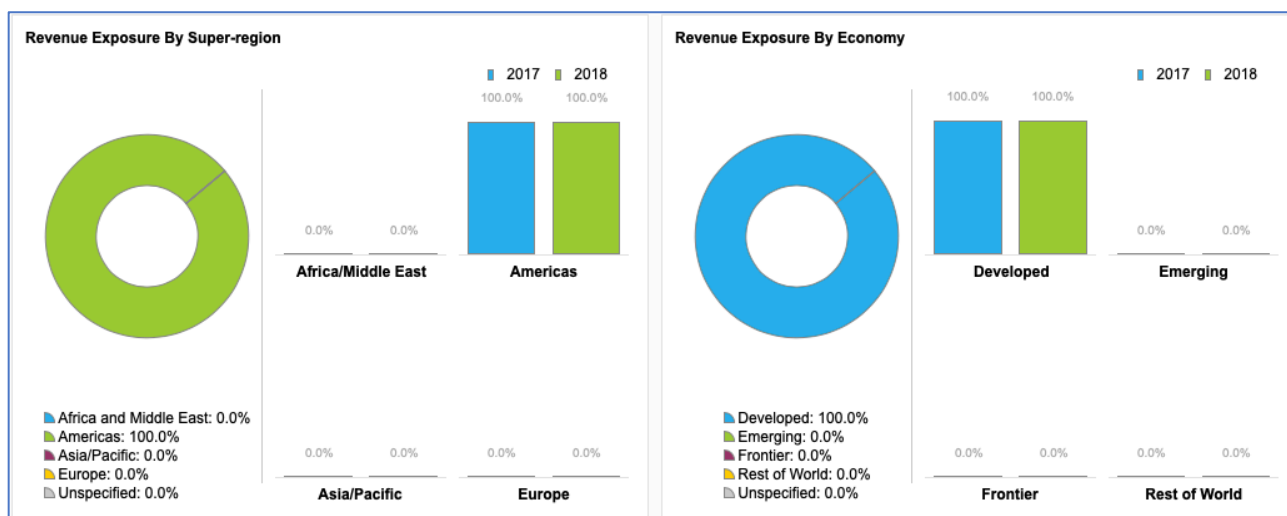


Figure 3: Whiting's Revenue Exposure domestically and internationally (Source: Factset)

## CORPORATE STRATEGY

Whiting Petroleum continues to pursue aggressive cost reduction measures, such as increasing capital efficiencies through technology development and making divestitures to pay their outstanding debt obligations. According to their 2018 Q4 report, Whiting has improved oil drilling efficiency year to year. Most recently, they have developed customized well-completion designs for each area, including closer spacing of wells, increased fracture intensities and adapting multivariate analysis to identify important completion factors in each area of the Williston basin<sup>4</sup>. According to their 2018 10-K report, Whiting has made 5 divestures (one additional deal pending) between 2016 and 2019 and they have used a portion of the sales to pay their debt obligations. In 2018, they acquired a portion of the Williston basin (2018). Whiting has worked towards reducing their total debt to under \$2B USD. Management restated their commitment to their 2017 debt reduction plan in the Q4 2018 Earnings Call "to take every cashflow dollar to pay down the debt." Additionally, "to position itself to weather pricing downturns" the firm has hedged 57% of its oil and natural gas exposure for the rest of 2019. The firm has also hedged 10% of its oil and natural gas production, for the first half of 2020, as a percentage of March 2019 production (Q1 2019 Earnings Call and Business Wire statement on Q1 2019 Financial and Operations Report<sup>5</sup>).

<sup>4</sup> <https://seekingalpha.com/article/4244820-whiting-petroleum-corporation-2018-q4-results-earnings-call-slides>

<sup>5</sup> <https://www.businesswire.com/news/home/20190501005921/en/>

## HISTORICAL PERFORMANCE (As of May 3, 2019)



Figure 4: Whiting's Historical Performance – current price as of May 3, 2019 (Source: Factset)

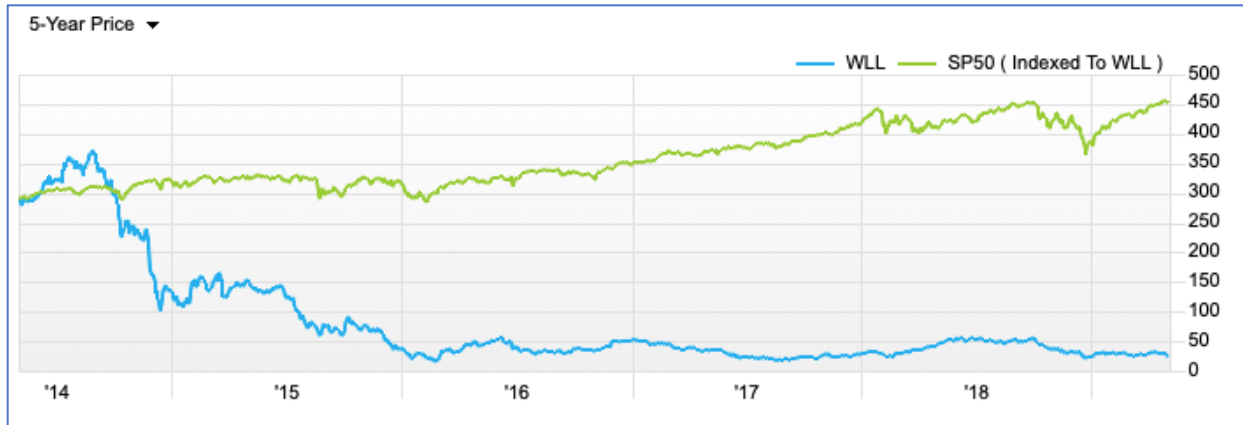


Figure 5: Whiting's Historical Performance- S&P500 indexed to WLL (Source: Factset)



Figure 6: Whiting's Performance relative to Oil & Gas Exploration ETF (XOP) (Source: Factset)

The stock price of Whiting has been volatile over the past decade, \$370.64 being its all-time-high. When compared with the Oil and Gas Exploration and Production ETF(XOP), Whiting’s stock performance moved above and below the industry average implying a higher than average volatility. The firm’s 52-week price range is \$18.37 to \$56.67, representing 140% above and 22% below the current stock price. In fiscal year 2014, the share price plummeted. Earlier that year, Whiting’s acquisition of a competitor also contributed to the drop in its market value. In July 2014, Whiting announced an all-stock acquisition of Kodiak Oil & Gas Corporation for \$6B USD (inclusive of Kodiak’s \$2.2B in net debt), when oil price was at \$104/bbl, in order to expand in the Bakken reserve<sup>6</sup>. After the announcement, Whiting’s stock fell by up to 50%. The market’s negative reaction probably stemmed from two main reasons. Firstly, the acquisition was at a premium. Secondly, the all-stock purchase signaled that Whiting’s stock was overvalued<sup>7</sup>. Between the fourth quarter of 2014 and into 2015, the share price continued to drop due to a decrease in oil price as can be seen in the graph below.

