APPENDIX H.2 - SECTION 1
GREENHOUSE GASES SUMMARY

Table H.2.PP.Un.Sum.2010-3.
2010 Proposed Project Summary of Average Daily Unmitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.06	6683.39	0.88	6,720.12
Tanker Hoteling	0.04	4140.42	0.55	4,163.23
Offloading Emissions	0.11	12868.06	1.64	12,936.24
Transiting Operations	0.01	1008.21	0.13	1,013.55
Tug Assistance	0.0056	565.99	0.0781	569.36
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	10,563.92	1.18	10,594.92
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.2386**	**35829.98**	**4.4519**	**35,997.43**

Table H.2.PP.Un.Sum.2015-3.
2015 Proposed Project Summary of Average Daily Unmitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.08	8,609.34	1.14	8,656.66
Tanker Hoteling	0.05	5,164.46	0.68	5,192.93
Offloading Emissions	0.15	17,868.70	2.27	17,963.37
Transiting Operations	0.01	1,306.90	0.17	1,313.83
Tug Assistance	0.01	644.96	0.09	648.80
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	11,495.92	1.29	11,529.66
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.31**	**45,090.28**	**5.63**	**45,305.25**

Table H.2.PP.Un.Sum.2025-3.
2025 Proposed Project Summary of Average Daily Unmitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.10	11,690.37	1.54	11,754.62
Tanker Hoteling	0.06	7,036.40	0.93	7,075.19
Offloading Emissions	0.21	24,230.40	3.08	24,358.78
Transiting Operations	0.02	1,773.16	0.23	1,782.56
Tug Assistance	0.01	881.89	0.12	887.14
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	11,495.92	1.29	11,529.66
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.42**	**57,108.14**	**7.18**	**57,387.95**

Table H.2.PP.Un.Sum.2040-3.
2040 Proposed Project Summary of Average Daily Unmitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.10	11,690.37	1.54	11,754.62
Tanker Hoteling	0.06	7,036.40	0.93	7,075.19
Offloading Emissions	0.21	24,230.40	3.08	24,358.78
Transiting Operations	0.02	1,773.16	0.23	1,782.56
Tug Assistance	0.01	881.89	0.12	887.14
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	11,495.92	1.29	11,529.66
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.42**	**57,108.14**	**7.18**	**57,387.95**

Table H.2.PP.Mit.Sum.2010-3.
2010 Proposed Project Summary of Average Daily Mitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.05	5,264.71	0.73	5,296.06
Tanker Hoteling	0.04	3,956.65	0.55	3,980.20
Offloading Emissions	0.12	12,380.61	1.71	12,454.29
Transiting Operations	0.01	920.06	0.13	925.53
Tug Assistance	0.006	565.99	0.08	569.36
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	10,563.92	1.18	10,594.92
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
Emissions from AMPed off-site Elec. Generation	---	---	---	---
TOTAL	**0.25**	**33,651.93**	**4.37**	**33,820.4**

Table H.2.PP.Mit.Sum.2015-3.
2015 Proposed Project Summary of Average Daily Mitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.07	6,715.37	0.93	6,755.36
Tanker Hoteling	0.04	4,195.23	0.58	4,220.20
Offloading Emissions	0.17	17,197.38	2.37	17,299.74
Transiting Operations	0.011	1,106.86	0.15	1,113.44
Tug Assistance	0.01	515.97	0.07	519.04
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	11,495.92	1.29	11,529.66
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
Emissions from AMPed off-site Elec. Generation	0.03	3,825.41	0.02	3,835.66
TOTAL	**0.35**	**45,052.15**	**5.40**	**45,273.11**

Table H.2.PP.Mit.Sum.2025-3.
2025 Proposed Project Summary of Average Daily Mitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.09	9,122.98	1.26	9,177.30
Tanker Hoteling	0.04	4,034.72	0.56	4,058.74
Offloading Emissions	0.23	23,319.01	3.22	23,457.80
Transiting Operations	0.013	1,561.32	0.20	1,569.59
Tug Assistance	0.01	881.89	0.12	887.14
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	11,495.92	1.29	11,529.66
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
Emissions from AMPed off-site Elec. Generation	0.03	3,680.41	0.02	3,690.27
TOTAL	**0.43**	**54,096.26**	**6.65**	**54,370.51**

Table H.2.PP.Mit.Sum.2040-3.
2040 Proposed Project Summary of Average Daily Mitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.09	9,122.98	1.26	9,177.30
Tanker Hoteling	0.02	2,026.02	0.28	2,038.08
Offloading Emissions	0.23	23,319.01	3.22	23,457.80
Transiting Operations	0.002	163.33	0.02	164.30
Tug Assistance	0.01	705.51	0.10	709.71
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	11,495.92	1.29	11,529.66
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
Emissions from AMPed off-site Elec. Generation	0.02	1,840.21	0.01	1,845.14
TOTAL	**0.39**	**48,672.98**	**6.17**	**48,921.99**

Table H.2.NFA/NPA.Un.Sum.2010-2.
2010 No Federal Action/No Project Alternative Summary of Average Daily Unmitigated GHG Emissions.

