

ATTACHMENT L

El Paso Natural Gas Company, LLC

Washington Ranch Storage - Reducing Emissions to 0.5gm/hp-hr Nox

Engine Cost Analysis

Interest Rate:3.25%

All Units

Period (yrs):20

Cost Effectiveness Summary using Stack Test Data Emission Factors

Control Equipment	Unit	Retrofit Capital Cost	Building Modification	Total Annual Cost*	Emission Reduction	Cost Effectiveness
		(\$)	(\$)	(\$)	(tpy)	(\$/ton)
Hyperfuel System for 2 cycle engines	A-01	1,866,707	-	128,390	12.4	10,392
	B-02	1,866,707	-	128,390	4.2	30,395

* Total Annual Cost includes the annualized capital cost as well as the direct and indirect annual operating costs.

El Paso Natural Gas Company, LLC

Washington Ranch Storage - Reducing Emissions to 0.5gm/hp-hr Nox

Cooper Bessemer 12Q155HC2	Interest Rate:	3.25% <-- EPA Default Interest Rate
A-01	Period (yrs):	20 <-- EPA Air Pollution Control Cost Manual

Base Case		
NO _x lb/hr:	12.22 lb/hr	<-- Average Annual Test results from Ref Methods and Portable tests 2018 -2020
NO _x tpy:	18.79 tpy	<-- Calculated 3-yr avg stack test results and 2018 through 2020 and avg actual operating hours & ave hp. Gm/hp-hr using avg hp 2018-2020
NOX gm/hp-hr	1.46 gm/hp-hr	

0.5 grams/hp-hr Nox		
NO _x Reduction:	65.8%	<--Decrease 3 yr avg test to 0.5 gm/hp-hr
NO _x lb/hr:	4.18 lb/hr	<-- Rate based on 0.5 grams and 3 yr avg - hp
NO _x tpy:	6.43 tpy	<-- Expected annually NOx emissions (ton/yr) after retrofit to 0.5 gram Nox

Engine Housing Reconfiguration	\$	-	<-- Presumed to be included in CE2107006 shown below
Retrofit Capital Investment	\$	1,866,707	<-- CE2107006 WSR internal est 07/26/2021
Total Capital Investment	\$	1,866,707	
Annualized TCI:	\$	128,390	<-- Based on interest rate, year and TCI
Annual O&M Costs:	\$	-	<-- EPA Cost Control Spreadsheet
Total Annual Costs:	\$	128,390	
Emissions Reduction:		12.4 tpy	
Cost Effectiveness:	\$	10,391.99	\$/ton

El Paso Natural Gas Company, LLC

Washington Ranch Storage - Reducing Emissions to 0.5gm/hp-hr Nox

Cooper Bessemer 12Q155HC2	Interest Rate:	3.25%
B-02	Period (yrs):	20 <-- EPA Air Pollution Control Cost Manual

Base Case		
NO _x lb/hr:	7.06 lb/hr	<-- Average Annual Test results from Ref Methods and Portable tests 2018 -2020
NO _x tpy:	10.42 tpy	<-- Calculated 3-yr avg stack test results and 2018 through 2020 and avg actual operating hours & ave hp. Gm/hp-hr using avg hp 2018-2020
NOX gm/hp-hr	0.84 gm/hp-hr	

SCR		
NO _x Reduction:	41%	<--Decrease 3 yr avg test to 0.5 gm/hp-hr
NO _x lb/hr:	4.20 lb/hr	<-- Rate based on 0.5 grams and 3 yr avg - hp
NO _x tpy:	6.19 tpy	<-- Expected annually NOx emissions (ton/yr) after retrofit to 0.5 gram Nox

Turbine Housing Reconfiguration	\$	-	<-- Presumed to be included in CE2107006 shown below
Retrofit Capital Investment	\$	1,866,707	<-- CE2107006 WSR internal est 07/26/2021
Total Capital Investment	\$	1,866,707	

Annualized TCI:	\$	128,390	<-- Based on interest rate, year and TCI
Annual O&M Costs:	\$	-	<-- EPA Cost Control Spreadsheet
Total Annual Costs:	\$	128,390	
Emissions Reduction:		4.2 tpy	

Cost Effectiveness:	\$	30,394.82	\$/ton
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Washington Ranch Storage

Op Hour Comparison

Operating Hours Per Year		
Yr/Unit	A-01	B-02
2018	2,195.75	2,054.00
2019	4,461.00	4,153.00
2020	2,564.40	2,647.34
2018 – 2020 Avg. Hours	3,073.72	2,951.45

Annual Ref Meth & Portable Analyzer Test Results

Nox (lb/hr)		
Yr/Unit	A-01	B-02
2018	8.7	3.5
2019	13.5	10.3
2020	14.5	7.4
	12.2	7.1

A-01 (10/24/2018) B-02 (10/23/2018)

2Q portable analyzer tests

A-01 (11/04/2020) B-02 (

Annual Ref Meth & Portable Analyzer Test Results

Hp		
Yr/Unit	A-01	B-02
2018	3,727.0	3,841.0
2019	3,686.0	3,624.0
2020	3,975.0	3,959.0
	3,796.0	3,808.0

A-01 (10/24/2018) B-02 (10/23/2018)

2Q portable analyzer tests (A1: May 7)(B1:May 8)

A-01 (11/04/2020) B-02 (12/11/2020)