Appendix E:

Burden and Cost for Petroleum and Natural Gas Systems

(Subpart W)

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Appendix E-1. Detailed Unit Burden and Costs for Petroleum and Natural Gas Systems (Subpart W)—Year 1

Year 1	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
1. APPLICATIONS (Not Applicable)									
2. SURVEY AND STUDIES (Not Applicable)									
3. ACQUISITION, INSTALLATION, AND UTILIZATION OF TECHNOLOGY AND SYSTEMS									
4. REPORT REQUIREMENTS									
A1. Read Rule, Instructions, Guidance Documents									
Onshore Natural Gas Processing reporters [1,2]	5.00	1	5.00	470	2,350.0	-	235.0	117.5	$276,260
Onshore Natural Gas Transmission Compression reporters [1,2]	5.00	1	5.00	488	2,440.0	-	244.0	122.0	$286,840
Underground Natural Gas Storage reporters [1,2]	5.00	1	5.00	50	250.0	-	25.0	12.5	$29,389
LNG Import and Export Equipment reporters [1,2]	5.00	1	5.00	7	35.0	-	3.5	1.8	$4,115
Onshore Petroleum and Natural Gas Production existing reporters [1,2]	5.00	1	5.00	550	2,750.0	-	275.0	137.5	$323,283
Onshore Petroleum and Natural Gas Production new reporters [1,2,3]	5.00	1	5.00	50	250.0		25.0	12.5	$29,389
Natural Gas Distribution reporters [1,2]	5.00	1	5.00	177	885.0	-	88.5	44.3	$104,038
LNG Storage reporters [1,2]	5.00	1	5.00	4	20.0	-	2.0	1.0	$2,351
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [1,2,4]	5.00	1	5.00	200	1,000.0		100.0	50.0	$117,558
Natural Gas Transmission Pipeline reporters [1,2,4]	5.00	1	5.00	183	915.0		91.5	45.8	$107,565
Offshore Petroleum and Natural Gas Production reporters [2,5]	1.00	1	1.00	126	126.0	-	12.6	6.3	$14,812
A2. Read Rule, Instructions, Guidance Documents for Subpart A[6]	2.00	1	2.00	2,305	4,610.0	-	461.0	230.5	$541,940
B. Required Activities									
Acid Gas Removal Units									
Gather CEMS data for e-GGRT reporting (M1)									
Onshore Natural Gas Processing reporters [2,7,8]	1.00	1.7	1.67	6	10.0				$992
Onshore Petroleum and Natural Gas Production existing reporters [2,7,10]	1.00	1.0	1.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [2,7,11]	1.00	1.0	1.00	0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [2,7,11]	1.00	1.0	1.00	0					$0
Conduct quarterly gas sampling (M2)									
Onshore Natural Gas Processing reporters [12,13,14]	0.67	1.3	0.87	64	55.5		5.5	2.8	$6,521
Onshore Petroleum and Natural Gas Production existing reporters [12,13]	0.67	1.0	0.67	6	4.0		0.4	0.2	$470
Onshore Petroleum and Natural Gas Production new reporters [11,12]	0.67	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [11,12]	0.67	0.0	0.00	0					$0
Perform engineering calculation (M3)									
Onshore Natural Gas Processing reporters [13,15]	0.53	1.4	0.75	112	83.6		8.4	4.2	$9,831
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.53	1.0	0.53	9	4.8		0.5	0.2	$564
Onshore Petroleum and Natural Gas Production new reporters [11,15]	0.53	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [11,15]	0.53	0.0	0.00	0					$0
Perform simulation run (M4)									
Onshore Natural Gas Processing reporters [13,15]	0.17	1.5	0.25	48	12.0		1.2	0.6	$1,411
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.17	1.9	0.32	15	4.8		0.5	0.2	$558

Year 1	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Onshore Petroleum and Natural Gas Production new reporters [11,15,16]	0.17	2.0	0.33	50	16.7		1.7	0.8	$1,959
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [11,15,17]	0.17	2.0	0.33	200	66.7		6.7	3.3	$7,837
Equipment Leaks									
Conduct Leak Detection Surveys									
Onshore Natural Gas Processing reporters [18]	4.00	1	4.00	418	1,672.0				$165,829
Onshore Natural Gas Transmission Compression reporters [18]	4.00	1	4.00	480	1,920.0				$190,426
Underground Natural Gas Storage reporters [18]	4.00	1	4.00	45	180.0				$17,852
LNG Import and Export Equipment reporters [18]	4.00	1	4.00	7	28.0				$2,777
Natural Gas Distribution reporters [18]	4.00	1	4.00	103	412.0				$40,862
LNG Storage reporters [18]	4.00	1	4.00	3	12.0				$1,190
Determine emissions using population counts									
Onshore Petroleum and Natural Gas Production existing reporters [19,20]	0.45	1	0.45	503		226.4			$11,960
Onshore Petroleum and Natural Gas Production new reporters [19]	4.50	1	4.50	50		225.0			$11,889
Onshore Petroleum and Natural Gas Production new reporters [19,20]	0.45	1	0.45	0		-			$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [19]	4.50	1	4.50	200		900.0			$47,556
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [19,20]	0.45	1	0.45	0		-			$0
Blowdown Vent Stacks									
Calculate emissions									
Onshore Natural Gas Processing reporters [13, 15]	0.13	8.2	1.09	90	98.4		9.8	4.9	$11,568
Onshore Natural Gas Transmission Compression reporters [13, 15]	0.13	7.7	1.03	202	207.4		20.7	10.4	$24,380
LNG Import and Export Equipment reporters [13, 15]	0.13	9.0	1.20	3	3.6		0.4	0.2	$423
Natural Gas Transmission Pipeline reporters [15,20]	0.13	15	2.00	183	366.0		36.6	18.3	$43,026
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,20]	0.13	8.0	1.07	200	213.3		21.3	10.7	$25,079
Centrifugal Compressors									
Measure volumetric emissions from centrifugal compressors									
Onshore Natural Gas Processing reporters [13,21,22]	0.50	3.1	1.55	153	237.2				$23,521
Onshore Natural Gas Transmission Compression reporters [13,21,23]	0.50	2.4	1.20	343	411.6				$40,822
Underground Natural Gas Storage reporters [13,21,24]	0.50	3.5	1.75	10	17.5				$1,736
LNG Import and Export Equipment reporters [13,21,25]	0.50	3.2	1.60	3	5.4				$476
LNG Storage reporters [13,21,27]	0.50	1.9	0.95	1	1.0				$94
Calculate facility-wide emission factor and calculate mass emissions									
Onshore Natural Gas Processing reporters [13,21,22]	0.17	3.1	0.52	153	79.1		7.9	4.0	$9,293
Onshore Natural Gas Transmission Compression reporters [13,21,23]	0.17	2.4	0.40	343	137.2		13.7	6.9	$16,129
Underground Natural Gas Storage reporters [13,21,24]	0.17	3.5	0.58	10	5.8		0.6	0.3	$686
LNG Import and Export Equipment reporters [13,21,25]	0.17	3.2	0.53	3	1.6		0.2	0.1	$188
LNG Storage reporters [13,21,27]	0.17	1.9	0.32	1	0.3		0.0	0.0	$37
Determine count and calculate emissions using emission factor									
Onshore Petroleum and Natural Gas Production existing reporters [28]	0.10	1.0	0.10	207		20.7			$1,094
Onshore Petroleum and Natural Gas Production new reporters [28]	1.00	1.0	1.00	50		50.0			$2,642
Onshore Petroleum and Natural Gas Production new reporters [28]	0.10	1.0	0.10	0		-			$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [28]	1.00	1.0	1.00	200		200.0			$10,568
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [28]	0.10	1.0	0.10	0		-			$0
Reciprocating Compressors									

Year 1	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Measure volumetric emissions from reciprocating compressors									
Onshore Natural Gas Processing reporters [13,21,29]	0.50	7.5	3.75	347		1,301.3			$68,758
Onshore Natural Gas Transmission Compression reporters [13,21,30]	0.50	6.8	3.40	314		1,067.6			$56,412
Underground Natural Gas Storage reporters [13,21,31]	0.50	6.5	3.25	53		172.3			$9,102
LNG Import and Export Equipment reporters [13,21,32]	0.50	3.6	1.80	6		10.8			$571
LNG Storage reporters [13,21,33]	0.50	3.6	1.80	3		5.4			$285
Calculate facility-wide emission factor and calculate mass emissions									
Onshore Natural Gas Processing reporters [13,21,29]	0.17	7.5	1.25	347	433.8		43.4	21.7	$50,991
Onshore Natural Gas Transmission Compression reporters [13,21,30]	0.17	6.8	1.13	314	355.9		35.6	17.8	$41,835
Underground Natural Gas Storage reporters [13,21,31]	0.17	6.5	1.08	53	57.4		5.7	2.9	$6,750
LNG Import and Export Equipment reporters [13,21,32]	0.17	3.6	0.6	6	3.6		0.4	0.2	$423
LNG Storage reporters [13,21,33]	0.17	3.6	0.6	3	1.8		0.2	0.1	$212
Determine count and calculate emissions using emission factor									
Onshore Petroleum and Natural Gas Production existing reporters [28]	0.10	1.0	0.10	358	35.8	35.8			$5,442
Onshore Petroleum and Natural Gas Production new reporters [28]	1.00	1.0	1.00	50	50.0	50.0			$7,601
Onshore Petroleum and Natural Gas Production new reporters [28]	0.10	1.0	0.10		-	-			$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [28]	1.00	1.0	1.00	200		200.0			$10,568
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [28]	0.10	1.0	0.10	0		-			$0
Combustion Emissions									
Determine fuel consumption through company records and calculate emissions									
Onshore Petroleum and Natural Gas Production existing reporters [2,34]	2.00	1.0	2.00	476	952.0				$94,419
Onshore Petroleum and Natural Gas Production new reporters [2,34]	2.00	1.0	2.00	50	100.0				$9,918
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [2,34]	2.00	1.0	2.00	200	400.0				$39,672
Natural Gas Distribution reporters [2,35]	2.00	1.0	2.00	36	72.0				$7,141
Associated Gas Venting and Flaring									
Calculate emissions using GOR and equations in rule									
Onshore Petroleum and Natural Gas Production existing reporters [13,35]	5.00	1.0	5.00	149	745.0				$73,889
Onshore Petroleum and Natural Gas Production new reporters [13,35]	5.00	1.0	5.00	50	250.0				$24,795
Determine GOR using available information									
Onshore Petroleum and Natural Gas Production existing reporters [36]	1.00	0.0	0.00	149	-				$0
Onshore Petroleum and Natural Gas Production new reporters [36]	1.00	0.0	0.00	50	-				$0
Dehydrators									
Run simulation software (M1)									
Onshore Natural Gas Processing reporters [13,15]	0.25	1.7	0.43	270	114.8		11.5	5.7	$13,490
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.25	11.5	2.88	170	488.8		48.9	24.4	$57,456
Onshore Petroleum and Natural Gas Production new reporters [15,40]	0.25	11.5	2.88	50	143.8		14.4	7.2	$16,899
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,41]	0.25	2.7	0.67	200	134.3		13.4	6.7	$15,792
Equipment counts and population emission factors (M2)									
Onshore Natural Gas Processing reporters [38]	0.17	8.9	1.48	234	347.1		34.7	17.4	$40,804
Onshore Petroleum and Natural Gas Production existing reporters [38]	0.17	15.8	2.63	165	434.5		43.5	21.7	$51,079
Onshore Petroleum and Natural Gas Production new reporters [38]	0.17	15.8	2.63	50	131.7		13.2	6.6	$15,478

Year 1	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [38]	0.17	3.7	0.62	200	123.0		12.3	6.2	$14,464
Calculation using Eq. W-6 (M3)									
Onshore Natural Gas Processing reporters [13,39]	0.17	2.7	0.45	146	65.7		6.6	3.3	$7,724
Onshore Petroleum and Natural Gas Production existing reporters [13,39]	0.17	7.8	1.30	42	54.6		5.5	2.7	$6,419
Onshore Petroleum and Natural Gas Production new reporters [39,40]	0.17	7.8	1.30	50	65.0		6.5	3.3	$7,641
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [39,41]	0.17	1.8	0.3	200	60.7				$6,024
EOR Hydrocarbon Liquid Dissolved CO_2									
Measure volume of hydrocarbon liquids produced through EOR operations									
Onshore Petroleum and Natural Gas Production existing reporters [42,43]	0.17	3.0	0.50	15		7.5			$396
Onshore Petroleum and Natural Gas Production new reporters [39,42]	0.17	3.0	0.50	50		25			$1,321
Determine average CO_2 retained in HC liquids downstream of the storage tank									
Onshore Petroleum and Natural Gas Production existing reporters [42,43]	0.17	3.0	0.50	15		7.5			$396
Onshore Petroleum and Natural Gas Production new reporters [39,42]	0.17	3.0	0.50	50		25			$1,321
Calculation using Eq. W-38									
Onshore Petroleum and Natural Gas Production existing reporters [42,43]	0.17	3.0	0.50	15	7.5				$744
Onshore Petroleum and Natural Gas Production new reporters [39,42]	0.17	3.0	0.50	50	25.0				$2,480
EOR Injection Pump Blowdown									
Calculate total injection pump system volume									
Onshore Petroleum and Natural Gas Production existing reporters [13,44]	0.17	11.0	1.83	5	9.2				$909
Onshore Petroleum and Natural Gas Production new reporters [44]	0.17	11.0	1.83	50	91.7				$9,092
Retain logs of number of blowdowns per year									
Onshore Petroleum and Natural Gas Production existing reporters [13,44]	0.17	11.0	1.83	5	9.2				$909
Onshore Petroleum and Natural Gas Production new reporters [44]	0.17	11.0	0.80	50	91.7				$9,092
Calculate emissions using Eq W-37									
Onshore Petroleum and Natural Gas Production existing reporters [13,44]	0.17	11.0	1.83	5	9.2				$909
Onshore Petroleum and Natural Gas Production new reporters [44]	0.17	11.0	1.83	50	91.7				$9,092
Transmission Tanks at Onshore Natural Gas Transmission Compression reporters									
Determine leaks using optical gas imaging instrument [45,46]	0.08	0.0	0.00	0					$0
Determine leaks using acoustic leak detection device [45,46]	0.08	0.0	0.00	0					$0
Determine leaks using calibrated bag [42,46]	0.17	0.0	0.00	0					$0
Determine and quantify leaks using flow meter [13,42,47]	0.17	1.9	0.32	250	79.2				$7,852
Determine and quantify leaks using high volume sampler [42,46]	0.17	0.0	0.00	0					$0
Quantify leaks from optical gas imaging instrument and acoustic leak detection device using flow meter [42,46]	0.17	0.0	0.00	0					$0
Quantify leaks from optical gas imaging instrument and acoustic leak detection device using high volume sampler [42,46]	0.17	0.0	0.00	0					$0
Calculate emissions [48]	0.50	1.9	0.95	250	237.5				$23,555
Pneumatic Devices									

Year 1	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Estimate count of high bleed, low bleed, and intermittent bleed devices and apply population factor (available only in the first two reporting years for new reporters)									
Onshore Petroleum and Natural Gas Production new reporters [49,50]	0.45	1.0	0.45	50	22.5				$2,232
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [49,50]	0.45	1.0	0.45	200	90.0				$8,926
Perform inventory of high bleed, low bleed, and intermittent bleed devices and apply population factor									
Onshore Natural Gas Transmission Compression reporters [20,51,52]	0.45	1.0	0.45	306	137.7				$13,657
Underground Natural Gas Storage reporters [20,51,52]	0.45	1.0	0.45	43	19.4				$1,919
Onshore Petroleum and Natural Gas Production existing reporters [20,51,52]	0.45	1.0	0.45	456	205.2				$20,352
Onshore Petroleum and Natural Gas Production new reporters [20,51]	4.50	1.0	4.50	0	-				$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [20,51]	4.50	1.0	4.50	0	-				$0
Storage Tanks									
Determine emissions by calculating flashing emissions with software program (M1)									
Onshore Petroleum and Natural Gas Production existing reporters [15,53]	0.50	340.8	170.4	289	49,245.6				$4,884,179
Onshore Petroleum and Natural Gas Production new reporters [15,54,55]	0.50	69.7	34.85	45	1,559.1				$154,636
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,55,56]	0.50	5.4	2.71	179	484.4				$48,042
Determine emissions by sampling and analyzing separator oil composition (M2)									
Onshore Petroleum and Natural Gas Production existing reporters [15,57]	0.02	0.0	0.00	0		-			$0
Onshore Petroleum and Natural Gas Production new reporters [15,57]	0.02	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,57]	0.02	0.0	0.00	0					$0
Determine emissions using equipment counts and population emission factors (M3)									
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.01	162.8	1.36	34		46.1			$2,437
Onshore Petroleum and Natural Gas Production new reporters [15,54,55]	0.01	33.3	0.28	5		1.5			$77
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,55,56]	0.01	2.6	0.02	21		0.5			$24
Pneumatic Pumps									
Perform inventory of pneumatic pumps and apply population factor									
Onshore Petroleum and Natural Gas Production existing reporters [20,51]	0.45	1.0	0.45	330	148.5				$14,728
Onshore Petroleum and Natural Gas Production new reporters [51]	4.50	1.0	4.50	50	225.0				$22,316
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [51]	4.50	1.0	4.50	200	900.0				$89,262
Onshore Petroleum and Natural Gas Production new reporters [20,51]	0.45	1.0	0.45	0	-				$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [20,51]	0.45	1.0	0.45	0	-				$0
Well Testing									