Operation	BP (lb/yr)	Tesoro (lb/yr)	Exxon (lb/yr)	Total (lb/yr)
Tanker Cruising and Manuevering				
N_2O	0.01	0.02	0.03	0.07
CO_2	1,002.36	2,463.76	3,933.46	7,399.58
CH_4	0.13	0.34	0.52	0.99
CO_2e	1,007.86	2,478.42	3,955.08	7,441.37
Tanker Hoteling				
N_2O	0.01	0.02	0.03	0.06
CO_2	883.79	2,184.37	2,899.73	5,967.89
CH_4	0.12	0.30	0.38	0.80
CO_2e	888.67	2,197.37	2,915.72	6,001.76
Offloading Emissions				
N_2O	0.02	0.07	0.02	0.11
CO_2	2,738.51	6,828.96	2,748.62	12,316.09
CH_4	0.35	0.94	0.35	1.64
CO_2e	2,753.02	6,869.60	2,763.18	12,385.81
Transiting Operations				
N_2O	0.00	0.01	0.00	0.01
CO_2	211.92	528.45	374.93	1,115.29
CH_4	0.03	0.07	0.05	0.15
CO_2e	213.04	531.59	376.92	1,121.55
Tug Assistance				
N_2O	0.00	0.00	0.01	0.01
CO_2	127.24	329.06	548.44	1,004.74
CH_4	0.02	0.05	0.08	0.14
CO_2e	128.00	331.02	551.70	1,010.72
Tanks				
N_2O	- - -	- - -	- - -	- - -
CO_2	- - -	- - -	- - -	- - -
CH_4	- - -	- - -	- - -	- - -
CO_2e	- - -	- - -	- - -	- - -
Vapor Destruction Units				
N_2O	0.02	0.02	0.02	0.05
CO_2	8,722.23	9,276.95	9,879.91	27,879.09
CH_4	0.98	1.04	1.10	3.12
CO_2e	8,747.83	9,304.18	9,908.91	27,960.91
Valves, Flanges, Pumps				
N_2O	- - -	- - -	- - -	- - -
CO_2	- - -	- - -	- - -	- - -
CH_4	- - -	- - -	- - -	- - -
CO_2e	- - -	- - -	- - -	- - -

Table H.2.NFA/NPA.Un.Sum.2015-4.
2015 No Federal Action/No Project Alternative Summary of Average Daily Unmitigated GHG Emissions.

Operation	BP (lb/yr)	Tesoro (lb/yr)	Exxon (lb/yr)	Total (lb/yr)
Tanker Cruising and Manuevering				
N_2O	0.01	0.03	0.04	0.08
CO_2	1,175.18	2,857.96	4,367.42	8,400.56
CH_4	0.16	0.39	0.60	1.15
CO_2e	1,181.64	2,874.97	4,393.43	8,450.04
Tanker Hoteling				
N_2O	0.01	0.02	0.03	0.06
CO_2	1,036.17	2,533.87	2,751.26	6,321.30
CH_4	0.14	0.35	0.38	0.87
CO_2e	1,041.89	2,548.95	2,767.64	6,358.47
Offloading Emissions				
N_2O	0.03	0.01	0.03	0.06
CO_2	3,210.67	510.83	3,095.52	6,817.02
CH_4	0.41	0.07	0.43	0.91
CO_2e	3,227.68	513.87	3,113.95	6,855.50
Transiting Operations				
N_2O	0.00	0.01	0.00	0.01
CO_2	248.45	613.00	422.25	1,283.70
CH_4	0.03	0.08	0.06	0.17
CO_2e	249.77	616.65	424.76	1,291.18
Tug Assistance				
N_2O	0.00	0.00	0.01	0.01
CO_2	149.18	381.71	640.58	1,171.46
CH_4	0.02	0.05	0.09	0.16
CO_2e	150.06	383.99	644.39	1,178.44
Tanks				
N_2O	- - -	- - -	- - -	- - -
CO_2	- - -	- - -	- - -	- - -
CH_4	- - -	- - -	- - -	- - -
CO_2e	- - -	- - -	- - -	- - -
Vapor Destruction Units				
N_2O	0.02	0.02	0.02	0.05
CO_2	8,782.52	9,421.66	10,133.15	28,337.34
CH_4	0.98	1.05	1.13	3.17
CO_2e	8,808.30	9,449.31	10,162.89	28,420.50
Valves, Flanges, Pumps				
N_2O	- - -	- - -	- - -	- - -
CO_2	- - -	- - -	- - -	- - -
CH_4	- - -	- - -	- - -	- - -
CO_2e	- - -	- - -	- - -	- - -

