

US EPA ARCHIVE DOCUMENT

TABLE Y

RAMSEY PLANT EXPANSION, NUEVO MIDSTREAM, LLC

ESTIMATED COSTS FOR AMINE STILL VENT CO₂ EMISSIONS GHG PSD AIR PERMIT APPLICATION TO EPA
TREATMENT AND TRANSPORTATION FOR EOR COSTS
65% CASE

Pipeline Length (L) ¹	89 miles
Pipeline Diameter (D) ²	8 inches
Number of Injection Wells	0
Depth of well	NA feet
	NA meters
Tons CO ₂ per day	586 tons

CCS Transportation Cost Breakdown

Cost Type	Units	Cost		
Pipeline Costs ³			2007	2014
Pipeline Materials	\$ Diameter (inches), Length (miles)	$\$64,632 + \$1.85 \times L \times (330.5 \times D^2 + 686.7 \times D + 26,920)$	\$ 8,884,208.04	\$ 10,162,840.51
Pipeline Labor	\$ Diameter (inches), Length (miles)	$\$341,627 + \$1.85 \times L \times (343.2 \times D^2 + 2,074 \times D + 170,013)$	\$ 34,682,644.57	\$ 39,674,238.11
Pipeline Miscellaneous	\$ Diameter (inches), Length (miles)	$\$150,166 + \$1.58 \times L \times (8,417 \times D + 7,234)$	\$ 10,636,199.40	\$ 12,166,981.87
Pipeline Right of Way	\$ Diameter (inches), Length (miles)	$\$48,037 + \$1.20 \times L \times (577 \times D + 29,788)$	\$ 3,722,384.20	\$ 4,258,116.96
Other Capital			SUBTOTAL	\$ 66,262,177.44
Treatment and compression equipment ⁴	\$	Per Preliminary Design Estimate	\$ 27,973,936.72	\$ 32,000,000.00
Pipeline booster station ⁵	\$	Per Preliminary Design Estimate	\$ 13,986,968.36	\$ 16,000,000.00
O&M ²			SUBTOTAL	\$ 48,000,000.00
Fixed O&M for Pipeline	\$/mile/year	2007 = \$8,632 Adjusted per DOT 2014	\$ 768,248.00	\$ 1,142,460.47
Estimated O&M for treatment facility ⁵	\$/year	2014 = \$951,754 Adjusted per DOT 2014	\$ 832,009.35	\$ 951,753.75
Estimated O&M for booster station ⁵	\$/year	2014 = \$737,705 Adjusted per DOT 2014	\$ 644,890.68	\$ 737,704.60
			SUBTOTAL	\$ 2,831,918.82

Amortized CCS Cost

Total Capital Investment (TCI) =			\$ 85,899,372.93	\$ 114,262,177.44
Capital recovery factor (CRF) ¹ = $i(1+i)^n / ((1+i)^n - 1)$			0.15	0.15
i = interest rate =	0.08	Years		
n = equipment life =	10			
		Amortized installation costs = CRF * TCI =	\$ 12,884,905.94	\$ 17,028,433.88
		Total CCS Transportation Annualized Cost	\$ 14,485,163.29	\$ 19,860,352.70

Expected annual value of delivered CO₂⁶		\$ 2,031,955.00
Net CCS Transportation Annualized Cost		\$ 17,828,397.70
Net Cost per ton removed annually		\$ 83.35
Total First Year of Operation Net Cost	\$ 87,499,630.28	\$ 115,062,141.26

1 Distance to pipeline is calculated based on approximate location in Andrews County, southwest of Andrews (located at approximately 32° 13' 15.74"N and -120° 41' 26.00"W)

2 "Estimating Carbon Dioxide Transport and Storage Costs," National Energy Technology Laboratory, U.S. DOE, DOE/NETL - 2010/1447, March 2010

3 Cost adjusted using average consumer price index to June 2014 dollars from June 2007 dollars based on data presented in Estimating Carbon Dioxide Transport and Storage Costs," National Energy Technology Laboratory, U.S. DOE, DOE/NETL - 2010/1447, March 2010.

4 Capital costs of treatment and compression equipment are estimated in 2014 dollars based on cost estimates communicated by Kinder Morgan for the planned facility that will treat and compress 35% of the Ramsey Amine Unit Still Vent CO₂ stream.

5 Treatment facility operating and maintenance costs estimated based on similar proposed facility

6 Delivered CO₂ is evaluated at \$9.50 per ton based on estimated delivered price at planned destination.

NOTE: This cost estimate does not include: Costs for insurance or other CO₂ pipeline liability.

Amortized Project Cost (without CCS)

Total Capital Investment (TCI) =		\$ 300,000,000.00
Capital recovery factor (CRF) $1 = i(1+i)^n / ((1+i)^n - 1)$		0.10
i = interest rate =	0.08	years
n = equipment life =	20	
Amortized installation costs = CRF * TCI =		\$ 30,555,662.65
Total Project Annualized Cost		\$30,555,662.65

NOTE: Plant lifetime estimated at 20 years, due to normal plant lifetime expectations. However, CCS equipment life anticipated to be 10 years based upon extreme acidic conditions of CO₂ stream.

Net Annualized Cost of CCS as percent of Project Cost 58%