Year 1	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Determine GOR									
Onshore Petroleum and Natural Gas Production existing reporters [13,58,59]	0.17	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [13,58,59]	0.17	0.0	0.00	0					$0
Determine production rate									
Onshore Petroleum and Natural Gas Production existing reporters [13,58,60]	0.17	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [13,58,60]	0.17	0.0	0.00	0					$0
Calculate emissions using Eq W-17A or W-17B									
Onshore Petroleum and Natural Gas Production existing reporters [13,58]	0.17	569	94.83	49	4,646.8				$460,873
Onshore Petroleum and Natural Gas Production new reporters [13,58]	0.17	569	94.83	50	4,741.7				$470,229
Well Venting for Liquids Unloading									
Measure flow rate (M1)									
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.08	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [13,15]	0.08	0.0	0.00	0					$0
Calculate emissions (M1)									
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.17	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [13,15]	0.17	0.0	0.00	0					$0
Determine well counts, number of events, well depth, calculate pressure, calculate flow (M2 and M3)									
Onshore Petroleum and Natural Gas Production existing reporters [58]	0.17	203.4	36.33	255	9,265.0				$780,031
Onshore Petroleum and Natural Gas Production new reporters [39,58]	0.17	5.0	0.83	50	41.7				$4,133
Gas Well Completions and Workovers									
Measure flowback from Completions and Workovers with Hydraulic Fracturing (M1)									
Onshore Petroleum and Natural Gas Production existing reporters [13,15,57]	0.00	0.0	0.00	183					$0
Calculate emissions from Completions and Workovers with Hydraulic Fracturing (M2)									
Onshore Petroleum and Natural Gas Production reporters [13,42]	0.17	39.6	3.38	183	1,207.2				$119,290
Determine number of workovers and completions to estimate emissions from Completions and Workovers without Hydraulic Fracturing									
Onshore Petroleum and Natural Gas Production reporters [15,61]	0.17	39.6	3.38	212	1,399.2				$138,773
Oil Well Completions and Workovers									
Measure flowback from Completions and Workovers with Hydraulic Fracturing and determine emissions									
Onshore Petroleum and Natural Gas Production existing reporters [62,63,64]	24.00	6.0	144.00	246	35,424.0				$3,513,352
Onshore Petroleum and Natural Gas Production new reporters [62]	24.00	6.0	144.00	50	7,200.0				$714,096
Flare Stacks									
Determine volume of gas sent to the flare; determine fraction of the feed gas sent to an un-lit flare; and determine flare combustion efficiency									
Onshore Natural Gas Processing reporters [13,65]	0.33	2.1	0.70	317	221.9				$22,008
Onshore Petroleum and Natural Gas Production existing reporters [13,65]	0.33	90.1	30.03	245	7,358.2				$729,783
Onshore Petroleum and Natural Gas Production new reporters [39,65]	0.33	90.1	30.03	50	1,501.7				$148,935

Year 1	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [65,66]	0.33	18.0	6.00	200	1,200.0				$119,016
Calculate emissions									
Onshore Natural Gas Processing reporters [13,15]	0.17	2.1	0.35	317	111.0				$11,004
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.17	90.1	15.02	245	3,679.1				$364,891
Onshore Petroleum and Natural Gas Production new reporters [15,39]	0.17	90.1	15.02	50	750.8				$74,468
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,66]	0.17	18.0	3.00	200	600.0				$59,508
C. Create Information (Included in 4B)									
D. Gather Existing Information (Included in 4E)									
E. Write Report									
Annual Compliance Reporting through e-GGRT [67]	15.00	1.0	15.00	2,179	32,685.0		3,268.5	1,634.3	$3,842,367
5. RECORDKEEPING REQUIREMENTS									
A. Read Instructions (Included in 4A)									
B. Plan Activities (Included in 4B)									
C. Implement Activities (Included in 4B)									
D. Recordkeeping [68]	10.00	1.0	10.00	2,179	21,790.0		2,179.0	1,089.5	$2,561,578
E. Time to Transmit or Disclose Information (included in 4E)									
F. Time to Train Personnel (included in 4A)									
G. Time for Audits (Not Applicable)									
ANNUAL TESTING COSTS (O&M)									
Acid gas removal units									
Quarterly gas samples and analyses									
Onshore Natural Gas Processing reporters [13,69]		5.2		64					$133,120
Onshore Petroleum and Natural Gas Production existing reporters [13,69]		4.0		6					$9,600
Onshore Petroleum and Natural Gas Production new reporters [13,69]		4.0		0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [13,69]		4.0		0					$0
Acid gas removal units, storage tanks, and glycol dehydrators									
Simulation software yearly license									
Onshore Natural Gas Processing reporters [70,71]		1.0		270					$5,400
Onshore Petroleum and Natural Gas Production existing reporters [70,71]		1.0		289					$5,780
Onshore Petroleum and Natural Gas Production new reporters [70,71]		1.0		50					$1,000
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [70,71]		1.0		200					$4,000
Glycol Dehydrators >= 0.4 million standard cubic feet per day									
Feed gas sampling analysis									
Onshore Natural Gas Processing reporters [37]		1.7		270					$459,000
Onshore Petroleum and Natural Gas Production existing reporters [37]		11.5		170					$1,955,000
Onshore Petroleum and Natural Gas Production new reporters [37]		7.8		50					$390,000
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [37]		8.2		200					$1,640,000
Feed gas water content									
Onshore Natural Gas Processing reporters [37]		1.7		270					$11,475
Onshore Petroleum and Natural Gas Production existing reporters [37]		11.5		170					$48,875
Onshore Petroleum and Natural Gas Production new reporters [37]		3.0		50					$3,750
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [37]		8.2		200					$41,000

Year 1	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Dry gas water content									
Onshore Natural Gas Processing reporters [37]		1.7		270					$11,475
Onshore Petroleum and Natural Gas Production existing reporters [37]		11.5		170					$48,875
Onshore Petroleum and Natural Gas Production new reporters [37]		3.0		50					$3,750
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [37]		8.2		200					$41,000
Equipment Leak Surveys--Method 21 Testing									
Onshore Natural Gas Processing reporters [72,73]		1,000.0		418					$1,045,000
Onshore Natural Gas Transmission Compression reporters [72,73]		1,000.0		480					$1,200,000
Underground Natural Gas Storage reporters [72,73]		1,000.0		45					$112,500
LNG Import and Export Equipment reporters [72,73]		1,000.0		7					$17,500
Natural Gas Distribution reporters [72,73]		1,000.0		103					$257,500
LNG Storage reporters [72,73]		1,000.0		3					$7,500
ANNUALIZED CAPITAL COSTS									
Blowdown vent stacks--flow meter									
Onshore Natural Gas Processing reporters [74,75]		1.0		90					$52,680
Onshore Natural Gas Transmission Compression reporters [74,75]		1.0		202					$118,238
LNG Import and Export Equipment reporters [74,75]		1.0		3					$1,756
Natural Gas Transmission Pipeline reporters [74,75]		1.0		183					$107,117
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [74,75]		1.0		200					$117,068
Centrifugal and Reciprocating Compressors--flow meter [74,75]									
Onshore Natural Gas Processing reporters		1.0		347					$203,112
Onshore Natural Gas Transmission Compression reporters		1.0		343					$200,771
Underground Natural Gas Storage reporters		1.0		53					$31,023
LNG Import and Export Equipment reporters		1.0		6					$3,512
LNG Storage reporters		1.0		3					$1,756
Equipment Leak surveys--acoustic leak detection device [57]									
Onshore Natural Gas Processing reporters		0.0		0					$0
Onshore Natural Gas Transmission Compression reporters		0.0		0					$0
Underground Natural Gas Storage reporters		0.0		0					$0
LNG Import and Export Equipment reporters		0.0		0					$0
Natural Gas Distribution reporters		0.0		0					$0
LNG Storage reporters		0.0		0					$0
Equipment Leak surveys--infrared laser beam illuminated instrument [57]									
Onshore Natural Gas Processing reporters		0.0		0					$0
Onshore Natural Gas Transmission Compression reporters		0.0		0					$0
Underground Natural Gas Storage reporters		0.0		0					$0
LNG Import and Export Equipment reporters		0.0		0					$0
Natural Gas Distribution reporters		0.0		0					$0
LNG Storage reporters		0.0		0					$0
Equipment Leak surveys--optical gas imaging instrument [57]									
Onshore Natural Gas Processing reporters		0.0		0					$0
Onshore Natural Gas Transmission Compression reporters		0.0		0					$0
Underground Natural Gas Storage reporters		0.0		0					$0
LNG Import and Export Equipment reporters		0.0		0					$0
Natural Gas Distribution reporters		0.0		0					$0
LNG Storage reporters		0.0		0					$0
Acid gas removal units, glycol dehydrators or storage tanks--simulation software [77]									

Year 1	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Onshore Natural Gas Processing reporters		1.0		270					$32,925
Onshore Petroleum and Natural Gas Production existing reporters		1.0		289					$35,242
Onshore Petroleum and Natural Gas Production new reporters		1.0		50					$6,097
Onshore Petroleum and Natural Gas Gathering and Boosting reporters		1.0		200					$24,389
Transmission storage tanks--flow meter									
Onshore Natural Gas Transmission Compression reporters [74,75]		1.0		250					$146,334
Transmission storage tanks--acoustic leak detection device									
Onshore Natural Gas Transmission Compression reporters [57]		0.0		0					$0
Transmission storage tanks--optical gas imaging instrument									
Onshore Natural Gas Transmission Compression reporters [57]		0.0		0					$0
Transmission storage tanks--high volume sampler									
Onshore Natural Gas Transmission Compression reporters [57]		0.0		0					$0
Transmission storage tanks--calibrated bag									
Onshore Natural Gas Transmission Compression reporters [57]		0.0		0					$0
Gas well completions and workovers with hydraulic fracturing--flow meter									
Onshore Petroleum and Natural Gas Production existing reporters [57]		0.0		0					$0
Oil well completions and workovers with hydraulic fracturing--flow meter									
Onshore Petroleum and Natural Gas Production existing reporters [74,75]		1.0		246					$143,993
Onshore Petroleum and Natural Gas Production new reporters [74,75]		1.0		50					$29,267
Well venting for liquids unloading--flow meter									
Onshore Petroleum and Natural Gas Production existing reporters [57]		0.0		0					$0
Onshore Petroleum and Natural Gas Production new reporters [57]		0.0		0					$0

YEAR 1 COSTS					
TOTAL ANNUAL LABOR BURDEN AND COST	213,631.5	4,578.2	7,442.2	3,721.1	$22,797,578
				229,373.0	
TOTAL ANNUALIZED CAPITAL COST					$1,255,281
TOTAL ANNUAL LABOR COST					$22,797,578
TOTAL ANNUAL O&M COSTS					$7,453,100
TOTAL ANNUAL COSTS (Labor, O&M, and annualized capital)					$31,505,959

Appendix E-2. Detailed Unit Burden and Costs for Petroleum and Natural Gas Systems (Subpart W)—Year 2

Year 2	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
1. APPLICATIONS (Not Applicable)									
2. SURVEY AND STUDIES (Not Applicable)									
3. ACQUISITION, INSTALLATION, AND UTILIZATION OF TECHNOLOGY AND SYSTEMS									
4. REPORT REQUIREMENTS									
A1. Read Rule, Instructions, Guidance Documents for Subpart W									
Onshore Natural Gas Processing reporters [1,2]	5.00	1	5.00	470	2,350.0	-	235.0	117.5	$276,260
Onshore Natural Gas Transmission Compression reporters [1,2]	5.00	1	5.00	488	2,440.0	-	244.0	122.0	$286,840
Underground Natural Gas Storage reporters [1,2]	5.00	1	5.00	50	250.0	-	25.0	12.5	$29,389
LNG Import and Export Equipment reporters [1,2]	5.00	1	5.00	7	35.0	-	3.5	1.8	$4,115
Onshore Petroleum and Natural Gas Production existing reporters [1,2]	5.00	1	5.00	550	2,750.0	-	275.0	137.5	$323,283
Onshore Petroleum and Natural Gas Production new reporters [1,2,3]	5.00	1	5.00	50	250.0		25.0	12.5	$29,389
Natural Gas Distribution reporters [1,2]	5.00	1	5.00	177	885.0	-	88.5	44.3	$104,038
LNG Storage reporters [1,2]	5.00	1	5.00	4	20.0	-	2.0	1.0	$2,351
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [1,2,4]	5.00	1	5.00	200	1,000.0		100.0	50.0	$117,558
Natural Gas Transmission Pipeline reporters [1,2,4]	5.00	1	5.00	183	915.0		91.5	45.8	$107,565
Offshore Petroleum and Natural Gas Production reporters [2,5]	1.00	1	1.00	126	126.0	-	12.6	6.3	$14,812
A2. Read Rule, Instructions, Guidance Documents for Subpart A[6]	5.00	1	5.00	2,305	1 1,525.0	-	1,1 52.5	576.3	$1,354,850
B. Required Activities									
Acid Gas Removal Units									
Gather CEMS data for e-GGRT reporting (M1)									
Onshore Natural Gas Processing reporters [2,7,8]	1.00	1.7	1.67	6	10.0				$992
Onshore Petroleum and Natural Gas Production existing reporters [2,7,10]	1.00	1.0	1.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [2,7,11]	1.00	1.0	1.00	0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [2,7,11]	1.00	1.0	1.00	0					$0
Conduct quarterly gas sampling (M2)									
Onshore Natural Gas Processing reporters [12,13,14]	0.67	1.3	0.87	64	55.5		5.5	2.8	$6,521
Onshore Petroleum and Natural Gas Production existing reporters [12,13]	0.67	1.0	0.67	6	4.0		0.4	0.2	$470
Onshore Petroleum and Natural Gas Production new reporters [11,12]	0.67	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [11,12]	0.67	0.0	0.00	0					$0
Perform engineering calculation (M3)									
Onshore Natural Gas Processing reporters [13,15]	0.53	1.4	0.75	112	83.6		8.4	4.2	$9,831
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.53	1.0	0.53	9	4.8		0.5	0.2	$564
Onshore Petroleum and Natural Gas Production new reporters [11,15]	0.53	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [11,15]	0.53	0.0	0.00	0					$0
Perform simulation run (M4)									
Onshore Natural Gas Processing reporters [13,15]	0.17	1.5	0.25	48	12.0		1.2	0.6	$1,411
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.17	1.9	0.32	15	4.8		0.5	0.2	$558
Onshore Petroleum and Natural Gas Production new reporters [11,15,16]	0.17	2.0	0.33	50	16.7		1.7	0.8	$1,959
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [11,15,17]	0.17	2.0	0.33	200	66.7		6.7	3.3	$7,837