Table H.2.NFA/NPA.Un.Sum.2025-6.
2025 No Federal Action/No Project Alternative Summary of Average Daily Unmitigated GHG Emissions.

Operation	BP (lb/yr)	Tesoro (lb/yr)	Exxon (lb/yr)	Total (lb/yr)
Tanker Cruising and Manuevering				
N_2O	0.01	0.03	0.04	0.08
CO_2	1,116.90	2,857.96	4,367.42	8,342.28
CH_4	0.15	0.39	0.60	1.15
CO_2e	1,123.55	2,874.97	4,393.43	8,391.95
Tanker Hoteling				
N_2O	0.01	0.02	0.01	0.04
CO_2	990.25	2,533.87	971.03	4,495.15
CH_4	0.14	0.35	0.13	0.62
CO_2e	996.14	2,548.95	976.81	4,521.90
Offloading Emissions				
N_2O	0.03	0.08	0.03	0.14
CO_2	3,095.79	7,921.59	3,095.52	14,112.91
CH_4	0.43	1.09	0.43	1.95
CO_2e	3,114.22	7,968.74	3,113.95	14,196.91
Transiting Operations				
N_2O	0.00	0.01	0.00	0.01
CO_2	239.56	613.00	422.25	1,274.81
CH_4	0.03	0.08	0.06	0.18
CO_2e	240.99	616.65	424.76	1,282.40
Tug Assistance				
N_2O	0.00	0.00	0.01	0.01
CO_2	149.18	381.71	640.58	1,171.46
CH_4	0.02	0.05	0.09	0.16
CO_2e	150.06	383.99	644.39	1,178.44
Tanks				
N_2O	- - -	- - -	- - -	- - -
CO_2	- - -	- - -	- - -	- - -
CH_4	- - -	- - -	- - -	- - -
CO_2e	- - -	- - -	- - -	- - -
Vapor Destruction Units				
N_2O	0.02	0.02	0.02	0.05
CO_2	8,782.52	9,421.66	10,133.15	28,337.34
CH_4	0.98	1.05	1.13	3.17
CO_2e	8,808.30	9,449.31	10,162.89	28,420.50
Valves, Flanges, Pumps				
N_2O	- - -	- - -	- - -	- - -
CO_2	- - -	- - -	- - -	- - -
CH_4	- - -	- - -	- - -	- - -
CO_2e	- - -	- - -	- - -	- - -

Table H.2.NFA/NPA.Un.Sum.2040-8.
2040 No Federal Action/No Project Alternative Summary of Average Daily Unmitigated GHG Emissions.

Operation	BP (lb/yr)	Tesoro (lb/yr)	Exxon (lb/yr)	Total (lb/yr)
Tanker Cruising and Manuevering				
N_2O	0.01	0.03	0.04	0.08
CO_2	1,116.90	2,857.96	4,367.42	8,342.28
CH_4	0.15	0.39	0.60	1.15
CO_2e	1,123.55	2,874.97	4,393.43	8,391.95
Tanker Hoteling				
N_2O	0.01	0.02	0.01	0.04
CO_2	990.25	2,533.87	971.03	4,495.15
CH_4	0.14	0.35	0.13	0.62
CO_2e	996.14	2,548.95	976.81	4,521.90
Offloading Emissions				
N_2O	0.03	0.08	0.03	0.14
CO_2	3,095.79	7,921.59	3,095.52	14,112.91
CH_4	0.43	1.09	0.43	1.95
CO_2e	3,114.22	7,968.74	3,113.95	14,196.91
Transiting Operations				
N_2O	0.00	0.01	0.00	0.01
CO_2	239.56	613.00	422.25	1,274.81
CH_4	0.03	0.08	0.06	0.18
CO_2e	240.99	616.65	424.76	1,282.40
Tug Assistance				
N_2O	0.00	0.00	0.01	0.01
CO_2	149.18	381.71	640.58	1,171.46
CH_4	0.02	0.05	0.09	0.16
CO_2e	150.06	383.99	644.39	1,178.44
Tanks				
N_2O	- - -	- - -	- - -	- - -
CO_2	- - -	- - -	- - -	- - -
CH_4	- - -	- - -	- - -	- - -
CO_2e	- - -	- - -	- - -	- - -
Vapor Destruction Units				
N_2O	0.02	0.02	0.02	0.05
CO_2	8,782.52	9,421.66	10,133.15	28,337.34
CH_4	0.98	1.05	1.13	3.17
CO_2e	8,808.30	9,449.31	10,162.89	28,420.50
Valves, Flanges, Pumps				
N_2O	- - -	- - -	- - -	- - -
CO_2	- - -	- - -	- - -	- - -
CH_4	- - -	- - -	- - -	- - -
CO_2e	- - -	- - -	- - -	- - -