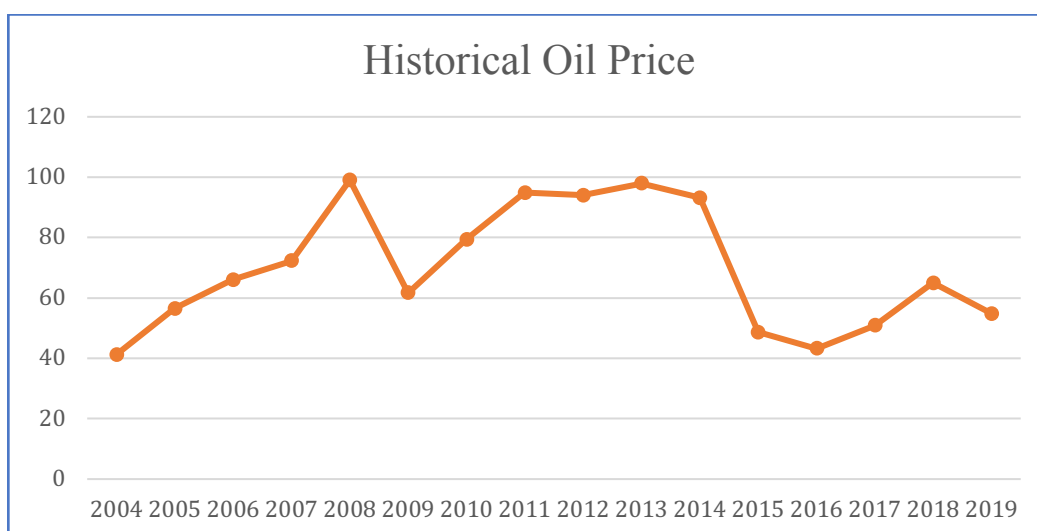


Figure 6: Historical Oil Price (Source: Statista<sup>8</sup>)

### COMPARABLE FIRMS (As of May 1, 2019)

As shown in the table below, Whiting’s EV/EBITDA and EV/EBIT multiples are below the industry average. The lower multiples imply that Whiting has a cheaper valuation relative to its close competitors<sup>8</sup>. This is also supported by our valuation that shows an upside of 56%.

<sup>6</sup> <https://www.businesswire.com/news/home/20140713005030/en/Whiting-Petroleum-Corporation-Acquire-Kodiak-Oil-Gas>

<sup>7</sup> <https://seekingalpha.com/article/2781305-whiting-petroleum-sold-off-unloved-and-a-deeply-undervalued-value-play>

<sup>8</sup> <https://www.investopedia.com/ask/answers/072715/what-considered-healthy-evebitda.asp>

Company Name	Fiscal Period	Price	Shares Outstanding	Market Value	Shares Outstanding Diluted	Enterprise Value	Sales	EBIT	EBITDA	Enterprise Value/EBIT	Enterprise Value/EBITDA
Whiting Petroleum	12/31/2018	23.11	91.8	2,122.4	91.8	4,901.1	2,081.4	585.9	1,404.3	8.36x	3.49x
<b>Average</b>		<b>35.15</b>	<b>353.6</b>	<b>10,694.0</b>	<b>349.9</b>	<b>16,090.2</b>	<b>4,183.5</b>	<b>1,117.8</b>	<b>2,301.4</b>	<b>12.87x</b>	<b>7.31x</b>
<b>Median</b>		<b>25.11</b>	<b>423.3</b>	<b>4,320.5</b>	<b>425.2</b>	<b>7,542.9</b>	<b>2,309.5</b>	<b>518.6</b>	<b>1,110.9</b>	<b>13.23x</b>	<b>6.97x</b>
Anadarko Petroleum	12/31/2018	71.54	502.0	35,910.1	494.0	53,479.1	13,078.0	3,327.0	7,668.0	16.07x	6.97x
Black Hills	12/31/2018	71.80	60.2	4,320.5	58.3	7,542.9	1,754.3	397.2	593.5	18.99x	12.71x
Cabot Oil & Gas	03/31/2019	25.11	423.3	10,628.7	425.2	11,533.2	2,309.5	871.6	1,397.0	13.23x	8.26x
Denbury Resources	12/31/2018	1.90	460.4	874.8	456.7	3,262.3	1,453.7	518.6	737.4	6.29x	4.42x
Oasis Petroleum	12/31/2018	5.39	322.1	1,736.0	315.1	4,633.4	2,321.9	474.7	1,110.9	9.76x	4.17x

Comps Source: Top 5 Named Competitors  
All figures in millions of U.S. Dollar, except per share items

Key Comps							
	Price	MV (M)	PE (NTM)	PEG (NTM)	ROE (%)	EPS YoY (%)	
Whiting Petroleum Corporation	23.11	2,122	11.0	8.8	6.4	-	
Anadarko Petroleum Corporation	71.54	35,910	29.9	3.0	5.4	-	
Black Hills Corporation	71.80	4,320	20.4	15.8	13.3	45.1	
Cabot Oil & Gas Corporation	25.11	10,629	12.9	0.4	29.7	465.7	
Chesapeake Energy Corporation	2.73	4,458	4.3	0.7	1,398.4	-5.3	

Figure 7: Whiting Petroleum's key competitors and performance ratios: EV/EBIT vs. EV/EBITDA (Source: Factset)

## FORECAST

All figures are in millions of USD except otherwise stated. Note that share prices are in their actual values.

