

Fort Berthold Federal Implementation Plan  
Emissions Control Cost Data Analysis  
July 2019

Cost Parameter	EOG	XTO - Dual Tip Scenario	XTO - Single Tip Utility Scenario	Enerplus	QEP	Slawson	WPX - Dual Tip Scenario	Dual Tip Utility Flare Scenario Average	Single Tip Utility Flare Scenario Average	Single Tip Utility Flare Scenario Average w/out Slawson	Single Tip Average with 2 combustors & 2 auto ignition w/out Slawson
Pit Flare - Total Capital Investment	\$6,000.00	\$6,000.00	\$6,000.00	\$6,208.00	\$15,000.00	\$4,770.45	\$27,500.00				
Pit Flare - Life Expectancy	20	20	20	15	5		10				
Pit Flare CRF Factor @ 7%	0.09439	0.09439	0.09439	0.10979	0.24389		0.14238				
Pit Flare - TCI annual cost	\$566.34	\$566.34	\$566.34	\$681.58	\$3,658.35		\$3,915.45				
Pit Flare - other annual cost	\$1,000.00			\$1,439.00	\$5,000.00	\$55,159.42	\$13,000.00				
Pit Flare Total Annual Cost	<b>\$1,566.34</b>	<b>\$566.34</b>	<b>\$566.34</b>	<b>\$2,120.58</b>	<b>\$8,658.35</b>	<b>\$55,159.42</b>	<b>\$16,915.45</b>	<b>\$8,740.90</b>	<b>\$13,614.21</b>	<b>\$3,227.90</b>	<b>\$3,227.90</b>
Single Tip Utility Flare - Total Capital Investment	\$20,000.00		\$15,000.00	\$38,701.00	\$45,000.00	\$82,990.00					
Single Tip Utility Flare - Life Expectancy	10		10	10	10						
Single Tip Utility Flare CRF Factor @ 7%	0.14238		0.14238	0.14238	0.14238						
Single Tip Utility Flare - TCI annual cost	\$2,847.60		\$2,135.70	\$5,510.25	\$6,407.10						
Single Tip Utility Flare - other annual cost	\$1,200.00		\$23,250.00	\$6,289.00	\$8,500.00	\$58,288.00					
Single Tip Utility Flare Total Annual Cost	<b>\$4,047.60</b>		<b>\$25,385.70</b>	<b>\$11,799.25</b>	<b>\$14,907.10</b>	<b>\$58,288.00</b>			<b>\$22,885.53</b>	<b>\$14,034.91</b>	<b>\$14,034.91</b>
Dual Tip Utility Flare - Total Capital Investment		\$81,520.00					\$110,000.00				
Dual Tip Utility Flare - Life Expectancy		10					10				
Dual Tip Utility Flare CRF Factor @ 7%		0.14238					0.14238				
Dual Tip Utility Flare - TCI annual cost		\$11,606.82					\$15,661.80				
Dual Tip Utility Flare - other annual cost		\$46,500.00					\$28,700.00				
Dual Tip Utility Flare Total Annual Cost		<b>\$58,106.82</b>					<b>\$44,361.80</b>	<b>\$51,234.31</b>			
Enclosed Combustor - Total Capital Investment	\$25,000.00		\$20,250.00	\$32,957.00	\$43,000.00	\$103,708.99					
Enclosed Combustor - Life Expectancy	10		10	10	10						
Enclosed Combustor CRF Factor @ 7%	0.14238		0.14238	0.14238	0.14238						
Enclosed Combustor - TCI annual cost	\$3,559.50		\$2,883.20	\$4,692.42	\$6,122.34						
Enclosed Combustor - other annual cost	\$1,500.00		\$23,250.00	\$6,289.00	\$8,500.00	\$59,116.96					
Enclosed Combustor Total Annual Cost	<b>\$5,059.50</b>		<b>\$26,133.20</b>	<b>\$10,981.42</b>	<b>\$14,622.34</b>	<b>\$59,116.96</b>			<b>\$23,182.68</b>	<b>\$14,199.11</b>	<b>\$28,398.23</b>
Auto ignition - Total Capital Investment	\$12,000.00		\$27,000.00	\$10,000.00	\$4,100.00						
Auto Ignition - Life Expectancy	10		10	10	10						
Auto Ignition CRF Factor @ 7%	0.14238		0.14238	0.14238	0.14238						
Auto Ignition - TCI annual cost	\$1,708.56		\$3,844.26	\$1,423.80	\$583.76						
Auto ignition - other annual cost	\$1,000.00										
Auto ignition - Total Annual Cost	<b>\$2,708.56</b>		<b>\$3,844.26</b>	<b>\$1,423.80</b>	<b>\$583.76</b>				<b>\$2,140.09</b>	<b>\$2,140.09</b>	<b>\$4,280.19</b>
Continuous Pilot - Total Capital Investment	\$12,000.00		\$27,000.00	\$10,000.00	\$4,500.00						
Continuous Pilot - Life Expectancy	10		10	10	10						
Continuous Pilot CRF Factor @ 7%	0.14238		0.14238	0.14238	0.14238						
Continuous Pilot - TCI annual cost	\$1,708.56		\$3,844.26	\$1,423.80	\$640.71						
Continuous Pilot - other annual cost	\$1,000.00										
Continuous Pilot - Total Annual Cost	<b>\$2,708.56</b>		<b>\$3,844.26</b>	<b>\$1,423.80</b>	<b>\$640.71</b>				<b>\$2,154.33</b>	<b>\$2,154.33</b>	<b>\$2,154.33</b>
<b>Total for Operator Scenario (Dual-tip or 1 single-tip with 1 combustor)</b>	<b>\$16,090.56</b>	<b>\$58,673.16</b>	<b>\$59,773.76</b>	<b>\$27,748.84</b>	<b>\$39,412.26</b>	<b>\$172,564.38</b>	<b>\$61,277.25</b>	<b>\$59,975.20</b>	<b>\$63,117.96</b>	<b>\$35,756.35</b>	<b>\$52,095.56</b>