Table H.2.RPA.Un.Sum.2010-3.
2010 Reduced Project Alternative Summary of Average Daily Unmitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.06	6,683.39	0.88	6,720.12
Tanker Hoteling	0.04	4,140.42	0.55	4,163.23
Offloading Emissions	0.11	12,889.35	1.64	12,957.64
Transiting Operations	0.01	1,008.21	0.13	1,013.55
Tug Assistance	0.006	565.99	0.08	569.36
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	10,563.92	1.18	10,594.92
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.24**	**35,851.27**	**4.45**	**36,018.83**

Table H.2.RPA.Un.Sum.2015-3.
2015 Reduced Project Alternative Summary of Average Daily Unmitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.07	7,720.08	1.02	7,762.51
Tanker Hoteling	0.04	4,644.54	0.61	4,670.14
Offloading Emissions	0.14	16,109.62	2.05	16,194.97
Transiting Operations	0.01	1,175.77	0.15	1,182.00
Tug Assistance	0.01	579.15	0.08	582.60
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	11,495.92	1.29	11,529.66
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.28**	**41,725.08**	**5.19**	**41,921.89**

Table H.2.RPA.Un.Sum.2025-3.
2025 Reduced Project Alternative Summary of Average Daily Unmitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.07	7,720.08	1.02	7,762.51
Tanker Hoteling	0.04	4,644.54	0.61	4,670.14
Offloading Emissions	0.14	16,109.62	2.05	16,194.97
Transiting Operations	0.03	3,919.23	0.50	3,940.00
Tug Assistance	0.01	579.15	0.08	582.60
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	11,495.92	1.29	11,529.66
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
BP (Existing Terminal)	0.07	13,815.09	1.67	13,870.51
Tesoro (Existing Terminal)	0.07	22,079.75	2.79	22,159.22
Exxon (Existing Terminal)	0.10	17,557.55	2.18	17,634.07
TOTAL	**0.54**	**97,920.93**	**12.18**	**98,343.69**

Table H.2.RPA.Un.Sum.2040-3.
2040 Reduced Project Alternative Summary of Average Daily Unmitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.07	7,720.08	1.02	7,762.51
Tanker Hoteling	0.04	4,644.54	0.61	4,670.14
Offloading Emissions	0.14	16,109.62	2.05	16,194.97
Transiting Operations	0.01	1,175.77	0.15	1,182.00
Tug Assistance	0.01	579.15	0.08	582.60
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	11,495.92	1.29	11,529.66
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
BP (Existing Terminal)	0.07	14,621.40	1.78	14,681.38
Tesoro (Existing Terminal)	0.16	24,095.52	3.06	24,209.20
Exxon (Existing Terminal)	0.11	18,927.25	2.36	19,011.52
TOTAL	**0.63**	**99,369.25**	**12.39**	**99,823.98**

Table H.2.RPA.Mit.Sum.2010-3.
2010 Reduced Project Alternative Summary of Average Daily Mitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.05	5,264.71	0.73	5,296.06
Tanker Hoteling	0.04	3,956.65	0.55	3,980.20
Offloading Emissions	0.12	12,380.61	1.71	12,454.29
Transiting Operations	0.01	920.06	0.13	925.53
Tug Assistance	0.004	565.99	0.06	568.68
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	10,563.92	1.18	10,594.92
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
Emissions from AMPed off-site Elec. Generation	---	---	---	---
TOTAL	**0.25**	**33,651.93**	**4.35**	**33,819.7**