## Revenue/Sales

	DEC '08	DEC '09	DEC '10	DEC '11	DEC '12	DEC '13	DEC '14	DEC '15	DEC '16	DEC '17	DEC '18
<b>Sales</b>	<b>1,316.5</b>	<b>917.5</b>	<b>1,475.3</b>	<b>1,860.1</b>	<b>2,137.7</b>	<b>2,666.5</b>	<b>3,024.6</b>	<b>2,092.5</b>	<b>1,285.0</b>	<b>1,481.4</b>	<b>2,081.4</b>
Oil	1,082.8	807.6	1,268.2	1,621.5	1,940.5	2,443.7	2,729.0	1,931.9	1,167.8	1,296.4	1,850.1
Natural Gas	233.7	109.9	133.1	130.0	88.3	108.8	167.0	90.4	58.2	73.4	77.7
Natural Gas Liquids	-	-	74.0	108.6	108.9	114.0	128.6	70.2	59.0	111.6	153.6

Table 1: Whiting Petroleum's historical revenue/sales (Source: Factset)

To forecast revenue, we first used the historical prices of the commodities to estimate the effective production volumes or amounts sold for each commodity product segment by dividing each historical revenue stream by their respective commodity price. This revealed an eight-year average production growth rate of 9.5%, -0.4%, and 16.0% for oil, natural gas and natural gas liquids respectively. Within the last five years, Whiting has had an average growth rate of 5.4% (oil), 0.1% (NG) and 11.8% (LNG) for each segment. As shown in the table below, Whiting entered the LNG segment in 2011 and the growth rate in this revenue stream is much faster than the other areas. The estimated historical production levels of natural gas did not grow significantly in the long-run whereas the production of oil has been growing steadily at 5.4%.

Production Volumes	DEC '08	DEC '09	DEC '10	DEC '11	DEC '12	DEC '13	DEC '14	DEC '15	DEC '16	DEC '17	DEC '18
Oil	10.9	13.0	16.0	17.1	20.6	24.9	29.3	39.7	27.0	25.5	28.5
Natural gas	26.4	27.9	30.5	32.5	32.1	29.2	38.2	34.5	23.1	24.5	26.0
Natural gas Liquid	0.0	0.0	6.3	7.2	9.9	11.5	13.5	14.1	11.7	16.1	18.7

Change in production	DEC '08	DEC '09	DEC '10	DEC '11	DEC '12	DEC '13	DEC '14	DEC '15	DEC '16	DEC '17	DEC '18	8-year Growth	5-year Growth
Oil		1.20	1.22	1.07	1.21	1.21	1.17	1.36	0.68	0.95	1.12	9.5%	5.4%
Natural gas		1.06	1.09	1.07	0.99	0.91	1.31	0.90	0.67	1.06	1.06	-0.4%	0.1%
Natural gas Liquid				1.15	1.38	1.16	1.17	1.05	0.83	1.38	1.16	16.0%	11.8%

Table 2: Whiting Petroleum's historical production volumes and change in production levels of each business segment (Source: Analysts' calculations)

In their 2018 Q4 Earnings Call, the management reemphasized their goal of managing capital spending but did not provide a specific target amount. According to the CEO Bradley Holley, “Capital discipline is a top priority in 2019, and we will rigorously pursue executing on our guidance”. Similar to other companies in their industry, Whiting’s management team has expressed their intention to reduce capital expenditures to focus on generating free cash flows. Given their desire to reduce CAPEX to \$820mm USD in 2019 (but with no stated growth rate expectations), we estimated that a general reduction in capital investments would produce a slower growth rate. As a result, to forecast the 10-year production level of each revenue stream, we increased the production level for each business segment at a growth rate that linearly declines from the 5-year average historical growth rate to a terminal growth of 3% (approximately equal to the world GDP growth). Over the next 10 years, we expect an average production growth rate of 5.9%, 0.1% and 7.0% in Whiting’s oil, NG, and LNG segments respectively.

Production Forecast	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	Average growth
	1	2	3	4	5	6	7	8	9	10	11	
Oil	31.19	33.78	36.39	38.98	41.53	44.00	46.36	48.57	50.60	52.42	53.99	5.9%
Natural Gas	26.01	26.03	26.05	26.07	26.09	26.11	26.13	26.15	26.17	26.19	26.21	0.1%
Natural Gas Liquids	20.95	23.08	25.26	27.43	29.57	31.65	33.61	35.43	37.06	38.47	39.62	7.0%

Table 3: Production forecast for each business segment (Source: Analysts)

### Oil Price Forecast

Since Whiting obtains its sales from production in the United States alone, we used the U.S. inflation rate, 1.9% as the growth rate for our oil and gas price forecast. The long-run growth rate of oil price has been close to the inflation rate. Additionally, according to management’s statements in the 2019 Q1 Earnings Call, their strategy “is designed to benefit from commodity price fluctuations [by taking] advantage of the recent oil price increase to put on additional hedges in the second half of 2019 and in the first half of 2020 locking in favorable pricing”. Management states: “We are 57% percent hedged for the balance of 2019 at strong prices with a mix of swaps and collars.” We believe they will have lower risk exposure to oil price fluctuations in the coming year.

Price Forecast	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	Average growth
Oil	66.17	67.43	68.71	70.02	71.35	72.70	74.09	75.49	76.93	78.39	79.88	1.019
Natural Gas	3.05	3.10	3.16	3.22	3.29	3.35	3.41	3.48	3.54	3.61	3.68	1.019
Natural Gas liquids	8.36	8.51	8.68	8.84	9.01	9.18	9.35	9.53	9.71	9.90	10.09	1.019

Table 4: Price forecast for each product segment (Source: Analysts' calculations)

## Revenue Forecast

We multiplied the production level of each segment by the unit price forecasted for each year and obtained the following revenue forecast as shown in the table. We believe a total average ten-year revenue growth rate of 8% decreasing to 6% is reasonable expectation for the company.

Revenue Forecast	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	"19-29 Average	"25-29 Average
Oil	2064.1	2278.0	2500.4	2729.5	2963.2	3199.1	3434.6	3666.7	3892.6	4108.9	4312.6	1.08	1.06
Natural Gas	79.2	80.8	82.4	84.0	85.7	87.4	89.1	90.9	92.7	94.5	96.4	1.02	1.02
Natural Gas Liquids	175.0	196.6	219.1	242.5	266.4	290.5	314.4	337.7	360.0	380.8	399.6	1.09	1.07
<b>Total Revenue</b>	<b>2318.3</b>	<b>2555.4</b>	<b>2802.0</b>	<b>3056.1</b>	<b>3315.4</b>	<b>3577.1</b>	<b>3838.1</b>	<b>4095.4</b>	<b>4345.2</b>	<b>4584.2</b>	<b>4808.6</b>	<b>1.08</b>	<b>1.06</b>

Table 5: Revenue forecast for each product segment (Source: Analysts' calculations)

On May 1<sup>st</sup>, 2019, the company released their first quarter financial and operating results. In the Q1 report (as we can see from the chart below on the left), the stock price dropped from \$27 to \$23.5 (a 15% decrease) immediately after its publication. This is primarily due to the drop in net income of Q1 2019 to negative \$68.9M from positive \$15M as the net cash provided by operation activity dropped from \$232M to \$148M.