Year 2	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Equipment Leaks									
Conduct Leak Detection Surveys									
Onshore Natural Gas Processing reporters [18]	4.00	1	4.00	418	1,672.0				$165,829
Onshore Natural Gas Transmission Compression reporters [18]	4.00	1	4.00	480	1,920.0				$190,426
Underground Natural Gas Storage reporters [18]	4.00	1	4.00	45	180.0				$17,852
LNG Import and Export Equipment reporters [18]	4.00	1	4.00	7	28.0				$2,777
Natural Gas Distribution reporters [18]	4.00	1	4.00	103	412.0				$40,862
LNG Storage reporters [18]	4.00	1	4.00	3	12.0				$1,190
Determine emissions using population counts									
Onshore Petroleum and Natural Gas Production existing reporters [19,20]	0.45	1	0.45	503		226.4			$11,960
Onshore Petroleum and Natural Gas Production new reporters [19]	4.50	1	4.50	0		-			$0
Onshore Petroleum and Natural Gas Production new reporters [19,20]	0.45	1	0.45	50		22.5			$1,189
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [19]	4.50	1	4.50	0		-			$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [19,20]	0.45	1	0.45	200		90			$4,756
Blowdown Vent Stacks									
Calculate emissions									
Onshore Natural Gas Processing reporters [13, 15]	0.13	8.2	1.09	90	98.4		9.8	4.9	$11,568
Onshore Natural Gas Transmission Compression reporters [13, 15]	0.13	7.7	1.03	202	207.4		20.7	10.4	$24,380
LNG Import and Export Equipment reporters [13, 15]	0.13	9.0	1.20	3	3.6		0.4	0.2	$423
Natural Gas Transmission Pipeline reporters [15,20]	0.13	15	2.00	183	366.0		36.6	18.3	$43,026
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,20]	0.13	8.0	1.07	200	213.3		21.3	10.7	$25,079
Centrifugal Compressors									
Measure volumetric emissions from centrifugal compressors									
Onshore Natural Gas Processing reporters [13,21,22]	0.50	3.1	1.55	153	237.2				$23,521
Onshore Natural Gas Transmission Compression reporters [13,21,23]	0.50	2.4	1.20	343	411.6				$40,822
Underground Natural Gas Storage reporters [13,21,24]	0.50	3.5	1.75	10	17.5				$1,736
LNG Import and Export Equipment reporters [13,21,25]	0.50	3.2	1.60	3	5.4				$476
LNG Storage reporters [13,21,27]	0.50	1.9	0.95	1	1.0				$94
Calculate facility-wide emission factor and calculate mass emissions									
Onshore Natural Gas Processing reporters [13,21,22]	0.17	3.1	0.52	153	79.1		7.9	4.0	$9,293
Onshore Natural Gas Transmission Compression reporters [13,21,23]	0.17	2.4	0.40	343	137.2		13.7	6.9	$16,129
Underground Natural Gas Storage reporters [13,21,24]	0.17	3.5	0.58	10	5.8		0.6	0.3	$686
LNG Import and Export Equipment reporters [13,21,25]	0.17	3.2	0.53	3	1.6		0.2	0.1	$188
LNG Storage reporters [13,21,27]	0.17	1.9	0.32	1	0.3		0.0	0.0	$37
Determine count and calculate emissions using emission factor									
Onshore Petroleum and Natural Gas Production existing reporters [28]	0.10	1.0	0.10	207		20.7			$1,094
Onshore Petroleum and Natural Gas Production new reporters [28]	1.00	1.0	1.00	0		-			$0
Onshore Petroleum and Natural Gas Production new reporters [28]	0.10	1.0	0.10	50		0.50			$264
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [28]	1.00	1.0	1.00	0		-			$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [28]	0.10	1.0	0.10	200		20.0			$1,057
Reciprocating Compressors									
Measure volumetric emissions from reciprocating compressors									
Onshore Natural Gas Processing reporters [13,21,29]	0.50	7.5	3.75	347	1,301.3				$68,758
Onshore Natural Gas Transmission Compression reporters [13,21,30]	0.50	6.8	3.40	314	1,067.6				$56,412
Underground Natural Gas Storage reporters [13,21,31]	0.50	6.5	3.25	53	172.3				$9,102

Year 2	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
LNG Import and Export Equipment reporters [13,21,32]	0.50	3.6	1.80	6		10.8			$571
LNG Storage reporters [13,21,33]	0.50	3.6	1.80	3		5.4			$285
Calculate facility-wide emission factor and calculate mass emissions									
Onshore Natural Gas Processing reporters [13,21,29]	0.17	7.5	1.25	347	433.8		43.4	21.7	$50,991
Onshore Natural Gas Transmission Compression reporters [13,21,30]	0.17	6.8	1.13	314	355.9		35.6	17.8	$41,835
Underground Natural Gas Storage reporters [13,21,31]	0.17	6.5	1.08	53	57.4		5.7	2.9	$6,750
LNG Import and Export Equipment reporters [13,21,32]	0.17	3.6	0.6	6	3.6		0.4	0.2	$423
LNG Storage reporters [13,21,33]	0.17	3.6	0.6	3	1.8		0.2	0.1	$212
Determine count and calculate emissions using emission factor									
Onshore Petroleum and Natural Gas Production existing reporters [28]	0.10	1.0	0.10	358	35.8	35.8			$5,442
Onshore Petroleum and Natural Gas Production new reporters [28]	1.00	1.0	1.00	0	-	-			$0
Onshore Petroleum and Natural Gas Production new reporters [28]	0.10	1.0	0.10	50		0.50			$760
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [28]	1.00	1.0	1.00	0	-	-			$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [28]	0.10	1.0	0.10	200		20.0			$1,057
Combustion Emissions									
Determine fuel consumption through company records and calculate emissions									
Onshore Petroleum and Natural Gas Production existing reporters [2,34]	2.00	1.0	2.00	476	952.0				$94,419
Onshore Petroleum and Natural Gas Production new reporters [2,34]	2.00	1.0	2.00	50	100.0				$9,918
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [2,34]	2.00	1.0	2.00	200	400.0				$39,672
Natural Gas Distribution reporters [2,35]	2.00	1.0	2.00	36	72.0				$7,141
Associated Gas Venting and Flaring									
Calculate emissions using GOR and equations in rule									
Onshore Petroleum and Natural Gas Production existing reporters [13,35]	5.00	1.0	5.00	149	745.0				$73,889
Onshore Petroleum and Natural Gas Production new reporters [13,35]	5.00	1.0	5.00	50	250.0				$24,795
Determine GOR using available information									
Onshore Petroleum and Natural Gas Production existing reporters[36]	1.00	0.0	0.00	149	-				$0
Onshore Petroleum and Natural Gas Production new reporters [36]	1.00	0.0	0.00	50	-				$0
Dehydrators									
Run simulation software (M1)									
Onshore Natural Gas Processing reporters [13,15]	0.25	1.7	0.43	270	114.8		11.5	5.7	$13,490
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.25	11.5	2.88	170	488.8		48.9	24.4	$57,456
Onshore Petroleum and Natural Gas Production new reporters [15,40]	0.25	11.5	2.88	50	143.8		14.4	7.2	$16,899
Onshore Petroleum and Natural Gas Gathering and Boosting reporters[15,41]	0.25	2.7	0.67	200	134.3		13.4	6.7	$15,792
Equipment counts and population emission factors (M2)									
Onshore Natural Gas Processing reporters [38]	0.17	8.9	1.48	234	347.1		34.7	17.4	$40,804
Onshore Petroleum and Natural Gas Production existing reporters [38]	0.17	15.8	2.63	165	434.5		43.5	21.7	$51,079
Onshore Petroleum and Natural Gas Production new reporters [38]	0.17	15.8	2.63	50	131.7		13.2	6.6	$15,478
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [38]	0.17	3.7	0.62	200	123.0		12.3	6.2	$14,464
Calculation using Eq. W-6 (M3)									
Onshore Natural Gas Processing reporters [13,39]	0.17	2.7	0.45	146	65.7		6.6	3.3	$7,724
Onshore Petroleum and Natural Gas Production existing reporters [13,39]	0.17	7.8	1.30	42	54.6		5.5	2.7	$6,419
Onshore Petroleum and Natural Gas Production new reporters [39,40]	0.17	7.8	1.30	50	65.0		6.5	3.3	$7,641

Year 2	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [39,41]	0.17	1.8	0.3	200	60.7				$6,024
EOR Hydrocarbon Liquid Dissolved CO_2									
Measure volume of hydrocarbon liquids produced through EOR operations									
Onshore Petroleum and Natural Gas Production existing reporters [42,43]	0.17	3.0	0.50	15		7.5			$396
Onshore Petroleum and Natural Gas Production new reporters [39,42]	0.17	3.0	0.50	50		25			$1,321
Determine average CO_2 retained in HC liquids downstream of the storage tank									
Onshore Petroleum and Natural Gas Production existing reporters [42,43]	0.17	3.0	0.50	15		7.5			$396
Onshore Petroleum and Natural Gas Production new reporters [39,42]	0.17	3.0	0.50	50		25			$1,321
Calculation using Eq. W-38									
Onshore Petroleum and Natural Gas Production existing reporters [42,43]	0.17	3.0	0.50	15	7.5				$744
Onshore Petroleum and Natural Gas Production new reporters [39,42]	0.17	3.0	0.50	50	25.0				$2,480
EOR Injection Pump Blowdown									
Calculate total injection pump system volume									
Onshore Petroleum and Natural Gas Production existing reporters [13,44]	0.17	11.0	1.83	5	9.2				$909
Onshore Petroleum and Natural Gas Production new reporters [44]	0.17	11.0	1.83	50	91.7				$9,092
Retain logs of number of blowdowns per year									
Onshore Petroleum and Natural Gas Production existing reporters [13,44]	0.17	11.0	1.83	5	9.2				$909
Onshore Petroleum and Natural Gas Production new reporters [44]	0.17	11.0	0.80	50	91.7				$9,092
Calculate emissions using Eq W-37									
Onshore Petroleum and Natural Gas Production existing reporters [13,44]	0.17	11.0	1.83	5	9.2				$909
Onshore Petroleum and Natural Gas Production new reporters [44]	0.17	11.0	1.83	50	91.7				$9,092
Transmission Tanks at Onshore Natural Gas Transmission Compression reporters									
Determine leaks using optical gas imaging instrument [45,46]	0.08	0.0	0.00	0					$0
Determine leaks using acoustic leak detection device [45,46]	0.08	0.0	0.00	0					$0
Determine leaks using calibrated bag [42,46]	0.17	0.0	0.00	0					$0
Determine and quantify leaks using flow meter [13,42,47]	0.17	1.9	0.32	250	79.2				$7,852
Determine and quantify leaks using high volume sampler [42,46]	0.17	0.0	0.00	0					$0
Quantify leaks from optical gas imaging instrument and acoustic leak detection device using flow meter [42,46]	0.17	0.0	0.00	0					$0
Quantify leaks from optical gas imaging instrument and acoustic leak detection device using high volume sampler [42,46]	0.17	0.0	0.00	0					$0
Calculate emissions [48]	0.50	1.9	0.95	250	237.5				$23,555
Pneumatic Devices									
Estimate count of high bleed, low bleed, and intermittent bleed devices and apply population factor (available only in the first two reporting years for new reporters)									
Onshore Petroleum and Natural Gas Production new reporters [49,50]	0.45	1.0	0.45	50	22.5				$2,232
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [49,50]	0.45	1.0	0.45	200	90.0				$8,926
Perform inventory of high bleed, low bleed, and intermittent bleed devices and apply population factor									
Onshore Natural Gas Transmission Compression reporters [20,51,52]	0.45	1.0	0.45	306	137.7				$13,657
Underground Natural Gas Storage reporters [20,51,52]	0.45	1.0	0.45	43	19.4				$1,919
Onshore Petroleum and Natural Gas Production existing reporters [20,51,52]	0.45	1.0	0.45	456	205.2				$20,352
Onshore Petroleum and Natural Gas Production new reporters [20,51]	4.50	1.0	4.50	0	-				$0

Year 2	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [20,51]	4.50	1.0	4.50	0	-				$0
Storage Tanks									
Determine emissions by calculating flashing emissions with software program (M1)									
Onshore Petroleum and Natural Gas Production existing reporters [15,53]	0.50	340.8	170.4	289	49,245.6				$4,884,179
Onshore Petroleum and Natural Gas Production new reporters [15,54,55]	0.50	69.7	34.85	45	1,559.1				$154,636
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,55,56]	0.50	5.4	2.71	179	484.4				$48,042
Determine emissions by sampling and analyzing separator oil composition (M2)									
Onshore Petroleum and Natural Gas Production existing reporters [15,57]	0.02	0.0	0.00	0		-			$0
Onshore Petroleum and Natural Gas Production new reporters [15,57]	0.02	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,57]	0.02	0.0	0.00	0					$0
Determine emissions using equipment counts and population emission factors (M3)									
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.01	162.8	1.36	34		46.1			$2,437
Onshore Petroleum and Natural Gas Production new reporters [15,54,55]	0.01	33.3	0.28	5		1.5			$77
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,55,56]	0.01	2.6	0.02	21		0.5			$24
Pneumatic Pumps									
Perform inventory of pneumatic pumps and apply population factor									
Onshore Petroleum and Natural Gas Production existing reporters [20,51]	0.45	1.0	0.45	330	148.5				$14,728
Onshore Petroleum and Natural Gas Production new reporters [51]	4.50	1.0	4.50	0	-				$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [51]	4.50	1.0	4.50	0	-				$0
Onshore Petroleum and Natural Gas Production new reporters [20,51]	0.45	1.0	0.45	50	22.5				$2,232
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [20,51]	0.45	1.0	0.45	200	90.0				$8,926
Well Testing									
Determine GOR									
Onshore Petroleum and Natural Gas Production existing reporters [13,58,59]	0.17	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [13,58,59]	0.17	0.0	0.00	0					$0
Determine production rate									
Onshore Petroleum and Natural Gas Production existing reporters [13,58,60]	0.17	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [13,58,60]	0.17	0.0	0.00	0					$0
Calculate emissions using Eq W-17A or W-17B									
Onshore Petroleum and Natural Gas Production existing reporters [13,58]	0.17	569	94.83	49	4,646.8				$460,873
Onshore Petroleum and Natural Gas Production new reporters [13,58]	0.17	569	94.83	50	4,741.7				$470,229
Well Venting for Liquids Unloading									
Measure flow rate (M1)									
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.08	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [13,15]	0.08	0.0	0.00	0					$0
Calculate emissions (M1)									
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.17	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [13,15]	0.17	0.0	0.00	0					$0

Year 2	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manage r Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Determine well counts, number of events, well depth, calculate pressure, calculate flow (M2 and M3)									
Onshore Petroleum and Natural Gas Production existing reporters [58]	0.17	203.4	36.33	255	9,265.0				$780,031
Onshore Petroleum and Natural Gas Production new reporters [39,58]	0.17	5.0	0.83	50	41.7				$4,133
Gas Well Completions and Workovers									
Measure flowback from Completions and Workovers with Hydraulic Fracturing (M1)									
Onshore Petroleum and Natural Gas Production existing reporters [13,15,57]	0.00	0.0	0.00	183					$0
Calculate emissions from Completions and Workovers with Hydraulic Fracturing (M2)									
Onshore Petroleum and Natural Gas Production reporters [13,42]	0.17	39.6	3.38	183	1,207.2				$119,790
Determine number of workovers and completions to estimate emissions from Completions and Workovers without Hydraulic Fracturing									
Onshore Petroleum and Natural Gas Production reporters [15,61]	0.17	39.6	3.38	212	1,399.2				$138,773
Oil Well Completions and Workovers									
Measure flowback from Completions and Workovers with Hydraulic Fracturing and determine emissions									
Onshore Petroleum and Natural Gas Production existing reporters [62,63,64]	24.00	6.0	144.00	246	35,424.0				$3,513,352
Onshore Petroleum and Natural Gas Production new reporters [62]	24.00	6.0	144.00	50	7,200.0				$714,096
Flare Stacks									
Determine volume of gas sent to the flare; determine fraction of the feed gas sent to an un-lit flare; and determine flare combustion efficiency									
Onshore Natural Gas Processing reporters [13,65]	0.33	2.1	0.70	317	221.9				$22,008
Onshore Petroleum and Natural Gas Production existing reporters [13,65]	0.33	90.1	30.03	245	7,358.2				$729,783
Onshore Petroleum and Natural Gas Production new reporters [39,65]	0.33	90.1	30.03	50	1,501.7				$148,935
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [65,66]	0.33	18.0	6.00	200	1,200.0				$119,016
Calculate emissions									
Onshore Natural Gas Processing reporters [13,15]	0.17	2.1	0.35	317	111.0				$11,004
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.17	90.1	15.02	245	3,679.1				$364,891
Onshore Petroleum and Natural Gas Production new reporters [15,39]	0.17	90.1	15.02	50	750.8				$74,468
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,66]	0.17	18.0	3.00	200	600.0				$59,508
C. Create Information (Included in 4B)									
D. Gather Existing Information (Included in 4E)									
E. Write Report									
Annual Compliance Reporting through e-GGRT [67]	15.00	1.0	15.00	2,179	32,685.0		3,268.5	1,634.3	$3,842,367
5. RECORDKEEPING REQUIREMENTS									
A. Read Instructions (Included in 4A)									
B. Plan Activities (Included in 4B)									
C. Implement Activities (Included in 4B)									
D. Recordkeeping [68]	10.00	1.0	10.00	2,179	21,790.0		2,179.0	1,089.5	$2,561,578
E. Time to Transmit or Disclose Information (included in 4E)									
F. Time to Train Personnel (included in 4A)									