Table H.2.RPA.Mit.Sum.2015-3.
2015 Reduced Project Alternative Summary of Average Daily Mitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.06	6,022.15	0.83	6,058.00
Tanker Hoteling	0.04	3,772.88	0.52	3,795.34
Offloading Emissions	0.15	15,503.60	2.14	15,595.88
Transiting Operations	0.010	998.82	0.14	1,004.76
Tug Assistance	0.00	463.32	0.06	466.08
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	11,495.92	1.29	11,529.66
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
Emissions from AMPed off-site Elec. Generation	0.03	3,440.25	0.02	3,449.46
TOTAL	**0.31**	**41,696.94**	**4.99**	**41,899.19**

Table H.2.RPA.Mit.Sum.2025-3.
2025 Reduced Project Alternative Summary of Average Daily Mitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.06	6,022.15	0.83	6,058.00
Tanker Hoteling	0.03	2,663.21	0.37	2,679.07
Offloading Emissions	0.15	15,503.60	2.14	15,595.88
Transiting Operations	0.001	108.36	0.01	109.01
Tug Assistance	0.00	463.32	0.06	466.08
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	11,495.92	1.29	11,529.66
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
BP (Existing Terminal)	0.07	13,815.09	1.67	13,870.51
Tesoro (Existing Terminal)	0.07	22,079.75	2.79	22,159.22
Exxon (Existing Terminal)	0.10	17,557.55	2.18	17,634.07
Emissions from AMPed off-site Elec. Generation	0.05	5,691.72	0.03	5,706.96
TOTAL	**0.55**	**95,400.68**	**11.36**	**95,808.46**

Table H.2.RPA.Mit.Sum.2040-3.
2040 Reduced Project Alternative Summary of Average Daily Mitigated GHG Emissions.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.06	6,022.15	0.83	6,058.00
Tanker Hoteling	0.01	1,331.61	0.18	1,339.53
Offloading Emissions	0.15	15,503.60	2.14	15,595.88
Transiting Operations	0.001	108.36	0.01	109.01
Tug Assistance	0.00	463.32	0.06	466.08
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.02	11,495.92	1.29	11,529.66
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
BP (Existing Terminal)	0.07	14,621.40	1.78	14,681.38
Tesoro (Existing Terminal)	0.16	24,095.52	3.06	24,209.20
Exxon (Existing Terminal)	0.11	18,927.25	2.36	19,011.52
Emissions from AMPed off-site Elec. Generation	0.03	4,155.95	0.02	4,167.08
TOTAL	**0.63**	**96,725.07**	**11.73**	**97,167.34**

APPENDIX H.2 - SECTION 3
GREENHOUSE GASES

APPENDIX H.2 - SECTION 3.1
OPERATIONAL GHG EMISSIONS

Table H.2.PP.Un.GHG.2010-1. 2010 Proposed Project Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	15.54	1.42	16.9	0.777	25,400	27,957	26.0	0.0055	620.00	0.0818	0.0050	563.34	0.0743
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	26.0	0.0055	620.00	0.0818	0.0028	320.65	0.0423
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	26.0	0.0055	620.00	0.0818	0.0002	24.42	0.0032
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	26.0	0.0060	682.00	0.0902	0.0000	3.15	0.0004
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	26.0	0.0060	682.00	0.0902	0.0001	14.58	0.0019
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	26.0	0.0055	620.00	0.0818	0.0002	19.74	0.0026
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	26.0	0.0055	620.00	0.0818	0.0028	320.65	0.0423
		Cruising - VSR to CW	22	15.54	1.42	16.9	0.777	25,400	27,957	26.0	0.0055	620.00	0.0818	0.0050	563.34	0.0743
AFRAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	16.1	0.761	12,477	14,859	32.0	0.0055	620.00	0.0818	0.0032	368.51	0.0486
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	32.0	0.0055	620.00	0.0818	0.0010	117.45	0.0155
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	32.0	0.0055	620.00	0.0818	0.0002	17.08	0.0023
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	32.0	0.0060	682.00	0.0902	0.0000	2.20	0.0003
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	32.0	0.0060	682.00	0.0902	0.0001	10.19	0.0013
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	32.0	0.0055	620.00	0.0818	0.0001	12.72	0.0017
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	32.0	0.0055	620.00	0.0818	0.0012	133.46	0.0176
		Cruising - VSR to CW	24.5	14.7	1.67	16.1	0.761	12,477	15,828	32.0	0.0055	620.00	0.0818	0.0035	392.54	0.0518
PANAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	15.8	0.805	10,300	12,979	26	0.0055	620.00	0.0818	0.0023	261.52	0.0345
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	26	0.0055	620.00	0.0818	0.0007	83.35	0.0110
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	26	0.0055	620.00	0.0818	0.0001	12.12	0.0016
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	26	0.0060	682.00	0.0902	0.0000	1.56	0.0002
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	26	0.0060	682.00	0.0902	0.0001	7.24	0.0010
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	26	0.0055	620.00	0.0818	0.0001	9.02	0.0012
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	26	0.0055	620.00	0.0818	0.0008	94.71	0.0125
		Cruising - VSR to CW	24.5	14.7	1.67	15.8	0.805	10,300	13,825	26	0.0055	620.00	0.0818	0.0024	278.57	0.0368
SUEZMAX	North In	Cruising - CW to VSR	22	15.54	1.42	17	0.764	16,000	17,302	45	0.0055	620.00	0.0818	0.0053	603.41	0.0796
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	45	0.0055	620.00	0.0818	0.0030	343.45	0.0453
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	45	0.0055	620.00	0.0818	0.0002	26.16	0.0035
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	45	0.0060	682.00	0.0902	0.0000	3.37	0.0004
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	45	0.0060	682.00	0.0902	0.0001	15.62	0.0021
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	45	0.0055	620.00	0.0818	0.0002	21.15	0.0028
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	45	0.0055	620.00	0.0818	0.0030	343.45	0.0453
		Cruising - VSR to CW	22	15.54	1.42	17	0.764	16,000	17,302	45	0.0055	620.00	0.0818	0.0053	603.41	0.0796
													TOTAL	**0.0492**	**5592.14**	**0.7378**