Figure 8: Performance after 2019 Q1 Earnings Call (left) and performance of Oil Price (right) (Source: Factset)

However, this can be explained by the concurrent short term drop of oil price from the end of 2018 to early 2019. At the beginning of 2019, the price of oil dropped from around \$60 per barrel from a year ago to \$50. As we can see from the table above (right), the oil price is rising again, and just increased back above \$60. As a conclusion, we think the oil price fluctuation is a short-term trend, and should not affect our long-term forecast on oil price and net cash flow significantly.



## Cost of Goods Sold (COGS)

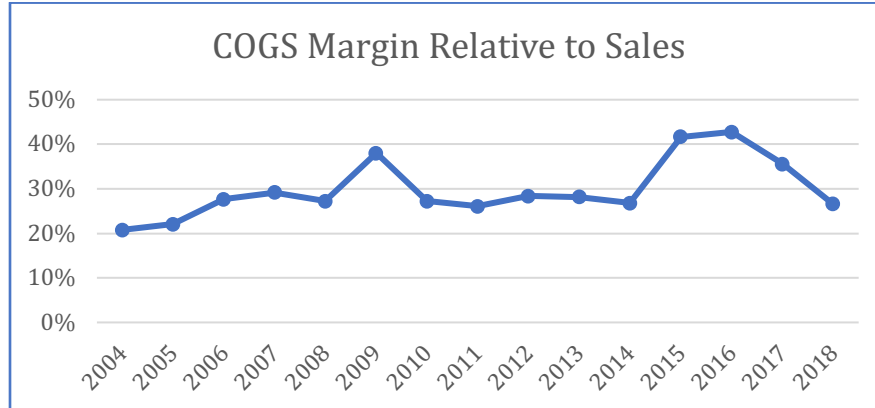


Figure 9: Historical COGS Margin (Source: Factset & Analysts' calculations)

As shown in the graph above, the ratio of COGS on sales has ranged as low as 20% and as high as 45% in the last 15 years. To obtain a more accurate relationship between COGS and sales, we analyzed comparable firms in the industry. First, we identified 40 companies with similar market capitalization as a proportion of the industry, and further narrowed down to 20 companies similar to Whiting that are involved in all three business segments (oil, liquid natural gas (LNG) and natural gas (NG)). COGS was calculated by performing a multiple regression of change in COGS with change in sales of each business segment. The results of the regression are as shown below:

<b>COGS Regression Statistics</b>	
Multiple R	0.694
R Square	<b>0.482</b>
Adjusted R Square	0.468
Standard Error	895.430
Observations	118
<b>Coefficients</b>	
Intercept	1.126
Change in Oil Sales	0.205
Change in NG Sales	<b>1.537</b>
Change in NGL Sales	1.043

Table 6: COGS Regression Statistics (Source: Analysts' calculations)

Using the intercept and slopes of the above regression for each business segment, COGS was forecasted as shown in the table below:

COGS Forecast	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E
Change in Oil Sales	214.0	213.9	222.4	229.1	233.7	235.9	235.5	232.2	225.8	216.3	203.7
Change in NG Sales	1.5	1.6	1.6	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.9
Change in NGL Sales	21.4	21.5	22.6	23.4	23.9	24.1	23.9	23.3	22.3	20.8	18.9
Change in COGS	69.6	69.8	72.6	74.9	76.4	77.1	76.9	75.6	73.3	69.9	65.3
<b>COGS</b>	623.5	693.2	765.9	840.7	917.1	994.2	1071.1	1146.7	1220.0	1289.9	1355.2
<b>Forecast COGS Margin</b>	27%	27%	27%	28%	28%	28%	28%	28%	28%	28%	28%

Table 7: COGS Forecast (Source: Analysts' calculations)

## Selling, General, & Administrative (SG&A) and Operating Expenses (OPEX)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average
SG&A on Sales	4.7%	4.6%	5.2%	4.5%	9.4%	4.4%	5.9%	8.2%	11.4%	8.4%	5.9%	6.34%

SG&A, OPEX, D&A Forecast	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	SG&A Margin
SG&A	147	162	178	194	210	227	243	260	275	291	305	6.34%

Table 8: SG&A margin on sales (Source: Factset) and SG&A forecasts (Source: Factset & Analysts' calculations)

Whiting has high historical values of SG&A of 6.34% compared to the representative industry average of 4.2% (from ten selected companies from the industry). The higher than average value is probably due to the addition of operating expense to SG&A. The operating expense of the company has been zero since 2009. We forecast that the SG&A will remain at a constant margin of sales.

## Operating Expenses (OPEX)

Analysis of Other Operating Expenses	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average
Sales	1,316	918	1,475	1,860	2,138	2,667	3,025	2,092	1,285	1,481	2,081	
Other Operating Expenses	32	3	0	0	0	0	0	0	0	0	0	0
Margin	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2.1%

Table 9: Historical trend of operating expenses and the OPEX margin on sales (Source: Factset & Analysts' calculations)

As stated above, Whiting has no other operating expenses every year since 2009. We assume OPEX is incorporated into SG&A costs given the company's relatively high SG&A. We therefore follow the trend and forecast an OPEX of zero for the foreseeable future.

## Capital Expenditures (CAPEX)

CAPEX Forecast	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E
CAPEX Margin	40%	36%	33%	31%	31%	31%	31%	31%	31%	31%	31%
CAPEX	927	920	925	936	1,016	1,096	1,176	1,255	1,331	1,405	1,473

Table 10: Forecast of capital expenditures as a proportion of sales (Source: Analysts' calculations)

Given their stated desire in the Earnings Call to decrease CAPEX and improve cash flows, we believe they are gradually going to reduce CAPEX. However, we predict management will be unable to meet their goal of \$820 million spend because the company overspent on CAPEX in 2019 Q1 as stated in their 2019 Q1 Earnings Call on May 1st, 2019. Rather, we predict a 2019 CAPEX of \$927 million dollars (40% proportion of sales) similar to the 2018 CAPEX of \$957 million dollars (46% proportion of sales). We forecast CAPEX by starting with the 2018 CAPEX margin on sales and scaling it down to the industry average of 31%.