Year 2	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
G. Time for Audits (Not Applicable)									
ANNUAL TESTING COSTS (O&M)									
Acid gas removal units									
Quarterly gas samples and analyses									
Onshore Natural Gas Processing reporters [13,69]		5.2		64					$133,120
Onshore Petroleum and Natural Gas Production existing reporters [13,69]		4.0		6					$9,600
Onshore Petroleum and Natural Gas Production new reporters [13,69]		4.0		0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [13,69]		4.0		0					$0
Acid gas removal units, storage tanks, and glycol dehydrators									
Simulation software yearly license									
Onshore Natural Gas Processing reporters [70,71]		1.0		270					$5,400
Onshore Petroleum and Natural Gas Production existing reporters [70,71]		1.0		289					$5,780
Onshore Petroleum and Natural Gas Production new reporters [70,71]		1.0		50					$1,000
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [70,71]		1.0		200					$4,000
Glycol Dehydrators >= 0.4 million standard cubic feet per day									
Feed gas sampling analysis									
Onshore Natural Gas Processing reporters [37]		1.7		270					$459,000
Onshore Petroleum and Natural Gas Production existing reporters [37]		11.5		170					$1,955,000
Onshore Petroleum and Natural Gas Production new reporters [37]		7.8		50					$390,000
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [37]		8.2		200					$1,640,000
Feed gas water content									
Onshore Natural Gas Processing reporters [37]		1.7		270					$11,475
Onshore Petroleum and Natural Gas Production existing reporters [37]		11.5		170					$48,875
Onshore Petroleum and Natural Gas Production new reporters [37]		3.0		50					$3,750
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [37]		8.2		200					$41,000
Dry gas water content									
Onshore Natural Gas Processing reporters [37]		1.7		270					$11,475
Onshore Petroleum and Natural Gas Production existing reporters [37]		11.5		170					$48,875
Onshore Petroleum and Natural Gas Production new reporters [37]		3.0		50					$3,750
Onshore Petroleum and Natural Gas Gathering and Boosting reporters[37]		8.2		200					$41,000
Equipment Leak Surveys--Method 21 Testing									
Onshore Natural Gas Processing reporters [72,73]		1,000.0		418					$1,045,000
Onshore Natural Gas Transmission Compression reporters [72,73]		1,000.0		480					$1,200,000
Underground Natural Gas Storage reporters [72,73]		1,000.0		45					$112,500
LNG Import and Export Equipment reporters [72,73]		1,000.0		7					$17,500
Natural Gas Distribution reporters [72,73]		1,000.0		103					$257,500
LNG Storage reporters [72,73]		1,000.0		3					$7,500
ANNUALIZED CAPITAL COSTS									
Blowdown vent stacks--flow meter									
Onshore Natural Gas Processing reporters [74,75]		1.0		90					$52,680
Onshore Natural Gas Transmission Compression reporters [74,75]		1.0		202					$118,238
LNG Import and Export Equipment reporters [74,75]		1.0		3					$1,756
Natural Gas Transmission Pipeline reporters [74,75]		1.0		183					$107,117
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [74,75]		1.0		200					$117,068
Centrifugal and Reciprocating Compressors--flow meter [74,75]									
Onshore Natural Gas Processing reporters		1.0		347					$203,112
Onshore Natural Gas Transmission Compression reporters		1.0		343					$200,771

Year 2	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Underground Natural Gas Storage reporters		1.0		53					$31,023
LNG Import and Export Equipment reporters		1.0		6					$3,512
LNG Storage reporters		1.0		3					$1,756
Equipment Leak surveys--acoustic leak detection device [57]									
Onshore Natural Gas Processing reporters		0.0		0					$0
Onshore Natural Gas Transmission Compression reporters		0.0		0					$0
Underground Natural Gas Storage reporters		0.0		0					$0
LNG Import and Export Equipment reporters		0.0		0					$0
Natural Gas Distribution reporters		0.0		0					$0
LNG Storage reporters		0.0		0					$0
Equipment Leak surveys--infrared laser beam illuminated instrument [57]									
Onshore Natural Gas Processing reporters		0.0		0					$0
Onshore Natural Gas Transmission Compression reporters		0.0		0					$0
Underground Natural Gas Storage reporters		0.0		0					$0
LNG Import and Export Equipment reporters		0.0		0					$0
Natural Gas Distribution reporters		0.0		0					$0
LNG Storage reporters		0.0		0					$0
Equipment Leak surveys--optical gas imaging instrument [57]									
Onshore Natural Gas Processing reporters		0.0		0					$0
Onshore Natural Gas Transmission Compression reporters		0.0		0					$0
Underground Natural Gas Storage reporters		0.0		0					$0
LNG Import and Export Equipment reporters		0.0		0					$0
Natural Gas Distribution reporters		0.0		0					$0
LNG Storage reporters		0.0		0					$0
Acid gas removal units, glycol dehydrators or storage tanks--simulation software [77]									
Onshore Natural Gas Processing reporters		1.0		270					$32,925
Onshore Petroleum and Natural Gas Production existing reporters		1.0		289					$35,242
Onshore Petroleum and Natural Gas Production new reporters		1.0		50					$6,097
Onshore Petroleum and Natural Gas Gathering and Boosting reporters		1.0		200					$24,389
Transmission storage tanks--flow meter									
Onshore Natural Gas Transmission Compression reporters [74,75]		1.0		250					$146,334
Transmission storage tanks--acoustic leak detection device									
Onshore Natural Gas Transmission Compression reporters [57]		0.0		0					$0
Transmission storage tanks--optical gas imaging instrument									
Onshore Natural Gas Transmission Compression reporters [57]		0.0		0					$0
Transmission storage tanks--high volume sampler									
Onshore Natural Gas Transmission Compression reporters [57]		0.0		0					$0
Transmission storage tanks--calibrated bag									
Onshore Natural Gas Transmission Compression reporters [57]		0.0		0					$0
Gas well completions and workovers with hydraulic fracturing--flow meter									
Onshore Petroleum and Natural Gas Production existing reporters [57]		0.0		0					$0
Oil well completions and workovers with hydraulic fracturing--flow meter									
Onshore Petroleum and Natural Gas Production existing reporters [74,75]		1.0		246					$143,993
Onshore Petroleum and Natural Gas Production new reporters [74,75]		1.0		50					$29,267
Well venting for liquids unloading--flow meter									
Onshore Petroleum and Natural Gas Production existing reporters [57]		0.0		0					$0
Onshore Petroleum and Natural Gas Production new reporters [57]		0.0		0					$0

YEAR 2 COSTS					
TOTAL ANNUAL LABOR BURDEN AND COST	219,489.0	3,115.7	8,133.7	4,066.9	$23,428,327
				234,805.3	
TOTAL ANNUALIZED CAPITAL COST					$1,255,281
TOTAL ANNUAL LABOR COST					$23,428,327
TOTAL ANNUAL O&M COSTS					$7,453,100
TOTAL ANNUAL COSTS (Labor, O&M, and annualized capital)					$32,136,708

Appendix E-3. Detailed Unit Burden and Costs for Petroleum and Natural Gas Systems (Subpart W)—Year 3

Year 3	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
1. APPLICATIONS (Not Applicable)									
2. SURVEY AND STUDIES (Not Applicable)									
3. ACQUISITION, INSTALLATION, AND UTILIZATION OF TECHNOLOGY AND SYSTEMS									
4. REPORT REQUIREMENTS									
A1. Read Rule, Instructions, Guidance Documents for Subpart W									
Onshore Natural Gas Processing reporters [1,2]	5.00	1	5.00	470	2,350.0	-	235.0	117.5	$276,260
Onshore Natural Gas Transmission Compression reporters [1,2]	5.00	1	5.00	488	2,440.0	-	244.0	122.0	$286,840
Underground Natural Gas Storage reporters [1,2]	5.00	1	5.00	50	250.0	-	25.0	12.5	$29,389
LNG Import and Export Equipment reporters [1,2]	5.00	1	5.00	7	35.0	-	3.5	1.8	$4,115
Onshore Petroleum and Natural Gas Production existing reporters [1,2]	5.00	1	5.00	550	2,750.0	-	275.0	137.5	$323,283
Onshore Petroleum and Natural Gas Production new reporters [1,2,3]	5.00	1	5.00	50	250.0		25.0	12.5	$29,389
Natural Gas Distribution reporters [1,2]	5.00	1	5.00	177	885.0	-	88.5	44.3	$104,038
LNG Storage reporters [1,2]	5.00	1	5.00	4	20.0	-	2.0	1.0	$2,351
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [1,2,4]	5.00	1	5.00	200	1,000.0		100.0	50.0	$117,558
Natural Gas Transmission Pipeline reporters [1,2,4]	5.00	1	5.00	183	915.0		91.5	45.8	$107,565
Offshore Petroleum and Natural Gas Production reporters [2,5]	1.00	1	1.00	126	126.0	-	12.6	6.3	$14,812
A2. Read Rule, Instructions, Guidance Documents for Subpart A [6]	5.00	1	5.00	2,305	1 1,525.0	-	1,1 52.5	576.3	$1,354,850
B. Required Activities									
Acid Gas Removal Units									
Gather CEMS data for e-GGRT reporting (M1)									
Onshore Natural Gas Processing reporters [2,7,8]	1.00	1.7	1.67	6	10.0				$992
Onshore Petroleum and Natural Gas Production existing reporters [2,7,10]	1.00	1.0	1.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [2,7,11]	1.00	1.0	1.00	0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [2,7,11]	1.00	1.0	1.00	0					$0
Conduct quarterly gas sampling (M2)									
Onshore Natural Gas Processing reporters [12,13,14]	0.67	1.3	0.87	64	55.5		5.5	2.8	$6,521
Onshore Petroleum and Natural Gas Production existing reporters [12,13]	0.67	1.0	0.67	6	4.0		0.4	0.2	$470
Onshore Petroleum and Natural Gas Production new reporters [11,12]	0.67	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [11,12]	0.67	0.0	0.00	0					$0
Perform engineering calculation (M3)									
Onshore Natural Gas Processing reporters [13,15]	0.53	1.4	0.75	112	83.6		8.4	4.2	$9,831
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.53	1.0	0.53	9	4.8		0.5	0.2	$564
Onshore Petroleum and Natural Gas Production new reporters [11,15]	0.53	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [11,15]	0.53	0.0	0.00	0					$0
Perform simulation run (M4)									
Onshore Natural Gas Processing reporters [13,15]	0.17	1.5	0.25	48	12.0		1.2	0.6	$1,411
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.17	1.9	0.32	15	4.8		0.5	0.2	$558

Year 3	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Onshore Petroleum and Natural Gas Production new reporters [11,15,16]	0.17	2.0	0.33	50	16.7		1.7	0.8	$1,959
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [11,15,17]	0.17	2.0	0.33	200	66.7		6.7	3.3	$7,837
Equipment Leaks									
Conduct Leak Detection Surveys									
Onshore Natural Gas Processing reporters [18]	4.00	1	4.00	418	1,672.0				$165,829
Onshore Natural Gas Transmission Compression reporters [18]	4.00	1	4.00	480	1,920.0				$190,426
Underground Natural Gas Storage reporters [18]	4.00	1	4.00	45	180.0				$17,852
LNG Import and Export Equipment reporters [18]	4.00	1	4.00	7	28.0				$2,777
Natural Gas Distribution reporters [18]	4.00	1	4.00	103	412.0				$40,862
LNG Storage reporters [18]	4.00	1	4.00	3	12.0				$1,190
Determine emissions using population counts									
Onshore Petroleum and Natural Gas Production existing reporters [19,20]	0.45	1	0.45	503		226.4			$11,960
Onshore Petroleum and Natural Gas Production new reporters [19]	4.50	1	4.50	0		-			$0
Onshore Petroleum and Natural Gas Production new reporters [19,20]	0.45	1	0.45	50		22.5			$1,189
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [19]	4.50	1	4.50	0		-			$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [19,20]	0.45	1	0.45	200		90			$4,756
Blowdown Vent Stacks									
Calculate emissions									
Onshore Natural Gas Processing reporters [13, 15]	0.13	8.2	1.09	90	98.4		9.8	4.9	$11,568
Onshore Natural Gas Transmission Compression reporters [13, 15]	0.13	7.7	1.03	202	207.4		20.7	10.4	$24,380
LNG Import and Export Equipment reporters [13, 15]	0.13	9.0	1.20	3	3.6		0.4	0.2	$423
Natural Gas Transmission Pipeline reporters [15,20]	0.13	15	2.00	183	366.0		36.6	18.3	$43,026
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,20]	0.13	8.0	1.07	200	213.3		21.3	10.7	$25,079
Centrifugal Compressors									
Measure volumetric emissions from centrifugal compressors									
Onshore Natural Gas Processing reporters [13,21,22]	0.50	3.1	1.55	153	237.2				$23,521
Onshore Natural Gas Transmission Compression reporters [13,21,23]	0.50	2.4	1.20	343	411.6				$40,822
Underground Natural Gas Storage reporters [13,21,24]	0.50	3.5	1.75	10	17.5				$1,736
LNG Import and Export Equipment reporters [13,21,25]	0.50	3.2	1.60	3	5.4				$476
LNG Storage reporters [13,21,27]	0.50	1.9	0.95	1	1.0				$94
Calculate facility-wide emission factor and calculate mass emissions									
Onshore Natural Gas Processing reporters [13,21,22]	0.17	3.1	0.52	153	79.1		7.9	4.0	$9,293
Onshore Natural Gas Transmission Compression reporters [13,21,23]	0.17	2.4	0.40	343	137.2		13.7	6.9	$16,129
Underground Natural Gas Storage reporters [13,21,24]	0.17	3.5	0.58	10	5.8		0.6	0.3	$686
LNG Import and Export Equipment reporters [13,21,25]	0.17	3.2	0.53	3	1.6		0.2	0.1	$188
LNG Storage reporters [13,21,27]	0.17	1.9	0.32	1	0.3		0.0	0.0	$37
Determine count and calculate emissions using emission factor									
Onshore Petroleum and Natural Gas Production existing reporters [28]	0.10	1.0	0.10	207		20.7			$1,094
Onshore Petroleum and Natural Gas Production new reporters [28]	1.00	1.0	1.00	0		-			$0
Onshore Petroleum and Natural Gas Production new reporters [28]	0.10	1.0	0.10	50		0.50			$264
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [28]	1.00	1.0	1.00	0		-			$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [28]	0.10	1.0	0.10	200		20.0			$1,057