Table H.2.PP.Un.GHG.2010-2. 2010 Proposed Project Auxiliary Generator Average Daily Unmitigated GHG Emissions.

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO2 Emissions (tons/yr)	CH4 Emissions (tons/yr)
VLCC	North In	Cruising	3.84	3,600	0.278	3,840	26.0	0.0055	620.00	0.0818	0.0007	77.38	0.0102
		Maneuvering	2.00	3,600	0.278	2,002	26.0	0.0060	682.00	0.0902	0.0004	44.37	0.0059
	North Out	Maneuvering	1.50	3,600	0.278	1,501	26.0	0.0060	682.00	0.0902	0.0003	33.27	0.0044
		Cruising	3.71	3,600	0.278	3,712	26.0	0.0055	620.00	0.0818	0.0007	74.79	0.0099
AFRAMAX	South In	Cruising	3.15	3,600	0.278	3,155	32.0	0.0055	620.00	0.0818	0.0007	78.25	0.0103
		Maneuvering	2.00	3,600	0.278	2,002	32.0	0.0060	682.00	0.0902	0.0005	54.60	0.0072
	South Out	Maneuvering	1.50	3,600	0.278	1,501	32.0	0.0060	682.00	0.0902	0.0004	40.95	0.0054
		Cruising	3.21	3,600	0.278	3,211	32.0	0.0055	620.00	0.0818	0.0007	79.63	0.0105
PANAMAX	South In	Cruising	3.15	3,600	0.28	3,178	26	0.0055	620.00	0.0818	0.0006	64.04	0.0084
		Maneuvering	2.00	3,600	0.28	2,016	26	0.0060	682.00	0.0902	0.0004	44.68	0.0059
	South Out	Maneuvering	1.5	3,600	0.28	1,512	26	0.0060	682.00	0.0902	0.0003	33.51	0.0044
		Cruising	3.21	3,600	0.28	3,234	26	0.0055	620.00	0.0818	0.0006	65.17	0.0086
SUEZMAX	North In	Cruising	3.84	3,600	0.28	3,868	45	0.0055	620.00	0.0818	0.0012	134.89	0.0178
		Maneuvering	2.00	3,600	0.28	2,016	45	0.0060	682.00	0.0902	0.0007	77.34	0.0102
	North Out	Maneuvering	1.5	3,600	0.28	1,512	45	0.0060	682.00	0.0902	0.0005	58.00	0.0077
		Cruising	3.71	3,600	0.28	3,738	45	0.0055	620.00	0.0818	0.0011	130.37	0.0172
										TOTAL	**0.0096**	**1091.25**	**0.1441**

Table H.2.PP.Un.GHG.2010-3. 2010 Proposed Project Boiler Warm-Up Average Daily Unmitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	HFO	2.70	107.96	30%	3	50,000	20,700	0.0559	6,596.00	0.8390	0.0021	247.08	0.0314
26.0	VLCC	HFO	2.70	84.93	30%	3	90,000	23,817	0.0559	6,596.00	0.8390	0.0024	284.28	0.0362
26.0	Panamax	HFO	2.70	63.30	30%	3	35,000	6,903	0.0559	6,596.00	0.8390	0.0007	82.40	0.0105
45.0	Suezmax	HFO	2.70	87.54	30%	3	70,000	33,046	0.0559	6,596.00	0.8390	0.0033	394.45	0.0502
											TOTAL	**0.0085**	**1,008.21**	**0.1282**