## Depreciation & Amortization (D&A)

We noticed that D&A has invariably been a fraction of the value of CAPEX except for fiscal years 2015 and 2016 when D&A was higher than CAPEX. However, the long run average D&A margin (D&A on CAPEX) has been 58%. We used this margin to forecast the D&A going forward.

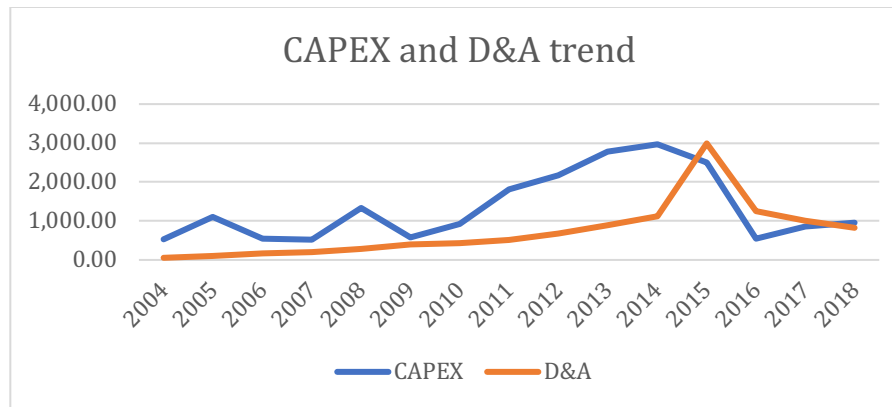


Figure 10: D&A and CAPEX trend (Source: Factset)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average
D&A on CAPEX	21%	67%	46%	28%	32%	32%	38%	120%	225%	118%	85%	58.7%
D&A Forecast	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	D&A/CAPEX (AVG)
D&A	544	540	543	549	596	643	690	736	781	824	864	58.7%

Table 11: Forecast of D&A as a proportion of CAPEX (Source: Factset & Analysts' calculations)

### Change in Working Capital

Analysis of Historical CA and CL	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018		
Sales	1,316	918	1,475	1,860	2,138	2,667	3,025	2,092	1,285	1,481	2,081		
COGS	358	349	401	486	607	750	810	872	550	527	554		
Current Assets	217.074	176.025	233.543	298.703	384.412	1069.618	842.999	535.19	622.602	1189.628	398.426		
Current Liabilities	351.168	282.732	459.205	567.034	636.979	777.685	1208.516	599.813	478.331	1553.328	536.931	Average	Median
Current Assets on Sales	16.5%	19.2%	15.8%	16.1%	18.0%	40.1%	27.9%	25.6%	48.5%	80.3%	19.1%	27.6%	20.0%
Current Liabilities on Sales	26.7%	30.8%	31.1%	30.5%	29.8%	29.2%	40.0%	28.7%	37.2%	104.9%	25.8%	34.2%	29.8%
Working Capital	-134.094	-106.707	-225.662	-268.331	-252.567	291.933	-365.517	-64.623	144.271	-363.7	-138.505		
Correlation of CA v Sales													
Correlation of CL v Sales													

Table 12: Historical analysis of Current Assets and Current Liabilities as a proportion of sales (Source: Factset & Analysts' calculations)

We forecasted the change in working capital by first decomposing working capital into the difference of current assets and current liabilities. To forecast current assets and current liabilities, we looked at the relationship between current assets with sales and current liabilities with sales. The correlation between current assets (CA) vs. sales and current liabilities (CL) vs. sales were equally strong (correlation coefficient CA on Sales: 66.5%) vs. (correlation coefficient CL on Sales: 67.8%). Consequently, we decided to use the average historical margins of 27.6% of current assets on sales and median historical margins of 29.8% of current liabilities on Sales to forecast. We used median margin for the forecast of CL because the presence of a major outlier (104%) in the historical CL on sales margins. We subtracted the forecasted current liabilities from current assets and took the change of working capital (change in working capital = working capital<sub>(t)</sub> – working capital<sub>(t-1)</sub> where t is the year).

Working Capital Forecast	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E
Current Assets -	639.9	705.3	773.4	843.5	915.1	987.3	1059.4	1130.4	1199.4	1265.3	1327.3
Current Liabilities	690.8	761.4	834.9	910.6	987.9	1065.9	1143.7	1220.3	1294.8	1366.0	1432.8
Working Capital	-50.9	-56.1	-61.5	-67.1	-72.8	-78.5	-84.3	-89.9	-95.4	-100.6	-105.6
Change in Working Capital	87.6	-5.2	-5.4	-5.6	-5.7	-5.7	-5.7	-5.6	-5.5	-5.2	-4.9

Table 12: Forecast of Change in Working Capital (Source: Analysts' calculations)

## Changing Debt to Equity Ratio

Whiting Petroleum Company has been changing their ratio of Total Debt to Market Equity significantly. As a result, we proceeded with APV analysis to determine the fair market value.

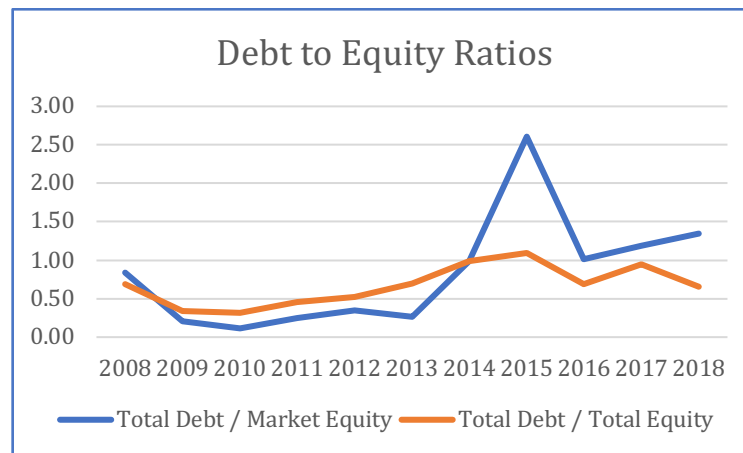


Figure 11: Historical analysis of Total Debt to Market Equity (Source: Compustat & Analysts' calculations) and Total Debt to Total Equity (Source: Factset)