Year 3	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Reciprocating Compressors									
Measure volumetric emissions from reciprocating compressors									
Onshore Natural Gas Processing reporters [13,21,29]	0.50	7.5	3.75	347		1,301.3			$68,758
Onshore Natural Gas Transmission Compression reporters [13,21,30]	0.50	6.8	3.40	314		1,067.6			$56,412
Underground Natural Gas Storage reporters [13,21,31]	0.50	6.5	3.25	53		172.3			$9,102
LNG Import and Export Equipment reporters [13,21,32]	0.50	3.6	1.80	6		10.8			$571
LNG Storage reporters [13,21,33]	0.50	3.6	1.80	3		5.4			$285
Calculate facility-wide emission factor and calculate mass emissions									
Onshore Natural Gas Processing reporters [13,21,29]	0.17	7.5	1.25	347	433.8		43.4	21.7	$50,991
Onshore Natural Gas Transmission Compression reporters [13,21,30]	0.17	6.8	1.13	314	355.9		35.6	17.8	$41,835
Underground Natural Gas Storage reporters [13,21,31]	0.17	6.5	1.08	53	57.4		5.7	2.9	$6,750
LNG Import and Export Equipment reporters [13,21,32]	0.17	3.6	0.6	6	3.6		0.4	0.2	$423
LNG Storage reporters [13,21,33]	0.17	3.6	0.6	3	1.8		0.2	0.1	$212
Determine count and calculate emissions using emission factor									
Onshore Petroleum and Natural Gas Production existing reporters [28]	0.10	1.0	0.10	358	35.8	35.8			$5,442
Onshore Petroleum and Natural Gas Production new reporters [28]	1.00	1.0	1.00	0	-	-			$0
Onshore Petroleum and Natural Gas Production new reporters [28]	0.10	1.0	0.10	50		0.50			$760
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [28]	1.00	1.0	1.00	0	-	-			$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [28]	0.10	1.0	0.10	200		20.0			$1,057
Combustion Emissions									
Determine fuel consumption through company records and calculate emissions									
Onshore Petroleum and Natural Gas Production existing reporters [2,34]	2.00	1.0	2.00	476	952.0				$94,419
Onshore Petroleum and Natural Gas Production new reporters [2,34]	2.00	1.0	2.00	50	100.0				$9,918
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [2,34]	2.00	1.0	2.00	200	400.0				$39,672
Natural Gas Distribution reporters [2,35]	2.00	1.0	2.00	36	72.0				$7,141
Associated Gas Venting and Flaring									
Calculate emissions using GOR and equations in rule									
Onshore Petroleum and Natural Gas Production existing reporters [13,35]	5.00	1.0	5.00	149	745.0				$73,889
Onshore Petroleum and Natural Gas Production new reporters [13,35]	5.00	1.0	5.00	50	250.0				$24,795
Determine GOR using available information									
Onshore Petroleum and Natural Gas Production existing reporters [36]	1.00	0.0	0.00	149	-				$0
Onshore Petroleum and Natural Gas Production new reporters [36]	1.00	0.0	0.00	50	-				$0
Dehydrators									
Run simulation software (M1)									
Onshore Natural Gas Processing reporters [13,15]	0.25	1.7	0.43	270	114.8		11.5	5.7	$13,490
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.25	11.5	2.88	170	488.8		48.9	24.4	$57,456
Onshore Petroleum and Natural Gas Production new reporters [15,40]	0.25	11.5	2.88	50	143.8		14.4	7.2	$16,899
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,41]	0.25	2.7	0.67	200	134.3		13.4	6.7	$15,792
Equipment counts and population emission factors (M2)									

Year 3	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Onshore Natural Gas Processing reporters [38]	0.17	8.9	1.48	234	347.1		34.7	17.4	$40,804
Onshore Petroleum and Natural Gas Production existing reporters [38]	0.17	15.8	2.63	165	434.5		43.5	21.7	$51,079
Onshore Petroleum and Natural Gas Production new reporters [38]	0.17	15.8	2.63	50	131.7		13.2	6.6	$15,478
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [38]	0.17	3.7	0.62	200	123.0		12.3	6.2	$14,464
Calculation using Eq. W-6 (M3)									
Onshore Natural Gas Processing reporters [13,39]	0.17	2.7	0.45	146	65.7		6.6	3.3	$7,724
Onshore Petroleum and Natural Gas Production existing reporters [13,39]	0.17	7.8	1.30	42	54.6		5.5	2.7	$6,419
Onshore Petroleum and Natural Gas Production new reporters [39,40]	0.17	7.8	1.30	50	65.0		6.5	3.3	$7,641
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [39,41]	0.17	1.8	0.3	200	60.7				$6,024
EOR Hydrocarbon Liquid Dissolved CO_2									
Measure volume of hydrocarbon liquids produced through EOR operations									
Onshore Petroleum and Natural Gas Production existing reporters [42,43]	0.17	3.0	0.50	15		7.5			$396
Onshore Petroleum and Natural Gas Production new reporters [39,42]	0.17	3.0	0.50	50		25			$1,321
Determine average CO_2 retained in HC liquids downstream of the storage tank									
Onshore Petroleum and Natural Gas Production existing reporters [42,43]	0.17	3.0	0.50	15		7.5			$396
Onshore Petroleum and Natural Gas Production new reporters [39,42]	0.17	3.0	0.50	50		25			$1,321
Calculation using Eq. W-38									
Onshore Petroleum and Natural Gas Production existing reporters [42,43]	0.17	3.0	0.50	15	7.5				$744
Onshore Petroleum and Natural Gas Production new reporters [39,42]	0.17	3.0	0.50	50	25.0				$2,480
EOR Injection Pump Blowdown									
Calculate total injection pump system volume									
Onshore Petroleum and Natural Gas Production existing reporters [13,44]	0.17	11.0	1.83	5	9.2				$909
Onshore Petroleum and Natural Gas Production new reporters [44]	0.17	11.0	1.83	50	91.7				$9,092
Retain logs of number of blowdowns per year									
Onshore Petroleum and Natural Gas Production existing reporters [13,44]	0.17	11.0	1.83	5	9.2				$909
Onshore Petroleum and Natural Gas Production new reporters [44]	0.17	11.0	0.80	50	91.7				$9,092
Calculate emissions using Eq W-37									
Onshore Petroleum and Natural Gas Production existing reporters [13,44]	0.17	11.0	1.83	5	9.2				$909
Onshore Petroleum and Natural Gas Production new reporters [44]	0.17	11.0	1.83	50	91.7				$9,092
Transmission Tanks at Onshore Natural Gas Transmission Compression reporters									
Determine leaks using optical gas imaging instrument [45,46]	0.08	0.0	0.00	0					$0
Determine leaks using acoustic leak detection device [45,46]	0.08	0.0	0.00	0					$0
Determine leaks using calibrated bag [42,46]	0.17	0.0	0.00	0					$0
Determine and quantify leaks using flow meter [13,42,47]	0.17	1.9	0.32	250	79.2				$7,852
Determine and quantify leaks using high volume sampler [42,46]	0.17	0.0	0.00	0					$0
Quantify leaks from optical gas imaging instrument and acoustic leak detection device using flow meter [42,46]	0.17	0.0	0.00	0					$0

Year 3	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Quantify leaks from optical gas imaging instrument and acoustic leak detection device using high volume sampler [42,46]	0.17	0.0	0.00	0					$0
Calculate emissions [48]	0.50	1.9	0.95	250	237.5				$23,555
Pneumatic Devices									
Estimate count of high bleed, low bleed, and intermittent bleed devices and apply population factor (available only in the first two reporting years for new reporters)									
Onshore Petroleum and Natural Gas Production new reporters [49,50]	0.45	1.0	0.45	0	-				$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [49,50]	0.45	1.0	0.45	0	-				$0
Perform inventory of high bleed, low bleed, and intermittent bleed devices and apply population factor									
Onshore Natural Gas Transmission Compression reporters [20,51,52]	0.45	1.0	0.45	306	137.7				$13,657
Underground Natural Gas Storage reporters [20,51,52]	0.45	1.0	0.45	43	19.4				$1,919
Onshore Petroleum and Natural Gas Production existing reporters [20,51,52]	0.45	1.0	0.45	456	205.2				$20,352
Onshore Petroleum and Natural Gas Production new reporters [20,51]	4.50	1.0	4.50	50	225.0				$22,316
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [20,51]	4.50	1.0	4.50	200	900.0				$89,262
Storage Tanks									
Determine emissions by calculating flashing emissions with software program (M1)									
Onshore Petroleum and Natural Gas Production existing reporters [15,53]	0.50	340.8	170.4	289	49,245.6				$4,884,179
Onshore Petroleum and Natural Gas Production new reporters [15,54,55]	0.50	69.7	34.85	45	1,559.1				$154,636
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,55,56]	0.50	5.4	2.71	179	484.4				$48,042
Determine emissions by sampling and analyzing separator oil composition (M2)									
Onshore Petroleum and Natural Gas Production existing reporters [15,57]	0.02	0.0	0.00	0		-			$0
Onshore Petroleum and Natural Gas Production new reporters [15,57]	0.02	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,57]	0.02	0.0	0.00	0					$0
Determine emissions using equipment counts and population emission factors (M3)									
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.01	162.8	1.36	34		46.1			$2,437
Onshore Petroleum and Natural Gas Production new reporters [15,54,55]	0.01	33.3	0.28	5		1.5			$77
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,55,56]	0.01	2.6	0.02	21		0.5			$24
Pneumatic Pumps									
Perform inventory of pneumatic pumps and apply population factor									
Onshore Petroleum and Natural Gas Production existing reporters [20,51]	0.45	1.0	0.45	330	148.5				$14,728
Onshore Petroleum and Natural Gas Production new reporters [51]	4.50	1.0	4.50	0	-				$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [51]	4.50	1.0	4.50	0	-				$0
Onshore Petroleum and Natural Gas Production new reporters [20,51]	0.45	1.0	0.45	50	22.5				$2,232
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [20,51]	0.45	1.0	0.45	200	90.0				$8,926

Year 3	(A) Hours per Occurrence	(B) Occurrences/ Respondent/ Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/ Year (C x D)	Technician Hours/ Year	Middle Manager Hours/ Year	(F) Senior Manager Hours/ Year	(H) Cost/ Year
Well Testing									
Determine GOR									
Onshore Petroleum and Natural Gas Production existing reporters [13,58,59]	0.17	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [13,58,59]	0.17	0.0	0.00	0					$0
Determine production rate									
Onshore Petroleum and Natural Gas Production existing reporters [13,58,60]	0.17	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [13,58,60]	0.17	0.0	0.00	0					$0
Calculate emissions using Eq W-17A or W-17B									
Onshore Petroleum and Natural Gas Production existing reporters [13,58]	0.17	569	94.83	49	4,646.8				$460,873
Onshore Petroleum and Natural Gas Production new reporters [13,58]	0.17	569	94.83	50	4,741.7				$470,229
Well Venting for Liquids Unloading									
Measure flow rate (M1)									
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.08	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [13,15]	0.08	0.0	0.00	0					$0
Calculate emissions (M1)									
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.17	0.0	0.00	0					$0
Onshore Petroleum and Natural Gas Production new reporters [13,15]	0.17	0.0	0.00	0					$0
Determine well counts, number of events, well depth, calculate pressure, calculate flow (M2 and M3)									
Onshore Petroleum and Natural Gas Production existing reporters [58]	0.17	203.4	36.33	255	9,265.0				$780,031
Onshore Petroleum and Natural Gas Production new reporters [39,58]	0.17	5.0	0.83	50	41.7				$4,133
Gas Well Completions and Workovers									
Measure flowback from Completions and Workovers with Hydraulic Fracturing (M1)									
Onshore Petroleum and Natural Gas Production existing reporters [13,15,57]	0.00	0.0	0.00	183					$0
Calculate emissions from Completions and Workovers with Hydraulic Fracturing (M2)									
Onshore Petroleum and Natural Gas Production reporters [13,42]	0.17	39.6	3.38	183	1,207.2				$119,290
Determine number of workovers and completions to estimate emissions from Completions and Workovers without Hydraulic Fracturing									
Onshore Petroleum and Natural Gas Production reporters [15,61]	0.17	39.6	3.38	212	1,399.2				$138,773
Oil Well Completions and Workovers									
Measure flowback from Completions and Workovers with Hydraulic Fracturing and determine emissions									
Onshore Petroleum and Natural Gas Production existing reporters [62,63,64]	24.00	6.0	144.00	246	35,424.0				$3,513,352
Onshore Petroleum and Natural Gas Production new reporters [62]	24.00	6.0	144.00	50	7,200.0				$714,096
Flare Stacks									
Determine volume of gas sent to the flare; determine fraction of the feed gas sent to an un-lit flare; and determine flare combustion efficiency									
Onshore Natural Gas Processing reporters [13,65]	0.33	2.1	0.70	317	221.9				$22,008

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Onshore Petroleum and Natural Gas Production existing reporters [13,65]	0.33	90.1	30.03	245	7,358.2				$729,783
Onshore Petroleum and Natural Gas Production new reporters [39,65]	0.33	90.1	30.03	50	1,501.7				$148,935
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [65,66]	0.33	18.0	6.00	200	1,200.0				$119,016
Calculate emissions									
Onshore Natural Gas Processing reporters [13,15]	0.17	2.1	0.35	317	111.0				$11,004
Onshore Petroleum and Natural Gas Production existing reporters [13,15]	0.17	90.1	15.02	245	3,679.1				$364,891
Onshore Petroleum and Natural Gas Production new reporters [15,39]	0.17	90.1	15.02	50	750.8				$74,468
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [15,66]	0.17	18.0	3.00	200	600.0				$59,508
C. Create Information (Included in 4B)									
D. Gather Existing Information (Included in 4E)									
E. Write Report									
Annual Compliance Reporting through e-GGRT [67]	15.00	1.0	15.00	2,179	32,685.0		3,268.5	1,634.3	$3,842,367
5. RECORDKEEPING REQUIREMENTS									
A. Read Instructions (Included in 4A)									
B. Plan Activities (Included in 4B)									
C. Implement Activities (Included in 4B)									
D. Recordkeeping [68]	10.00	1.0	10.00	2,179	21,790.0		2,179.0	1,089.5	$2,561,578
E. Time to Transmit or Disclose Information (included in 4E)									
F. Time to Train Personnel (included in 4A)									
G. Time for Audits (Not Applicable)									
ANNUAL TESTING COSTS (O&M)									
Acid gas removal units									
Quarterly gas samples and analyses									
Onshore Natural Gas Processing reporters [13,69]		5.2		64					$133,120
Onshore Petroleum and Natural Gas Production existing reporters [13,69]		4.0		6					$9,600
Onshore Petroleum and Natural Gas Production new reporters [13,69]		4.0		0					$0
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [13,69]		4.0		0					$0
Acid gas removal units, storage tanks, and glycol dehydrators									
Simulation software yearly license									
Onshore Natural Gas Processing reporters [70,71]		1.0		270					$5,400
Onshore Petroleum and Natural Gas Production existing reporters [70,71]		1.0		289					$5,780
Onshore Petroleum and Natural Gas Production new reporters [70,71]		1.0		50					$1,000
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [70,71]		1.0		200					$4,000
Glycol Dehydrators >= 0.4 million standard cubic feet per day									
Feed gas sampling analysis									
Onshore Natural Gas Processing reporters [37]		1.7		270					$459,000
Onshore Petroleum and Natural Gas Production existing reporters [37]		11.5		170					$1,955,000
Onshore Petroleum and Natural Gas Production new reporters [37]		7.8		50					$390,000
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [37]		8.2		200					$1,640,000
Feed gas water content									
Onshore Natural Gas Processing reporters [37]		1.7		270					$11,475

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Onshore Petroleum and Natural Gas Production existing reporters [37]		11.5		170					$48,875
Onshore Petroleum and Natural Gas Production new reporters [37]		3.0		50					$3,750
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [37]		8.2		200					$41,000
Dry gas water content									
Onshore Natural Gas Processing reporters [37]		1.7		270					$11,475
Onshore Petroleum and Natural Gas Production existing reporters [37]		11.5		170					$48,875
Onshore Petroleum and Natural Gas Production new reporters [37]		3.0		50					$3,750
Onshore Petroleum and Natural Gas Gathering and Boosting reporters[37]		8.2		200					$41,000
Equipment Leak Surveys--Method 21 Testing									
Onshore Natural Gas Processing reporters [72,73]		1,000.0		418					$1,045,000
Onshore Natural Gas Transmission Compression reporters [72,73]		1,000.0		480					$1,200,000
Underground Natural Gas Storage reporters [72,73]		1,000.0		45					$112,500
LNG Import and Export Equipment reporters [72,73]		1,000.0		7					$17,500
Natural Gas Distribution reporters [72,73]		1,000.0		103					$257,500
LNG Storage reporters [72,73]		1,000.0		3					$7,500
ANNUALIZED CAPITAL COSTS									
Blowdown vent stacks--flow meter									
Onshore Natural Gas Processing reporters [74,75]		1.0		90					$52,680
Onshore Natural Gas Transmission Compression reporters [74,75]		1.0		202					$118,238
LNG Import and Export Equipment reporters [74,75]		1.0		3					$1,756
Natural Gas Transmission Pipeline reporters [74,75]		1.0		183					$107,117
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [74,75]		1.0		200					$117,068
Centrifugal and Reciprocating Compressors--flow meter [74,75]									
Onshore Natural Gas Processing reporters		1.0		347					$203,112
Onshore Natural Gas Transmission Compression reporters		1.0		343					$200,771
Underground Natural Gas Storage reporters		1.0		53					$31,023
LNG Import and Export Equipment reporters		1.0		6					$3,512
LNG Storage reporters		1.0		3					$1,756
Equipment Leak surveys--acoustic leak detection device [57]									
Onshore Natural Gas Processing reporters		0.0		0					$0
Onshore Natural Gas Transmission Compression reporters		0.0		0					$0
Underground Natural Gas Storage reporters		0.0		0					$0
LNG Import and Export Equipment reporters		0.0		0					$0
Natural Gas Distribution reporters		0.0		0					$0
LNG Storage reporters		0.0		0					$0
Equipment Leak surveys--infrared laser beam illuminated instrument [57]									
Onshore Natural Gas Processing reporters		0.0		0					$0
Onshore Natural Gas Transmission Compression reporters		0.0		0					$0
Underground Natural Gas Storage reporters		0.0		0					$0
LNG Import and Export Equipment reporters		0.0		0					$0
Natural Gas Distribution reporters		0.0		0					$0
LNG Storage reporters		0.0		0					$0
Equipment Leak surveys--optical gas imaging instrument [57]									
Onshore Natural Gas Processing reporters		0.0		0					$0
Onshore Natural Gas Transmission Compression reporters		0.0		0					$0
Underground Natural Gas Storage reporters		0.0		0					$0
LNG Import and Export Equipment reporters		0.0		0					$0
Natural Gas Distribution reporters		0.0		0					$0