Table H.2.PP.Un.GHG.2010-4. 2010 Proposed Project Berth Operations Average Daily Unmitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	HFO	2.70	3,600	28%	2.5	0.0064	722.0	0.0952	0.0006	72.2578	0.0095
26.0	VLCC	2,000,000	HFO	2.70	3,600	28%	2.5	0.0064	722.0	0.0952	0.0005	58.7094	0.0077
26.0	Panamax	350,000	HFO	2.70	3,600	28%	2.5	0.0064	722.0	0.0952	0.0005	59.1318	0.0078
45.0	Suezmax	1,000,000	HFO	2.70	3,600	28%	2.5	0.0064	722.0	0.0952	0.0009	102.3435	0.0135
										TOTAL	**0.003**	**292.442**	**0.039**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	HFO	2.70	107.96	30%	2.5	50,000	57,501	0.0559	6,596.0	0.8390	0.0017	205.90	0.03
26.0	VLCC	2,000,000	HFO	2.70	84.93	30%	2.5	90,000	66,157	0.0559	6,596.0	0.8390	0.0020	236.90	0.03
26.0	Panamax	350,000	HFO	2.70	63.30	30%	2.5	35,000	18,149	0.0559	6,596.0	0.8390	0.0006	64.99	0.01
45.0	Suezmax	1,000,000	HFO	2.70	87.54	30%	2.5	70,000	86,877	0.0559	6,596.0	0.8390	0.0026	311.10	0.04
												TOTAL	**0.0069**	**818.89**	**0.1042**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	MDO	0.52	3,600	56%	15.0	0.0064	722.0	0.0952	0.008	867.093	0.114
26.0	VLCC	2,000,000	MDO	0.52	3,600	56%	23.2	0.0064	722.0	0.0952	0.010	1,090.691	0.144
26.0	Panamax	350,000	MDO	0.52	3,600	56%	11.0	0.0064	722.0	0.0952	0.005	520.360	0.069
45.0	Suezmax	1,000,000	MDO	0.52	3,600	56%	15.3	0.0064	722.0	0.0952	0.011	1,252.684	0.165
										TOTAL	**0.0330**	**3,730.83**	**0.4919**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	MDO	0.52	102.17	28.06	15.0	50,000	236,841	0.0559	6,596.0	0.8390	0.02	2,827.00	0.36
26.0	VLCC	2,000,000	MDO	0.52	80.38	28.06	23.2	90,000	378,553	0.0559	6,596.0	0.8390	0.04	4,518.51	0.57
26.0	Panamax	350,000	MDO	0.52	59.91	28.06	11.0	35,000	42,453	0.0559	6,596.0	0.8390	0.00	506.73	0.06
45.0	Suezmax	1,000,000	MDO	0.52	82.85	28.06	15.3	70,000	351,612	0.0559	6,596.0	0.8390	0.04	4,196.93	0.53
												TOTAL	**0.1021**	**12,049.17**	**1.5326**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	HFO	2.70	3,600	28%	1.0	0.0064	722.0	0.0952	0.0003	28.9031	0.0038
26.0	VLCC	2,000,000	HFO	2.70	3,600	28%	1.0	0.0064	722.0	0.0952	0.0002	23.6527	0.0031
26.0	Panamax	350,000	HFO	2.70	3,600	28%	1.0	0.0064	722.0	0.0952	0.0002	23.6527	0.0031
45.0	Suezmax	1,000,000	HFO	2.70	3,600	28%	1.0	0.0064	722.0	0.0952	0.0004	40.9374	0.0054
										TOTAL	**0.0010**	**117.1459**	**0.0154**