Debt to Equity Ratio Analysis	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
End of Year Market Value	1416.13	3632.88	6861.36	5480.52	5101.66	7341.12	5493.58	1927.11	3417.81	2401.68	2064.68
<b>Total Debt / Market Equity</b>	<b>0.84</b>	<b>0.21</b>	<b>0.11</b>	<b>0.25</b>	<b>0.34</b>	<b>0.27</b>	<b>0.99</b>	<b>2.61</b>	<b>1.01</b>	<b>1.18</b>	<b>1.35</b>
Total Debt / Total Equity	0.69	0.34	0.32	0.46	0.52	0.69	0.99	1.09	0.69	0.95	0.65
Net Debt to Equity Ratio	65.42	33.61	30.86	45.16	50.95	51.05	95.09	105.73	67.34	72.57	65.07
Debt	1,240	780	800	1,380	1,800	2,654	5,629	5,198	3,535	3,723	2,792
Net Debt	1,183	763	781	1,364	1,755	1,954	5,415	5,023	3,462	2,844	2,779
Cash & Equivalents	56.4	16.7	19.0	15.8	44.8	699.5	213.7	174.8	<b>73.2</b>	879.4	13.6

Table 13: Historical analysis of Total Debt to Market Equity (Source: Compustat & Analysts' calculations) and Total Debt to Total Equity (Source: Factset)

## Adjusted Present Value Input Data

### Effective Tax Rate

Effective Tax Rate Data	2011	2012	2013	2014	2015	2016	2017	2018	Average
Year									
Effective Tax Rate	34.3%	36.9%	35.9%	39.5%	35.9%	37.4%	62.4%	<b>72.8%</b>	<b>36.7%</b>
Source: 10-K									

Table 14: Historical analysis of Whiting's effective tax rate (Source: Whiting's 10-K statements)

Due to the fluctuations in the effective tax rate over the past few years and the absence of a clear forecast of effective tax rates in the firm's 10-K, we are using the average rate over the period from 2011 to 2016. We excluded 2017 and 2018 because they seem to be outliers. We forecast the effective tax rate using the average value of 36.7%. We think our forecast tax rate is reasonable because comparable companies like as ConocoPhillips and Noble have similar effective tax rates (that of ConocoPhillips is estimated to be 36.8%)

## Free Cash Flow (FCF)

Free cash flow was forecasted as  $EBIT \times (1 - \text{effective tax rate}) + D\&A - \text{Change in Working Capital} - CAPEX$ . EBIT was determined as  $\text{Revenue} - COGS - OPEX - SG\&A - D\&A$ .

## Unlevered Cost of Equity

Unlevered Cost of Equity was calculated by first determining the unlevered beta that we calculated from the 5-year rolling average beta of Whiting relative to CRSP market returns. As shown in the rolling beta graph below, the rolling levered beta has fluctuated between values of 2 and 3.5. We therefore calculated the levered beta to be 3.333 using the average from the beginning of 2017 to end of 2018.

Unlevered Cost of Equity Calculation		
Levered Beta	3.333	
Effective Tax Rate	36.7%	
Debt to MV of Equity	134.6%	As of May 3rd, 2019
Unlevered Beta	1.592	
+ 10y Risk Free Rate	2.54%	From Factset
Market Premium	5.96%	From Factset
<b>Unlevered Cost of Equity</b>	<b>12.03%</b>	

Table 15: Unlevered cost of equity calculation (Sources: Factset, Mercer's Capital and Analysts' calculations)

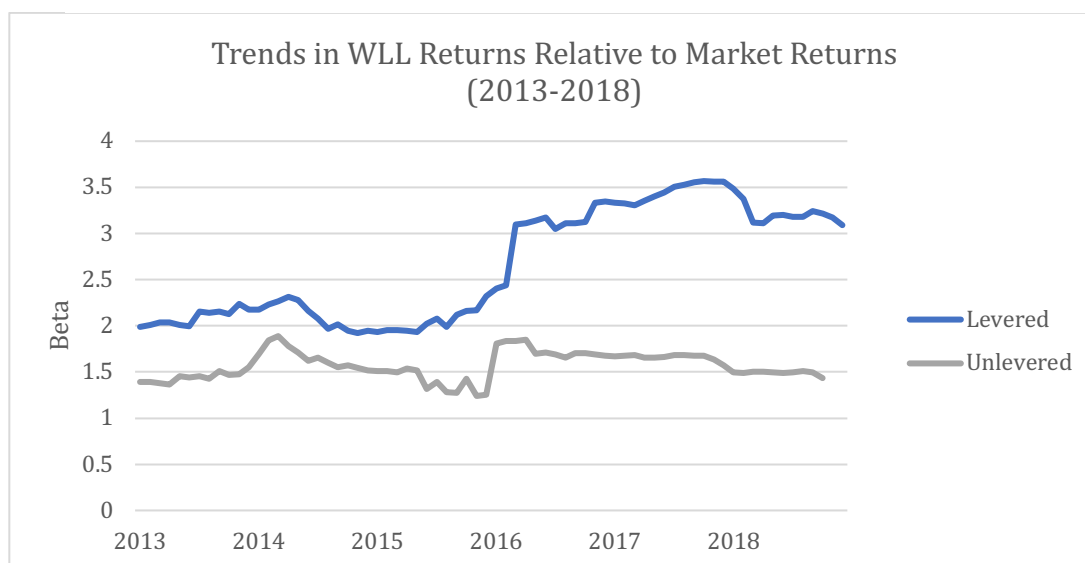


Figure 12: Trend of Whiting's Unlevered and Levered Betas (Sources: CRSP monthly security files, Fama French Liquidity Factors – Excess Market Return)

The monthly rolling unlevered beta was calculated using the following equation assuming a debt beta ( $\beta_{debt}$ ) of zero and using the market equity (E) and total debt (D), the excess return on the market ( $r_m - r_f$ ), and the stock return ( $r_i$ ) relative to the risk free rate ( $r_i - r_f$ ):

$$r_i - r_f + \frac{D}{E} \beta_{debt} = \alpha + \beta_{asset} * \frac{E + D(r_m - r_f)}{E}$$

As can be seen from the rolling beta graph above (Figure 12), the unlevered beta becomes more stable from 2017. We therefore estimated the unlevered beta going forward as the average of the rolling beta from 2017 onwards. This yielded an unlevered beta of 1.592. We subsequently estimated the unlevered cost of equity using a risk free rate ( $R_f$ ) of 2.55% (the 10-year US treasury bond). The debt to market value of equity was 134.6% as of May 3<sup>rd</sup>, 2019 and the effective tax rate was set at 36.7%. The market risk premium ( $R_m$ ) used in our estimate is 5.96%, a value sourced from Factset. The unlevered cost of equity was determined to be 12.03% using the equation  $\text{Unlevered Cost of Equity} = R_f + (\beta_{\text{asset}} * R_m)$ .