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LNG Storage reporters		0.0		0					$0
Acid gas removal units, glycol dehydrators, or storage tanks--simulation software[77]									
Onshore Natural Gas Processing reporters		1.0		270					$32,925
Onshore Petroleum and Natural Gas Production existing reporters		1.0		289					$35,242
Onshore Petroleum and Natural Gas Production new reporters		1.0		50					$6,097
Onshore Petroleum and Natural Gas Gathering and Boosting reporters		1.0		200					$24,389
Transmission storage tanks--flow meter									
Onshore Natural Gas Transmission Compression reporters [74,75]		1.0		250					$146,334
Transmission storage tanks--acoustic leak detection device									
Onshore Natural Gas Transmission Compression reporters [57]		0.0		0					$0
Transmission storage tanks--optical gas imaging instrument									
Onshore Natural Gas Transmission Compression reporters [57]		0.0		0					$0
Transmission storage tanks--high volume sampler									
Onshore Natural Gas Transmission Compression reporters [57]		0.0		0					$0
Transmission storage tanks--calibrated bag									
Onshore Natural Gas Transmission Compression reporters [57]		0.0		0					$0
Gas well completions and workovers with hydraulic fracturing--flow meter									
Onshore Petroleum and Natural Gas Production existing reporters [57]		0.0		0					$0
Oil well completions and workovers with hydraulic fracturing--flow meter									
Onshore Petroleum and Natural Gas Production existing reporters [74,75]		1.0		246					$143,993
Onshore Petroleum and Natural Gas Production new reporters [74,75]		1.0		50					$29,267
Well venting for liquids unloading--flow meter									
Onshore Petroleum and Natural Gas Production existing reporters [57]		0.0		0					$0
Onshore Petroleum and Natural Gas Production new reporters [57]		0.0		0					$0

YEAR 3 COSTS					
TOTAL ANNUAL LABOR BURDEN AND COST	220,501.5	3,115.7	8,133.7	4,066.9	$23,528,746
				235,817.8	
TOTAL ANNUALIZED CAPITAL COST					$1,255,281
TOTAL ANNUAL LABOR COST					$23,528,746
TOTAL ANNUAL O&M COSTS					$7,453,100
TOTAL ANNUAL COSTS (Labor, O&M, and annualized capital)					$32,237,127

Appendix E-4. Footnotes Applicable to Appendix E-1, Appendix E-2, and Appendix E-3

[1] Assumed 5 hours per reporter per year to read rule.

[2] Assumed activity occurs once per year per reporter.

[3] These are new reporters due to the inclusion of oil wells with hydraulic fracturing in 2015 subpart W amendments finalized on October 22, 2015 (80 FR 64262).

[4] These are new reporters due to the 2015 subpart W amendments finalized on October 22, 2015 (80 FR 64262).

[5] Assumed lower LOE for Offshore segment because rule only asks for information already being gathered under other programs.

[6] Assumed 2 hours per reporter per year to read Subpart A of Part 98.

[7] Assumed 1 hour per year to gather CEMS data.

[8] Most of the costs used in this analysis assume that reporters will choose to use the least cost option. Although the use of CEMS is not the least cost option, reporters already using CEMS are required to comply using CEMS for acid gas removal units.

[9] No reporters used M1 in RY2013.

[10] Although this is not the least cost option, reporters with CEMS are required to comply using CEMS for acid gas removal units.

[11] Assumed new reporters would use the least cost option (M4).

[12] Assumed sampling was equal to calculation (10 minutes per unit) and multiplied by 4 for quarterly activities.

[13] Number of occurrences per respondent based on average number reported by segment for RY2014.

[14] Although this is not the least cost option, reporters with flow meters are required to comply using existing flow meters for acid gas removal units.

[15] LOE from December 2010 EIA.

[16] For new reporters without GHGRP data, we assumed that each reporter would report all pieces of equipment; this is an overly conservative estimate.

[17] For new G&B reporters without GHGRP data, we assumed that each reporter would report all pieces of equipment; this is an overly conservative estimate.

[18] Assumed 4 hours per year per respondent to schedule contractor, review contractor results, etc.

[19] Assumed 10% of 4.5 hours for existing sources in all years. Assumed 4.5 hours in first year for new sources and 10% of 4.5 hours in subsequent years. After the first year, the LOE will only involve accounting for changes from the previous year.

[20] Assumed that updating the inventory each year would not include counting each piece of equipment but more of an accounting exercise where records show how many devices are no longer in service during the reporting year and how many new devices were installed during the reporting year. Assumed 10% of 4.5 hours for existing sources in all years. Assumed 4.5 hours in third year for new sources and 10% of 4.5 hours in subsequent years.

[21] Assumed 30 minutes per compressor for measuring emissions and assumed 10 minutes per compressor for calculating emissions.

[22] There is burden reduction of one vent reading if vents are manifolded; assuming that 10% of vents are manifolded and 90% are not manifolded, the number of occurrences is reduced from 3.2 to 3.1 (0.9*3.2+0.1*(3.2-1)=3.1).

[23] There is burden reduction of one vent reading if vents are manifolded; assuming that 10% of vents are manifolded and 90% are not manifolded, the number of occurrences is reduced from 2.5 to 2.4 (0.9*2.5+0.1*(2.5-1)=2.4).

[24] There is burden reduction of one vent reading if vents are manifolded; assuming that 10% of vents are manifolded and 90% are not manifolded, the number of occurrences is reduced from 3.6 to 3.5 (0.9*3.6+0.1*(3.6-1)=3.5).

[25] There is burden reduction of one vent reading if vents are manifolded; assuming that 10% of vents are manifolded and 90% are not manifolded, the number of occurrences is reduced from 3.3 to 3.2 (0.9*3.3+0.1*(3.3-1)=3.2).

[26] None were reported in RY2013 and RY2014 but assumed 2 for future years.

[27] There is burden reduction of one vent reading if vents are manifolded; assuming that 10% of vents are manifolded and 90% are not manifolded, the number of occurrences is reduced from 2.0 to 1.9 (0.9*2.0+0.1*(2.0-1)=1.9).

[28] Assumed 1.0 hours per reporter in first year. Assumed 10% of 1.0 hours in subsequent years. After the first year, the LOE will only involve accounting for changes from the previous year.

[29] There is burden reduction of one vent reading if vents are manifolded; assuming that 10% of vents are manifolded and 90% are not manifolded, the number of occurrences is reduced from 7.6 to 7.5 (0.9*7.6+0.1*(7.6-1)=7.5).

[30] There is burden reduction of one vent reading if vents are manifolded; assuming that 10% of vents are manifolded and 90% are not manifolded, the number of occurrences is reduced from 6.9 to 6.8 (0.9*6.9+0.1*(6.9-1)=6.8).

[31] There is burden reduction of one vent reading if vents are manifolded; assuming that 10% of vents are manifolded and 90% are not manifolded, the number of occurrences is reduced from 6.6 to 6.5 (0.9*6.6+0.1*(6.6-1)=6.5).

[32] There is burden reduction of one vent reading if vents are manifolded; assuming that 10% of vents are manifolded and 90% are not manifolded, the number of occurrences is reduced from 3.7 to 3.6 (0.9*3.7+0.1*(3.7-1)=3.6).

[33] There is burden reduction of one vent reading if vents are manifolded; assuming that 10% of vents are manifolded and 90% are not manifolded, the number of occurrences is reduced from 3.7 to 3.6 (0.9*3.7+0.1*(3.7-1)=3.6).

[34] Assumed 2 hours per year to combine company records and calculate emissions.

[35] Assumed 5 hours per year per reporter to calculate emissions using GOR and equations in the rule.

[36] Assumed industry already determines GOR as part of standard business practices.

[37] Assumed testing cost of $1,000 per sample for feed gas sampling, $25 per sample for feed gas water content, and $25 per sample for dry gas water content.

[38] Assumed 10 minutes per reporter per year.

[39] Assumed 10 minutes per dehydrator per year.

[40] Assumed same average number of pieces of equipment as for existing Production reporters.

[41] Assumed 8.2 dehydrators from 2015 amendment package finalized on October 22, 2015 (80 FR 64262).

[42] Assumed 10 minutes per tank.

[43] Number of occurrences per respondent based on average number of sub-basins reported per segment for RY2014.

[44] Assumed 10 minutes per blowdown per year.

[45] Assumed 5 minutes per tank.

[46] Assumed that this is not the least cost option available.

[47] Assumed that using a flow meter to determine and quantify leaks is the least cost option.

[48] Assumed 30 minutes per tank.

[49] Assumed 0.45 hours per reporter in first two years to estimate the count of pneumatic devices.

[50] This option is only available to reporters during the first two years of reporting under subpart W.

[51] To perform the inventory, assumed 4.5 hours in first year and assumed 10% of 4.5 hours in subsequent years. After the first year, the LOE will only involve accounting for changes from the previous year.

[52] Assumed that all existing reporters are required to perform the inventory.

[53] Number of occurrences per reporter based on average number of hydrocarbon tanks reported by segment for RY2014.

[54] Assumed 103 total storage tanks.

[55] Used number of storage tanks reported in RY2014 for the Production segment to determine the ratio of total storage tanks using Method 1 or Method 3 to determine the number of storage tanks using each of the two methods for the G&B segment.

[56] Assumed 8 total storage tanks.

[57] Assumed this is not the least cost option available to reporters.

[58] Assumed 10 minutes per well.

[59] Assumed industry already determines GOR as part of standard business practices.

[60] Assumed industry already determines production rate as part of standard business practices.

[61] Assumed same average number of wells as for hydraulic fracturing in RY2014.

[62] Assuming 24 hours to conduct the measurements needed for hydraulically fractured oil wells.

[63] For RY2012, 246 of the facilities in the Onshore Petroleum and Natural Gas Production segment reported oil sub-basins and the oil sub-basins contained companies that conducted oil well completions with hydraulic fracturing in 2011. (Reference: U.S. EPA Office of Air Quality Planning and Standards (OAQPS). Oil and Natural Gas Sector Hydraulically Fractured Oil Well Completions and Associated Gas during Ongoing Production: Report for Oil and Natural Gas Sector, Oil Well Completions and Associated Gas during Ongoing Production Review Panel. April 2014. Available at http://www.epa.gov/airquality/oilandgas/pdfs/20140415completions.pdf. Pages A-7 through A-17.).

[64] Instead of taking a measurement for each oil well, assume that each reporter will elect to take "representative" measurements from each oil well type combination and apply to all wells (up to 25 completions and workovers) using Equation W-10A. The well type combinations are flare/non-flare; vertical/horizontal well type; and REC/nonREC. The most well type combinations per reporter is 8, but assume that a typical facility has 3 of these well type combinations and a typical reporter has 2 sub-basins..

[65] Assumed 20 minutes to determine flare stack information.

[66] Assumed 18 flare stacks per Gathering and Boosting reporter.

[67] Assumed 10 hours per reporter per year to submit report through e-GGRT (except Offshore Production).

[68] Assumed 10 hours per reporter per year for recordkeeping (except Offshore Production).

[69] Assumed testing cost of $400 per unit.

[70] Assumed activity occurs once per year per reporter for simulation software related to acid gas removal units, storage tanks, dehydrators.

[71] Assumed license cost of $20 per year.

[72] Assumed 1,000 pieces of equipment per reporter.

[73] Assumed Method 21 cost of $2.5 per piece of equipment.

[74] Assumed one portable flow meter per reporter rather than one flow meter per vent stack.

[75] Assumed capital cost of $2,400 for flow meter; annualized cost of $585.34.

[76] Assumed reporters would use a contractor to measure emissions from reciprocating and centrifugal compressors rather than purchasing equipment.

[77] Assumed one simulation software program for acid gas removal units and storage tanks; not one for each; used higher number of reporters for calculating costs.

Appendix E-5. Summary of Burden and Costs for Reporters Subject to Subpart W to Comply with Subpart C—Year 1 through Year 3

Year 1 - Year 3	(A) Hours per Occurrence	(B) Occurrences/ Respondent/Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/Year (C x D)	Technician Hours/Year	Middle Manager Hours/Year	(F) Senior Manager Hours/Year	(H) Cost/ Year
1. APPLICATIONS (Not Applicable)									
2. SURVEY AND STUDIES (Not Applicable)									
3. ACQUISITION, INSTALLATION, AND UTILIZATION OF TECHNOLOGY AND SYSTEMS									
4. REPORT REQUIREMENTS									
A. Read Rule, Instructions, Guidance Documents									
Onshore Natural Gas Processing reporters [1,2,3]	5.00	1	5.00	326	1,630.0				$161,663
Onshore Natural Gas Transmission Compression reporters [1,2,3]	5.00	1	5.00	510	2,550.0				$252,909
Underground Natural Gas Storage reporters [1,2,3]	5.00	1	5.00	42	210.0				$20,828
LNG Import and Export Equipment reporters [1,2,3]	5.00	1	5.00	7	35.0				$3,471
Onshore Petroleum and Natural Gas Production existing reporters [2,3,4]	0.00	1	0.00	0	-				$0
Onshore Petroleum and Natural Gas Production new reporters [2,3,4]	0.00	1	0.00	0	-				$0
Natural Gas Distribution reporters [2,3,4]	0.00	1	0.00	0	-				$0
LNG Storage reporters [1,2,3]	5.00	1	5.00	2	10.0				$992
Onshore Petroleum and Natural Gas Gathering and Boosting reporters [2,3,4]	0.00	1	0.00	0	-				$0
Natural Gas Transmission Pipeline reporters [2,3,4]	0.00	1	0.00	0	-				$0
Offshore Petroleum and Natural Gas Production reporters [2,3,5]	5.00	1	5.00	127	635.0				$62,979
B. Required Activities									
Activity covering Tier 1 and Tier 3 Methodologies									
Conduct annual review of company records to determine mass or volume of fuel combusted									
Onshore Natural Gas Processing reporters [1,2,6]	5.00	1.0	5.00	86	430.0				$42,647
Onshore Natural Gas Transmission Compression reporters [1,2,7]	5.00	1.0	5.00	91	455.0				$45,127
Underground Natural Gas Storage reporters [1,2,8]	5.00	1.0	5.00	14	70.0				$6,943
LNG Import and Export Equipment reporters [1,2,9]	5.00	1.0	5.00	2	10.0				$992
LNG Storage reporters [1,2,10]	5.00	1.0	5.00	1	5.0				$496
Offshore Petroleum and Natural Gas Production reporters [1,2,11]	5.00	1.0	5.00	127	635.0				$62,979
Activity covering Tier 1 and Tier 2 Methodologies									
Conduct annual review of billing records to determine natural gas consumption in therms or mmBtu									
Onshore Natural Gas Processing reporters [1,2,12]	5.00	1.0	5.00	315	1,575.0				$156,209
Onshore Natural Gas Transmission Compression reporters [1,2,13]	5.00	1.0	5.00	510	2,550.0				$252,909
Underground Natural Gas Storage reporters [1,2,14]	5.00	1.0	5.00	42	210.0				$20,828
LNG Import and Export Equipment reporters [1,2,15]	5.00	1.0	5.00	7	35.0				$3,471
LNG Storage reporters [1,2,16]	5.00	1.0	5.00	2	10.0				$992
Offshore Petroleum and Natural Gas Production reporters [1,2,17]	5.00	1.0	5.00	127	635.0				$62,979