Max values used from EOG Range Provided

Life expectancy of equipment for XTO was assumed to be the same as EOG, due to such close capital cost equipment values

Total value of automation equipment provided by XTO was \$54K. Divided this by 2 for auto-ignite and continuous pilot columns for each combustion device

XTO did not provide annual O&M labor cost for each type of equipment, only a total cost per pad. 46,500 added to dual tip utility flare cost and divided by 2 for single tip/enclosed combustor

Equipment cost of \$54K (auto-ignition/continuous pilot) was added to the dual tip XTO capital cost (\$27520) to allow for comparison to WPX since the WPX capital cost included the auto flame system.

Auto-ignition or continuous pilot monitoring was included in Slawson's estimates for flare/combustor pricing

Marathon's submittal was claimed as CBI and is not included in this analysis

PetroHunt provided a total cost including one time equipment & install with annual labor and O&M of \$22,000 for a pit flare and \$87,000 for a enclosed combustor.

PetroHunt claimed they had no other data other than the 3 cost numbers provided, so their data was not used in analysis.

Slawson's estimates included CRF of total capital cost in annual cost, therefore this was not calculated separately above.

WPX indicated that the cost of an auto-ignition system is included in the price of the utility flare, therefore the cost for this or continuous pilot was not added to their operating scenario

WPX does not use enclosed combustors, supporting documentation indicated utility flare was a tandem, or dual tip utility flare

Since cost for auto-ignition and continuous pilot were similar, one of each was included for total cost to assume 1 for flare, 1 for combustor. Both were included XTO dual-tip due to division in table

Slawson included 1272 labor hours for pit flare, utility flare, and enclosed combustor totaling 3,816 labor hours per well pad scenario. A 40 hour work week for 52 weeks is 2,080 hours.

Due to unrealistic scenario that annual labor cost per site are approximately 2 full time FTE, Slawson's high cost estimates were considered to be an outlier and not included in final cost figures for TSD.