## Present Value of Cash Flows

Accounting for an effective tax rate of 36.7%, a terminal growth rate value of 3%, and a cost of unlevered equity of 12.43%, the present value of expected cash flows was equal to \$5.6B USD.

Free Cash Flows Forecast	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	
EBIT	1,003.8	1,160.4	1,316.0	1,472.2	1,592.1	1,713.0	1,833.8	1,952.8	2,068.7	2,179.6	2,284.2	
1-Tc	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	Effective Tax Rate
D&A	544.1	539.7	542.5	549.4	596.0	643.0	689.9	736.2	781.1	824.1	864.4	36.7%
Change in Working Capital	87.6	-5.2	-5.4	-5.6	-5.7	-5.7	-5.7	-5.6	-5.5	-5.2	-4.9	Terminal Growth rate
Capital Expenditures	927.3	919.9	924.6	936.3	1,015.8	1,096.0	1,176.0	1,254.8	1,331.3	1,404.5	1,473.3	3%
Free Cash Flow (FCF)	165.0	360.1	456.9	551.3	594.4	638.0	681.4	724.2	765.8	805.6	843.0	
									Terminal Value		9615.27	Cost Unlevered of Equity
Period from Friday May 3rd 2019	0.66	2	3	4	5	6	7	8	9	10	11	12.03%
PV	153.11	286.92	324.97	349.95	336.84	322.69	307.64	291.84	275.46	258.66	2997.43	
<b>Total Present Value</b>	<b>5905.51</b>											

Table 16: Forecast of Free Cash Flows (Source: Analysts' calculations)

## Debt Tax Shield

The company has been using debt to fund working capital, acquisitions and other capital expenditures. Historically, the debt amount has been correlated with capital expenditures of the company (correlation coefficient: 61%). In their Q4 2018 earnings call, management expressed their desire to reduce their absolute debt level closer to 2 billion USD: “We want to get leverage down below 2 times. We feel more comfortable down to 1.5 times. I think, in absolute debt terms, we've talked about it before. But we'd like to move our debt from \$2.8 billion down to closer to \$2 billion over time”. Over the past 4 years, the company has been able to reduce its debt at an average rate of 15%. Given that they have been able to reduce the amount in the past, we believe they will be able to reduce it going forward. We however believe that they would be able to reduce it close to the rate at which they reduce their expenditures. We consequently used the forecast rate of change in CAPEX as a proxy for the rate of change in net debt.

Debt Tax Shield	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E
	1	2	3	4	5	6	7	8	9	10	11
<b>Debt</b>	2687.5	2665.7	2679.6	2713.5	2944.0	3176.0	3408.0	3636.2	3858.1	4070.5	4269.9
% decrease/ (increase) in CAPEX	-3.3%	-0.8%	0.5%	1.3%	8.5%	7.9%	7.3%	6.7%	6.1%	5.5%	4.9%
Cost of Debt	4.1%	Factset									
Unlevered Cost of Equity	12.4%	Analyst Calculation									
Debt Tax Shield (DTS)	39.9	39.6	39.8	40.3	43.7	47.1	50.6	54.0	57.3	60.4	63.4
Discount Factor	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.6
PV of DTS	38.9	36.5	35.3	34.4	35.8	37.1	38.3	39.3	40.1	40.6	41.0
<b>Debt Tax Shield</b>	<b>417.3</b>										

Table 16: Forecast of Debt Tax Shield (Sources: Factset & Analysts' calculations)

To confirm the robustness of our forecast, we regressed the change in CAPEX on the change in debt. The relation from the regression is as shown below.

<b>Regression Statistics</b>	
Multiple R	0.58771
R Square	0.34541
Adjusted R Square	0.29086
Standard Error	0.48855
Observations	14
<b>Coefficients</b>	
Intercept	0.148062916
Change in CAPEX	0.517121831

Table 17: Regression statistics of change in CAPEX on change in net debt (Source: Analysts' calculations)

Because of the lower R-squared value, we decided against using the regression results for our forecast. Had we used the regression for our forecast, the debt tax shield would have decreased by 6.2% (from \$417.3 million to \$391.6 million). The effect on company valuation, however, would have been insignificant.

## Bankruptcy Risk

In the course of due-diligence, we estimated the expected cost of bankruptcy by using the historical probability (risk) of default by a BB rated bond (as reported by Fitch in their North America Corporate Finance Default Ratings), and the expected cost associated with the bankruptcy procedure. We assumed that an amount between 20% and 30% of current value will be consumed in the bankruptcy procedure. Under these assumptions, the expected cost of bankruptcy was estimated to be 133.22 million USD.

<b>Expected Cost of Bankruptcy</b>	
<b>Current market value of E</b>	2,122 Factset
Probability of default	9.96% Fitch Ratings North America Corp Finance Average Cum Default Rate (1994-2014)
<b>Bankruptcy Cost</b>	
Proportion of value	25% This is an estimate of the bankruptcy cost as a percentage of current asset value.
Enterprise Value	5350 Factset
<b>Expected Cost of Bankruptcy</b>	<b>133.22</b> *=Prob of Default*Direct cost of bankruptcy (as a proportion of current enterprise value)

Table 18: Expected cost of bankruptcy (Sources: As cited above and Analysts' calculations)

## Valuation Results

The fundamental value of Whiting is estimated by adding the present value of cash flows and the value of the debt-tax-shield, and subtracting the expected cost of bankruptcy and the net debt. This yields a fundamental equity value of \$3.341 billion USD. Our estimated value of the stock of Whiting is \$36.60. This represents an upside of 56%. We therefore recommend buying WLL's stock.