Year 1 - Year 3	(A) Hours per Occurrence	(B) Occurrences/ Respondent/Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/Year (C x D)	Technician Hours/Year	Middle Manager Hours/Year	(F) Senior Manager Hours/Year	(H) Cost/ Year
Tier 1 Methodology for combustion emissions reported under subpart C									
Perform engineering calculation to determine CO_2 emissions using Eq C-1, C-1a, or C-1b, using default high heat values and/or default emission factors									
Onshore Natural Gas Processing reporters [18, 19, 20, 21]	0.17	3.1	0.52	75	38.8				$3,843
Onshore Natural Gas Transmission Compression reporters [18, 20, 22, 23]	0.17	5.9	0.98	91	89.5				$8,875
Underground Natural Gas Storage reporters [18, 20, 24, 25]	0.17	12.3	2.05	14	28.7				$2,846
LNG Import and Export Equipment reporters [18, 20, 26, 27]	0.17	2.0	0.33	2	0.7				$66
LNG Storage reporters [18, 20, 28, 29]	0.17	0.0	0.00	0	-				$0
Offshore Petroleum and Natural Gas Production reporters [18, 20, 30, 31]	0.17	4.2	0.70	127	8.9				$8,817
Perform engineering calculation to determine CH_4 and N_2O emissions using Eq C-8, Eq C-8a, or Eq C-8b									
Onshore Natural Gas Processing reporters [19, 20, 21, 32]	0.33	3.1	1.03	75	77.5				$7,686
Onshore Natural Gas Transmission Compression reporters [20, 22, 23, 32]	0.33	5.9	1.97	91	179.0				$17,750
Underground Natural Gas Storage reporters [20, 24, 25, 32]	0.33	12.3	4.10	14	57.4				$5,693
LNG Import and Export Equipment reporters [20, 26, 27, 32]	0.33	2.0	0.67	2	1.3				$132
LNG Storage reporters [20, 28, 29, 32]	0.33	0.0	0.00	0	-				$0
Offshore Petroleum and Natural Gas Production reporters [20, 30, 31, 32]	0.33	4.2	1.40	127	177.8				$17,634
Tier 2 Methodology for combustion emissions reported under subpart C									
Conduct sampling to determine high heat value for each type of fuel or fuel mixture									
Onshore Natural Gas Processing reporters [20, 33, 34]		2.5		259					
Daily measurements [35, 36, 37]	1.00	0.2	0.23	19	4.4				$438
Hourly measurements [35, 38, 39]	1.00	0.1	0.08	9	0.7				$69
Monthly measurements [35, 40, 41]	1.00	1.7	1.68	148	248.3				$24,623
Quarterly measurements [35, 42, 43]	1.00	0.2	0.19	19	3.6				$361
Semiannual measurements [35, 44, 45]	1.00	0.3	0.32	63	20.3				$2,015
Weekly measurements [46, 47, 48]	2.00	0.0	0.01	1	0.0				$1
Onshore Natural Gas Transmission Compression reporters [20, 49, 50]		2.9		436					
Daily measurements [35, 51, 52]	1.00	1.5	1.47	209	307.9				$30,537
Hourly measurements [35, 53, 54]	1.00	0.1	0.06	27	1.6				$163
Monthly measurements [35, 55, 56]	1.00	1.0	1.03	100	102.7				$10,182
Quarterly measurements [35, 57, 58]	1.00	0.0	0.00	1	0.0				$0
Semiannual measurements [35, 59, 60]	1.00	0.3	0.30	89	27.1				$2,688
Weekly measurements [46, 61, 62]	2.00	0.0	0.06	9	0.5				$52
Underground Natural Gas Storage reporters [20, 63, 64]		5.0		37					
Daily measurements [35, 65, 66]	1.00	1.0	0.98	11	10.8				$1,069
Monthly measurements [35, 67, 68]	1.00	3.9	3.86	15	57.9				$5,743
Semiannual measurements [35, 69, 70]	1.00	0.2	0.17	3	0.5				$49
LNG Import and Export Equipment reporters [20, 71, 72]		9.7		7					
Daily measurements [35, 73, 74]	1.00	2.7	2.71	2	5.4				$537
Hourly measurements [35, 75, 76]	1.00	0.7	0.72	1	0.7				$71
Monthly measurements [35, 77, 78]	1.00	6.3	6.28	4	25.1				$2,492
LNG Storage reporters [20, 79, 80]		2.5		4					
Daily measurements [35, 81, 82]	1.00	1.0	1.00	1	1.0				$99
Semiannual measurements [35, 83, 84]	1.00	1.3	1.25	2	2.5				$248

Year 1 - Year 3	(A) Hours per Occurrence	(B) Occurrences/ Respondent/Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/Year (C x D)	Technician Hours/Year	Middle Manager Hours/Year	(F) Senior Manager Hours/Year	(H) Cost/ Year
Weekly measurements [35, 85, 86]	1.00	0.3	0.25	1	0.3				$25
Offshore Petroleum and Natural Gas Production reporters [20, 87, 88]		1.2		38					
Daily measurements [35, 89, 90]	1.00	0.1	0.11	4	0.4				$42
Monthly measurements [35, 91, 92]	1.00	0.7	0.75	21	15.7				$1,555
Quarterly measurements [35, 93, 94]	1.00	0.1	0.08	3	0.2				$24
Semiannual measurements [35, 95, 96]	1.00	0.3	0.27	10	2.7				$264
Perform engineering calculation to determine CO_2 emissions using Eq C-2a, along with Eq C-2b or Eq C-2c.									
Onshore Natural Gas Processing reporters [18, 20, 97, 98]	0.17	2.5	0.42	259	107.9				$10,703
Onshore Natural Gas Transmission Compression reporters [18, 20, 99, 100]	0.17	2.9	0.48	436	210.7				$20,901
Underground Natural Gas Storage reporters [18, 20, 64, 101]	0.17	5.0	0.83	37	30.8				$3,058
LNG Import and Export Equipment reporters [18, 20, 103, 104]	0.17	9.7	1.62	7	11.3				$1,124
LNG Storage reporters [18, 20, 105, 106]	0.17	2.5	0.42	4	1.7				$165
Offshore Petroleum and Natural Gas Production reporters [18, 20, 107, 108]	0.17	1.2	0.20	38	7.6				$754
Perform engineering calculation to determine CH_4 and N_2O emissions using Eq C-9a or Eq 9b									
Onshore Natural Gas Processing reporters [20, 32, 97, 98]	0.33	2.5	0.83	259	215.8				$21,406
Onshore Natural Gas Transmission Compression reporters [20, 32, 99, 100]	0.33	2.9	0.97	436	421.5				$41,801
Underground Natural Gas Storage reporters [20, 32, 64, 101]	0.33	5.0	1.67	37	61.7				$6,116
LNG Import and Export Equipment reporters [20, 32, 103, 104]	0.33	9.7	3.24	7	22.7				$2,247
LNG Storage reporters [20, 32, 105, 106]	0.33	2.5	0.83	4	3.3				$331
Offshore Petroleum and Natural Gas Production reporters [20, 32, 107, 108]	0.33	1.2	0.40	127	50.8				$5,038
Tier 3 Methodology for combustion emissions reported under subpart C									
Conduct sampling to determine carbon content for each type of fuel or fuel mixture									
Onshore Natural Gas Processing reporters [20, 109, 110]		2.1		13					
Monthly measurements [35, 111, 112]	1.00	1.5	1.48	6	8.9				$880
Quarterly measurements [35, 113, 114]	1.00	0.6	0.62	7	4.4				$432
Onshore Natural Gas Transmission Compression reporters [20, 115, 116]		0.0	0.00	0	-				$0
Underground Natural Gas Storage reporters [20, 115, 116]		0.0	0.00	0	-				$0
LNG Import and Export Equipment reporters [20, 115, 116]		0.0	0.00	0	-				$0
LNG Storage reporters [20, 115, 116]		0.0	0.00	0	-				$0
Offshore Petroleum and Natural Gas Production reporters [20, 117, 118]		5.0		3					
Monthly measurements [35, 119, 120]	1.00	5.0	5.00	3	15.0				$1,488
Determine annual volume of liquid or gaseous fuel using fuel flow meters									
Onshore Natural Gas Processing reporters [20, 109, 110, 121]	0.50	2.1	1.05	13	13.7				$1,354
Onshore Natural Gas Transmission Compression reporters [20, 115, 116, 121]	0.50	0.0	0.00	0	-				$0

Year 1 - Year 3	(A) Hours per Occurrence	(B) Occurrences/ Respondent/Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/Year (C x D)	Technician Hours/Year	Middle Manager Hours/Year	(F) Senior Manager Hours/Year	(H) Cost/ Year
Underground Natural Gas Storage reporters [20, 115, 116, 121]	0.50	0.0	0.00	0	-				$0
LNG Import and Export Equipment reporters [20, 115, 116, 121]	0.50	0.0	0.00	0	-				$0
LNG Storage reporters [20, 115, 116, 121]	0.50	0.0	0.00	0	-				$0
Offshore Petroleum and Natural Gas Production reporters [20, 117, 118, 121]	0.50	5.0	2.50	3	7.5				$744
Determine annual average molecular weight of gaseous fuel									
Onshore Natural Gas Processing reporters [20, 110, 121, 122]	0.50	2.1	1.05	13	13.7				$1,354
Onshore Natural Gas Transmission Compression reporters [20, 115, 116, 121]	0.50	0.0	0.00	0	-				$0
Underground Natural Gas Storage reporters [20, 115, 116, 121]	0.50	0.0	0.00	0	-				$0
LNG Import and Export Equipment reporters [20, 115, 116, 121]	0.50	0.0	0.00	0	-				$0
LNG Storage reporters [20, 115, 116, 121]	0.50	0.0	0.00	0	-				$0
Offshore Petroleum and Natural Gas Production reporters [20, 118, 121, 122]	0.50	5.0	2.50	3	7.5				$744
Perform engineering calculation to determine CO_2 emissions using Eq C-3, Eq C-4, or Eq C-5.									
Onshore Natural Gas Processing reporters [18, 20, 110, 122]	0.17	2.1	0.35	13	4.6				$451
Onshore Natural Gas Transmission Compression reporters [18, 20, 115, 116]	0.17	0.0	0.00	0	-				$0
Underground Natural Gas Storage reporters [18, 20, 115, 116]	0.17	0.0	0.00	0	-				$0
LNG Import and Export Equipment reporters [18, 20, 115, 116]	0.17	0.0	0.00	0	-				$0
LNG Storage reporters [18, 20, 115, 116]	0.17	0.0	0.00	0	-				$0
Offshore Petroleum and Natural Gas Production reporters [18, 20, 118, 122]	0.17	5.0	0.83	3	2.5				$248
Perform engineering calculation to determine CH_4 and N_2O emissions using Eq C-8									
Onshore Natural Gas Processing reporters [20, 32, 110, 122]	0.33	2.1	0.70	13	9.1				$903
Onshore Natural Gas Transmission Compression reporters [20, 32, 115, 116]	0.33	0.0	0.00	0	-				$0
Underground Natural Gas Storage reporters [20, 32, 115, 116]	0.33	0.0	0.00	0	-				$0
LNG Import and Export Equipment reporters [20, 32, 115, 116]	0.33	0.0	0.00	0	-				$0
LNG Storage reporters [30, 32, 115, 116]	0.33	0.0	0.00	0	-				$0
Offshore Petroleum and Natural Gas Production reporters [20, 32, 118, 122]	0.33	5.0	1.67	3	5.0				$496
Tier 4 Methodology for combustion emissions reported under subpart C									
Gather CEMS data for e-GGRT reporting									
Onshore Natural Gas Processing reporters [123, 124]	20.00	4.0	40.00	0	-				$0

Year 1 - Year 3	(A) Hours per Occurrence	(B) Occurrences/ Respondent/Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/Year (C x D)	Technician Hours/Year	Middle Manager Hours/Year	(F) Senior Manager Hours/Year	(H) Cost/ Year
Onshore Natural Gas Transmission Compression reporters [123, 124]	20.00	4.0	40.00	0	-				$0
Underground Natural Gas Storage reporters[123, 124]	20.00	4.0	40.00	0	-				$0
LNG Import and Export Equipment reporters[123, 124]	20.00	4.0	40.00	0	-				$0
LNG Storage reporters [123, 124]	20.00	4.0	40.00	0	-				$0
Offshore Petroleum and Natural Gas Production reporters [123, 124]	20.00	4.0	40.00	0	-				$0
C. Create Information (Included in 4B)									
D. Gather Existing Information (Included in 4E)									
E. Write Report									
Annual Compliance Reporting through e-GGRT [125]	10.00	1.0	10.00	1,014	10,140.0				$1,005,685
5. RECORDKEEPING REQUIREMENTS									
A. Read Instructions (Included in 4A)									
B. Plan Activities (Included in 4B)									
C. Implement Activities (Included in 4B)									
D. Recordkeeping [126]	5.00	1.0	5.00	1,014	5,070.0				$502,843
E. Time to Transmit or Disclose Information (included in 4E)									
F. Time to Train Personnel (included in 4A)									
G. Time for Audits (Not Applicable)									
TOTAL ANNUAL LABOR BURDEN AND COST	97.0			29,717.4					$2,947,3706
								29,717.4	

ANNUAL TESTING COSTS (O&M)									
Sampling costs for Tier 2 units									
Annual gas and liquid samples and analyses									
Onshore Natural Gas Processing reporters [33, 34, 127]		2.5		259					$259,000
Onshore Natural Gas Transmission Compression reporters [49, 50, 127]		2.9		436					$505,760
Underground Natural Gas Storage reporters [63, 64, 127]		5.0		37					$74,000
LNG Import and Export Equipment reporters [71, 72, 127]		9.7		7					$27,188
LNG Storage reporters [79, 80, 127]		2.5		4					$4,000
Offshore Petroleum and Natural Gas Production reporters [87, 88, 127]		1.2		38					$18,240

ANNUALIZED CAPITAL COSTS									
Flow meter costs for Tier 3 units									
Onshore Natural Gas Processing reporters [109, 110, 128]		2.1		13					$15,980
Onshore Natural Gas Transmission Compression reporters [115, 116, 128]		0.0		0					$0
Underground Natural Gas Storage reporters [115, 116, 128]		0.0		0					$0
LNG Import and Export Equipment reporters [115, 116, 128]		0.0		0					$0
LNG Storage reporters [115, 116, 128]		0.0		0					$0
Offshore Petroleum and Natural Gas Production reporters [117, 118, 128]		5.0		3					$8,780

YEAR 1 THROUGH YEAR 3 COSTS									
TOTAL ANNUAL LABOR BURDEN AND COST	97.0			29,717.4					$2,947,3706
								29,717.4	

TOTAL ANNUALIZED CAPITAL COST	$24,760
TOTAL ANNUAL LABOR COST	$2,947,370
TOTAL ANNUAL O&M COSTS	$888,188

Year 1 - Year 3	(A) Hours per Occurrence	(B) Occurrences/ Respondent/Year	(C) Hours/ Respondent/ Year (A x B)	(D) Respondents/ Year	(E) Engineer Hours/Year (C x D)	Technician Hours/Year	Middle Manager Hours/Year	(F) Senior Manager Hours/Year	(H) Cost/ Year
TOTAL ANNUAL COSTS (Labor, O&M, and annualized capital)									$3,860,318