<b>Enterprise Value</b>	5,906								
<b>Debt Tax Shield</b>	417.3								
<b>Expected Cost of Bankruptcy</b>	133								
<b>Net Debt</b>	2,849								
Market Value of Debt	2,862.30								
Cash & Short Term Securities	13.607								
<b>Net Debt</b>	<b>2,848.69</b>								
<b>Fundamental Value of Firm</b>	<b>\$ 3,341</b>	* = PV (Cash Flows) + PV (Debt Tax Shield) - Expected Cost of Bankruptcy-Net Debt							
Number of Shares Outstanding	91.28								
<b>Fundamental Share Price</b>	<b>\$ 36.60</b>	<b>Delta</b>							
Current Share Price	23.53	56%	<b>Buy</b>						

Table 19: Valuation of Whiting Petroleum (Sources: Factset & Analysts' calculations)

## Sensitivity Analysis

<b>Sensitivity Analysis</b>									
Terminal Growth Rate		3%							
Market Premium		5.96%							
Share Price	\$	36.60							
<b>\$</b>	<b>36.60</b>	<b>4.0%</b>	<b>4.5%</b>	<b>5.0%</b>	<b>5.5%</b>	<b>5.96%</b>	<b>6.5%</b>	<b>7.0%</b>	<b>7.5%</b>
	<b>0%</b>	53.46	45.46	38.72	32.98	28.41	23.75	19.99	16.67
	<b>1%</b>	59.04	49.79	42.13	35.70	30.65	25.54	21.47	17.90
	<b>2%</b>	66.24	55.24	46.34	39.01	33.33	27.66	23.19	19.32
	<b>3%</b>	75.88	62.31	51.68	43.11	<b>36.60</b>	30.21	25.24	20.98
	<b>4%</b>	89.43	71.87	58.65	48.34	40.69	33.34	27.72	22.97
	<b>5%</b>	109.93	85.49	68.16	55.23	45.94	37.25	30.76	25.37

Table 20: Sensitivity analysis of market risk premium and terminal growth rate (Source: Analysts' calculations)



## Valuation Results Using the EIA Energy Price Forecast

Price Forecast												
	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	Average growth
Oil	69.56	73.42	77.01	78.18	81.90	87.45	92.69	97.38	102.45	106.94	111.80	1.049
Natural Gas	3.10	3.25	3.24	3.33	3.56	3.84	4.20	4.39	4.52	4.72	4.84	1.046
Natural Gas liquids	7.75	8.125	8.1	8.325	8.9	9.6	10.5	10.975	11.3	11.8	12.1	1.046
Free Cash Flows Forecast												
	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	
EBIT	1,059.4	1,265.5	1,481.3	1,649.8	1,829.5	2,057.7	2,282.9	2,506.7	2,745.3	2,962.5	3,189.4	
1-Tc	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	Effective Tax Rate
D&A	566.2	581.4	598.5	604.5	675.5	764.4	855.6	940.7	1,028.5	1,111.4	1,194.0	36.7%
Change in Working Capital	85.5	-7.5	-7.4	-6.0	-8.7	-10.9	-11.1	-10.4	-10.7	-10.1	-10.1	Terminal Growth rate
Capital Expenditures	965.0	990.9	1,020.1	1,030.3	1,151.3	1,302.8	1,458.3	1,603.4	1,752.9	1,894.3	2,035.1	3%
Free Cash Flow (FCF)	186.8	399.7	524.2	625.3	691.8	776.0	854.7	935.7	1,025.4	1,104.0	1,189.5	
Period from Friday May 3rd 2019	0.66	2	3	4	5	6	7	8	9	10	11	Cost Unlevered of Equity
PV	173.29	318.43	372.83	396.94	392.02	392.47	385.87	377.08	368.85	354.47	4229.29	12.03%
<b>Total Present Value</b>	<b>7761.54</b>											
Debt Tax Shield												
	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	
Debt	1	2	3	4	5	6	7	8	9	10	11	
% decrease/ (increase) in CAPEX	0.7%	2.7%	3.0%	1.0%	11.7%	13.2%	11.9%	10.0%	9.3%	8.1%	7.4%	
Cost of Debt	4.1%	Factset										
Unlevered Cost of Equity	12.0%	Analyst Calculation										
Debt Tax Shield (DTS)	41.6	42.7	43.9	44.4	49.6	56.1	62.8	69.0	75.5	81.6	87.6	
Discount Factor	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.6	
PV of DTS	40.5	39.4	39.0	37.8	40.6	44.2	47.6	50.3	52.8	54.8	56.6	
<b>Debt Tax Shield</b>	<b>503.7</b>											
						Regression DT:	391.63	-6.2%				
						Margin DTS	417.3					
Expected Cost of Bankruptcy												
Current market value of E	2,148	Factset										
Probability of default	9.96%	Fitch Ratings North America Corp Finance Average Cum Default Rate (1994-2014)										
Bankruptcy Cost	25%	This is an estimate of the bankruptcy cost as a percentage of current asset value.										
Enterprise Value	5350	Factset										
<b>Expected Cost of Bankruptcy</b>	<b>133.22</b>	* = Prob of Default * Direct cost of bankruptcy (as a proportion of current enterprise value)										
<b>Enterprise Value</b>	<b>7,762</b>											
<b>Debt Tax Shield</b>	<b>503.7</b>											
<b>Expected Cost of Bankruptcy</b>	<b>133</b>											
<b>Net Debt</b>	<b>2,849</b>											
Market Value of Debt	2,862.30											
Cash & Short Term Securities	13,607											
<b>Net Debt</b>	<b>2,848.69</b>											
<b>Fundamental Value of Firm</b>	<b>\$ 5,283</b>	* = PV (Cash Flows) + PV (Debt Tax Shield) - Expected Cost of Bankruptcy - Net Debt										
Number of Shares Outstanding	91.28											
<b>Fundamental Share Price</b>	<b>\$ 57.88</b>	<b>Delta</b>										
Current Share Price	23.53	146%	<b>Buy</b>									

Table 21: Valuation using EIA Energy Price Forecast (Source: Analysts' calculations)

If the EIA forecast for oil, natural gas and natural gas liquids is used in the model, the stock price would be \$57.88, representing an upside of 146%.

## **Important Disclaimer**

Please read this document before reading this report.

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