Appendix E-6. Footnotes Applicable to Appendix E-5

[1] Assumed 5 hours per reporter per year.
[2] Assumed activity occurs once per year per reporter.
[3] Number of responses based on the number of subpart W facilities with subpart C reports in RY2014.
[4] Assumed 0 hours per reporter because this segment is not required to report emissions under subpart C.
[5] Assumed 2 hours per reporter per year.
[6] There are 86 subpart W facilities in this segment that reported under Tier 1 and/or Tier 3 in RY2014. No duplicates are included.
[7] There are 91 subpart W facilities in this segment that reported under Tier 1 and/or Tier 3 in RY2014. No duplicates are included.
[8] There are 14 subpart W facilities in this segment that reported under Tier 1 and/or Tier 3 in RY2014. No duplicates are included.
[9] There are 2 subpart W facilities in this segment that reported under Tier 1 and/or Tier 3 in RY2014. No duplicates are included.
[10] There is 1 subpart W facility in this segment that reported under Tier 1 and/or Tier 3 in RY2014. No duplicates are included.
[11] There are 127 subpart W facilities in this segment that reported under Tier 1 and/or Tier 3 in RY2014. No duplicates are included.
[12] There are 315 subpart W facilities in this segment that reported under Tier 1 and/or Tier 2 in RY2014. No duplicates are included.
[13] There are 510 subpart W facilities in this segment that reported under Tier 1 and/or Tier 2 in RY2014. No duplicates are included.
[14] There are 42 subpart W facilities in this segment that reported under Tier 1 and/or Tier 2 in RY2014. No duplicates are included.
[15] There are 7 subpart W facilities in this segment that reported under Tier 1 and/or Tier 2 in RY2014. No duplicates are included.
[16] There are 2 subpart W facilities in this segment that reported under Tier 1 and/or Tier 2 in RY2014. No duplicates are included.
[17] There are 127 subpart W facilities in this segment that reported under Tier 1 and/or Tier 2 in RY2014. No duplicates are included.
[18] Assumed 10 minutes per pollutant per fuel [1 pollutant].
[19] Using RY2014 data, there are 0 fuels per facility using Eq C-1a; 1 fuel per facility using Eq C-1b; 2.1 fuels per facility using Eq. C-1.
[20] Average number of fuels based on RY2014 data from facilities that report only under Subpart W and Subpart C. When facilities report under more than two subparts, the combustion sources may not be related to Subpart W activities.
[21] There are 75 subpart W facilities in this segment that reported under Tier 1 in RY2014.
[22] Using RY2014 data, there are 1.1 fuels per facility using Eq C-1a; 1 fuel per facility using Eq C-1b; 3.8 fuels per facility using Eq. C-1.
[23] There are 91 subpart W facilities in this segment that reported under Tier 1 in RY2014.
[24] Using RY2014 data, there is 1 fuel per facility using Eq C-1a; 1 fuel per facility using Eq C-1b; 10.3 fuels per facility using Eq. C-1.
[25] There are 14 subpart W facilities in this segment that reported under Tier 1 in RY2014.
[26] Using RY2014 data, there are 0 fuels per facility using Eq C-1a; 0 fuels per facility using Eq C-1b; 2 fuels per facility using Eq. C-1.
[27] There are 2 subpart W facilities in this segment that reported under Tier 1 in RY2014.
[28] Using RY2014 data, there are 0 fuels per facility using Eq C-1a; 0 fuels per facility using Eq C-1b; 0 fuels per facility using Eq. C-1.
[29] There are 0 subpart W facilities in this segment that reported under Tier 1 in RY2014.
[30] Using RY2014 data, there are 0 fuels per facility using Eq C-1a; 0 fuels per facility using Eq C-1b; 4.2 fuels per facility using Eq. C-1.
[31] There are 127 subpart W facilities in this segment that reported under Tier 1 in RY2014. No duplicates are included.
[32] Assumed 10 minutes per pollutant per fuel [2 pollutants].
[33] Using RY2014 data, there are 2.5 fuels per respondent.
[34] There are 259 subpart W facilities in this segment that reported under Tier 2 in RY2014.
[35] Assumed 0.5 hour per fuel and 2 measurements per year.
[36] Using RY2014 data, 9.3% of Tier 2 fuels in this segment are measured daily.
[37] 19 facilities reported daily measurements in RY2014. Considering that daily measurements are not required by subpart C and 100% of the fuel is natural gas, costs assumed the least cost option of semiannual sampling.
[38] Using RY2014 data, 3.1% of Tier 2 fuels in this segment are measured hourly.
[39] 9 facilities reported hourly measurements in RY2014. Considering that hourly measurements are not required by subpart C and 100% of this fuel is natural gas, costs assumed the least cost option of semiannual sampling.
[40] Using RY2014 data, 67.1% of Tier 2 fuels in this segment are measured monthly.
[41] 148 facilities reported monthly measurements in RY2014. Considering that monthly measurements are not required by subpart C and 100% of this fuel is natural gas, costs assumed the least cost option of semiannual sampling.
[42] Using RY2014 data, 7.5% of Tier 2 fuels in this segment are measured quarterly.

[43] 32 facilities reported quarterly measurements in RY2014. Also included "Other" as quarterly measurements. Considering that quarterly measurements are not required by subpart C and the fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[44] Using RY2014 data, 12.9% of Tier 2 fuels in this segment are measured semiannually.

[45] 63 facilities reported semiannual measurements in RY2014. Also assumed that "once per fuel lot" were semiannual measurements.

[46] Assumed 0.5 hour per fuel and 4 measurements per year.

[47] Using RY2014 data, 0.2% of Tier 2 fuels in this segment are measured weekly.

[48] Assuming that "upon addition of oil to the storage tank" were weekly measurements, 1 facility reported weekly measurements in RY2014. Considering that weekly measurements are not required by subpart C and 100% of the fuel is fuel oil no. 2, costs assumed the least cost option of quarterly sampling.

[49] Using RY2014 data, there are 2.9 fuels per respondent.

[50] There are 436 subpart W facilities in this segment that reported under Tier 2 in RY2014.

[51] Using RY2014 data, 50.8% of Tier 2 fuels in this segment are measured daily.

[52] 209 facilities reported daily measurements in RY2014. Considering that daily measurements are not required by subpart C and 99.6% of the fuel used by this industry segment is natural gas, costs assumed the least cost option of semiannual sampling.

[53] Using RY2014 data, 2.1% of Tier 2 fuels in this segment are measured hourly.

[54] 27 facilities reported hourly measurements in RY2014. Considering that hourly measurements are not required by subpart C and 100% of this fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[55] Using RY2014 data, 35.4% of Tier 2 fuels in this segment are measured monthly.

[56] 100 facilities reported monthly measurements in RY2014. Considering that monthly measurements are not required by subpart C and 100% of this fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[57] Using RY2014 data, 0.1% of Tier 2 fuels in this segment are measured quarterly.

[58] Assuming that "Other" are quarterly measurements, 1 facility reported quarterly measurements in RY2014. Considering that quarterly measurements are not required by subpart C and 100% of this fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[59] Using RY2014 data, 10.5% of Tier 2 fuels in this segment are measured semiannually.

[60] 89 facilities reported semiannual measurements in RY2014. Also assumed that "once per fuel lot" were semiannual measurements.

[61] Using RY2014 data, 1.0% of Tier 2 fuels in this segment are measured weekly.

[62] Assuming that "upon addition of oil to the storage tank" were weekly measurements, 9 facilities reported weekly measurements in RY2014. Considering that weekly measurements are not required by subpart C and 100% of the fuel is fuel oil no. 2, costs assumed the least cost option of quarterly sampling.

[63] Using RY2014 data, there are 5.0 fuels per respondent.

[64] There are 37 subpart W facilities in this segment that reported under Tier 2 in RY2014.

[65] Using RY2014 data, 19.6% of Tier 2 fuels in this segment are measured daily.

[66] 11 facilities reported daily measurements in RY2014. Considering that daily measurements are not required by subpart C and 99.6% of the fuel used by this industry segment is natural gas, costs assumed the least cost option of semiannual sampling.

[67] Using RY2014 data, 77.2% of Tier 2 fuels in this segment are measured monthly.

[68] 15 facilities reported monthly measurements in RY2014. Considering that monthly measurements are not required by subpart C and 100% of the fuel used is natural gas, costs assumed the least cost option of semiannual sampling.

[69] Using RY2014 data, 3.3% of Tier 2 fuels in this segment are measured semiannually.

[70] 3 facilities reported semiannual measurements in RY2014. Also assumed that "once per fuel lot" were semiannual measurements.

[71] Using RY2014 data, there are 9.7 fuels per respondent

[72] There are 7 subpart W facilities in this segment that reported under Tier 2 in RY2014.

[73] Using RY2014 data, 27.9% of Tier 2 fuels in this segment are measured daily.

[74] 2 facilities reported daily measurements in RY2014. Considering that daily measurements are not required by subpart C and 100% of the fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[75] Using RY2014 data, 7.4% of Tier 2 fuels in this segment are measured hourly. Considering that daily measurements are not required by subpart C and 100% of the fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[76] 1 facility reported hourly measurements in RY2014. Considering that hourly measurements are not required by subpart C and 100% of the fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[77] Using RY2014 data, 64.7% of Tier 2 fuels in this segment are measured monthly.

[78] 4 facilities reported monthly measurements in RY2014. Considering that monthly measurements are not required by subpart C and 100% of the fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[79] Using RY2014 data, there are 2.5 fuels per respondent.

[80] There are 4 subpart W facilities in this segment that reported under Tier 2 in RY2014.

[81] Using RY2014 data, 40% of Tier 2 fuels in this segment are measured daily.

[82] 1 facility reported daily measurements in RY2014. Considering that daily measurements are not required by subpart C and 100% of the fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[83] Using RY2014 data, 50% of Tier 2 fuels in this segment are measured semiannually.

[84] 2 facilities reported semiannual measurements in RY2014. Also assumed that "once per fuel lot" were semiannual measurements.

[85] Using RY2014 data, 10% of Tier 2 fuels in this segment are measured weekly.

[86] Assuming that "upon addition of oil to the storage tank" were weekly measurements, 1 facility reported weekly measurements in RY2014. Considering that weekly measurements are not required by subpart C and 100% of the fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[87] Using RY2014 data, there are 1.2 fuels per respondent.

[88] There are 38 subpart W facilities in this segment that reported under Tier 2 in RY2014.

[89] Using RY2014 data, 8.9% of Tier 2 fuels in this segment are measured daily.

[90] 4 facilities reported daily measurements in RY2014. Considering that daily measurements are not required by subpart C and 100% of the fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[91] Using RY2014 data, 62.2% of Tier 2 fuels in this segment are measured monthly.

[92] 21 facilities reported monthly measurements in RY2014. Considering that monthly measurements are not required by subpart C and 100% of the fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[93] Using RY2014 data, 6.7% of Tier 2 fuels in this segment are measured quarterly.

[94] Assuming that "Other" were quarterly measurements, 3 facilities reported quarterly measurements in RY2014. Considering that quarterly measurements are not required by subpart C and 100% of the fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[95] Using RY2014 data, 22.2% of Tier 2 fuels in this segment are measured semiannually.

[96] Assuming that "once per fuel lot" is a semiannual measurement,10 facilities reported semiannual measurements in RY2014.

[97] Using RY2014 data, there are 2.5 fuels per respondent.

[98] There are 259 subpart W facilities in this segment that reported under Tier 2 in RY2014.

[99] Using RY2014 data, there are 2.9 fuels per respondent.

[100] There are 436 subpart W facilities in this segment that reported under Tier 2 in RY2014.

[101] Using RY2014 data, there are 6.6 fuels per respondent.

[102] [Reserved.]

[103] Using RY2014 data, there are 9.71 fuels per respondent.

[104] There are 7 subpart W facilities in this segment that reported under Tier 2 in RY2014.

[105] Using RY2014 data, there are 5.00 fuels per respondent.

[106] There are 4 subpart W facilities in this segment that reported under Tier 2 in RY2014.

[107] Using RY2014 data, there are 1.2 fuels per respondent.

[108] There are 38 subpart W facilities in this segment that reported under Tier 2 in RY2014.

[109] Using RY2014 data, there are 2.1 fuels per facility.

[110] There are 13 subpart W facilities in this segment that reported under Tier 3 in RY2014.

[111] Using RY2014 data, 70.4% of Tier 3 fuels in this segment are measured monthly.

[112] 6 facilities reported monthly measurements in RY2014. Considering that monthly measurements are not required by subpart C and 100% of the fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[113] Using RY2014 data, 29.6% of Tier 3 fuels in this segment are measured quarterly.

[114] Assuming "Other" is quarterly measurement, 7 facilities reported quarterly measurements in RY2014. Considering that quarterly measurements are not required by subpart C and 100% of the fuel is natural gas, costs assumed the least cost option of semiannual sampling.

[115] Using RY2014 data, there are 0 fuels per facility.

[116] There are 0 subpart W facilities in this segment that reported under Tier 3 in RY2014.
[117] Using RY2014 data, there are 5 fuels per facility.
[118] There are 3 subpart W facilities in this segment that reported under Tier 3 in RY2014.
[119] Using RY2014 data, 100% of Tier 3 fuels in this segment are measured monthly.
[120] 3 facilities reported monthly measurements in RY2014. Considering that monthly measurements are not required by subpart C and 100% of the fuel is natural gas, costs assumed the least cost option of semiannual sampling.
[121] Assumed 0.5 hours per fuel.
[122] Using RY2014 data, there is 1 fuel per facility.
[123] Assumed 20 hours per quarter to gather and QA the CEMS data.
[124] No subpart W reporters used Tier 4 methodology in RY2014.
[125] Assumed 5 hours per reporter per year to submit report through e-GGRT.
[126] Assumed 5 hours per reporter per year to maintain records.
[127] Assumed testing cost of $400 per fuel.
[128] Assumed capital cost of $2,400 per fuel per flow meter; annualized cost of $585.34.

Appendix E-7. Summary of Burden and Costs for Petroleum and Natural Gas Systems to Comply with Subpart W and Subpart C –by Segment and Year

Year 1

Industry Segment	No. Respondents	Total Labor Cost	Capital Cost	O&M Cost	Total Cost
Onshore Natural Gas Processing reporters	470	$3,140,226	$304,698	$1,924,470	$5,369,393
Onshore Natural Gas Transmission Compression reporters	488	$3,700,101	$465,343	$1,705,760	$5,871,204
Underground Natural Gas Storage reporters	50	$362,472	$31,023	$186,500	$579,995
LNG Import and Export Equipment reporters	7	$56,305	$5,268	$44,688	$106,261
Onshore Petroleum and Natural Gas Production existing reporters	550	$13,413,294	$179,235	$2,068,130	$15,660,659
Onshore Petroleum and Natural Gas Production new reporters	50	$1,911,161	$35,364	$398,500	$2,345,025
Natural Gas Distribution reporters	177	$716,255	$0	$257,500	$973,755
LNG Storage reporters	4	$23,243	$1,756	$11,500	$36,499
Onshore Petroleum and Natural Gas Gathering and Boosting reporters	200	$1,257,426	$141,457	$1,726,000	$3,124,882
Natural Gas Transmission Pipeline reporters	183	$733,931	$107,117	$0	$841,048
Offshore Petroleum and Natural Gas Production reporters	126	$430,536	$8,780	$18,240	$457,556
TOTALS	**2,305**	**$25,744,948**	**$1,280,041**	**$8,341,288**	**$35,366,277**

Year 2

Industry Segment	No. Respondents	Total Labor Cost	Capital Cost	O&M Cost	Total Cost
Onshore Natural Gas Processing reporters	470	$3,315,567	$304,698	$1,924,470	$5,544,734
Onshore Natural Gas Transmission Compression reporters	488	$3,882,157	$465,343	$1,705,760	$6,053,260
Underground Natural Gas Storage reporters	50	$381,125	$31,023	$186,500	$598,648
LNG Import and Export Equipment reporters	7	$58,916	$5,268	$44,688	$108,872
Onshore Petroleum and Natural Gas Production existing reporters	550	$13,618,480	$179,235	$2,068,130	$15,865,845
Onshore Petroleum and Natural Gas Production new reporters	50	$1,889,811	$35,364	$398,500	$2,323,675
Natural Gas Distribution reporters	177	$782,288	$0	$257,500	$1,039,788
LNG Storage reporters	4	$24,735	$1,756	$11,500	$37,991
Onshore Petroleum and Natural Gas Gathering and Boosting reporters	200	$1,189,880	$141,457	$1,726,000	$3,057,337
Natural Gas Transmission Pipeline reporters	183	$802,202	$107,117	$0	$909,319
Offshore Petroleum and Natural Gas Production reporters	126	$430,536	$8,780	$18,240	$457,556
TOTALS	**2,305**	**$26,375,697**	**$1,280,041**	**$8,341,288**	**$35,997,025**

Year 3

Industry Segment	No. Respondents	Total Labor Cost	Capital Cost	O&M Cost	Total Cost
Onshore Natural Gas Processing reporters	470	$3,315,567	$304,698	$1,924,470	$5,544,734
Onshore Natural Gas Transmission Compression reporters	488	$3,882,157	$465,343	$1,705,760	$6,053,260
Underground Natural Gas Storage reporters	50	$381,125	$31,023	$186,500	$598,648
LNG Import and Export Equipment reporters	7	$58,916	$5,268	$44,688	$108,872
Onshore Petroleum and Natural Gas Production existing reporters	550	$13,618,480	$179,235	$2,068,130	$15,865,845
Onshore Petroleum and Natural Gas Production new reporters	50	$1,909,895	$35,364	$398,500	$2,343,759
Natural Gas Distribution reporters	177	$782,288	$0	$257,500	$1,039,788
LNG Storage reporters	4	$24,735	$1,756	$11,500	$37,991
Onshore Petroleum and Natural Gas Gathering and Boosting reporters	200	$1,270,216	$141,457	$1,726,000	$3,137,673
Natural Gas Transmission Pipeline reporters	183	$802,202	$107,117	$0	$909,319
Offshore Petroleum and Natural Gas Production reporters	126	$430,536	$8,780	$18,240	$457,556
TOTALS	**2,305**	**$26,476,116**	**$1,280,041**	**$8,341,288**	**$36,097,445**