Table H.2.PP.Un.GHG.2010-5. 2010 Proposed Project Summary of Average Daily Unmitigated Vessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0486	5534.23	0.7302
Cruising	Aux Generator	0.0062	704.51	0.0929
Maneuvering	Main Engines	0.0005	57.91	0.0077
Maneuvering	Aux Generator	0.0034	386.74	0.0511
Boiler Warm-up	Boiler	0.0085	1008.21	0.1282
Berth Operations	Boiler	0.1091	12868.06	1.6368
Berth Operations	Aux Generator	0.0366	4140.42	0.5459
Propulsion	TOTAL	0.0588	6,683	0.8819
Non-Propulsion	TOTAL	0.1542	18,017	2.31
Total Emissions		**0.2130**	**24700.08**	**3.1929**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	1.33E-04	15.2	2.00E-03
Cruising	Aux Generator	1.70E-05	1.9	2.55E-04
Maneuvering	Main Engines	1.40E-06	0.2	2.10E-05
Maneuvering	Aux Generator	9.34E-06	1.1	1.40E-04
Boiler Warm-up	Boiler	2.34E-05	2.8	3.51E-04
Berth Operations	Boiler	2.99E-04	35.3	4.48E-03
Berth Operations	Aux Generator	1.00E-04	11.3	1.50E-03
Propulsion	TOTAL	1.61E-04	18.3	2.42E-03
Non-Propulsion	TOTAL	4.23E-04	49.4	6.33E-03
Total Emissions		**5.83E-04**	**67.67**	**8.75E-03**

Table H.2.PP.Un.GHG.2010-6. 2010 Proposed Project Tug Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	4,800	0.50	2400	8.2	26.0	0.00636	645.0	0.0890	0.0005	50.3100	0.0069
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	26.0	0.00636	645.0	0.0890	0.0005	50.3100	0.0069
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	32.0	0.00636	645.0	0.0890	0.0006	61.9200	0.0085
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	32.0	0.00636	645.0	0.0890	0.0006	61.9200	0.0085
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	26.0	0.00636	645.0	0.0890	0.0005	50.3100	0.0069
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	26.0	0.00636	645.0	0.0890	0.0005	50.3100	0.0069
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	4,800	0.50	2400	8.2	45.0	0.00636	645.0	0.0890	0.0009	87.0750	0.0120
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	45.0	0.00636	645.0	0.0890	0.0009	87.0750	0.0120
								TOTAL				**0.0049**	**499.23**	**0.0689**

Table H.2.PP.Un.GHG.2010-7. 2010 Proposed Project Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	300	1.00	300	1.0	26.0	0.0068	690.0	0.0952	0.00007	6.72750	0.00093
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	26.0	0.0068	690.0	0.0952	0.00007	6.72750	0.00093
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	32.0	0.0068	690.0	0.0952	0.00008	8.28000	0.00114
	Maneuvering - Berth to Pilc	1.00	2	300	1.00	300	1.0	32.0	0.0068	690.0	0.0952	0.00008	8.28000	0.00114
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	26.0	0.0068	690.0	0.0952	0.00007	6.72750	0.00093
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	26.0	0.0068	690.0	0.0952	0.00007	6.72750	0.00093
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	300	1.00	300	1.0	45.0	0.0068	690.0	0.0952	0.00011	11.64375	0.00161
	Maneuvering - Berth to Pilc	1.00	2	300	1.00	300	1.0	45.0	0.0068	690.0	0.0952	0.00011	11.64375	0.00161
								TOTAL				**0.0007**	**66.76**	**0.0092**

Table H.2.PP.Un.GHG.2010-8. 2010 Proposed Project Summary of Tug Average Daily Unmitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0049	499.23	0.0689
Tug Assist	Aux Generator	0.0007	66.76	0.0092
	TOTAL	**0.0056**	**565.99**	**0.0781**

Table H.2.PP.Un.GHG.2015-1. 2015 Proposed Project Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	15.54	1.42	16.9	0.777	25,400	27,957	95	51	0.0055	620.00	0.0818	0.0097	1105.02	0.1458
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	54	51	0.0055	620.00	0.0818	0.0055	628.97	0.0830
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	4	51	0.0055	620.00	0.0818	0.0004	47.90	0.0063
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	0	51	0.0060	682.00	0.0902	0.0001	6.18	0.0008
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	2	51	0.0060	682.00	0.0902	0.0003	28.60	0.0038
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	3	51	0.0055	620.00	0.0818	0.0003	38.73	0.0051
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	54	51	0.0055	620.00	0.0818	0.0055	628.97	0.0830
		Cruising - VSR to CW	22	15.54	1.42	16.9	0.777	25,400	27,957	95	51	0.0055	620.00	0.0818	0.0097	1105.02	0.1458
AFRAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	16.1	0.761	12,477	14,859	51	24	0.0055	620.00	0.0818	0.0024	276.38	0.0365
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	16	24	0.0055	620.00	0.0818	0.0008	88.08	0.0116
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	2	24	0.0055	620.00	0.0818	0.0001	12.81	0.0017
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	0	24	0.0060	682.00	0.0902	0.0000	1.65	0.0002
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	1	24	0.0060	682.00	0.0902	0.0001	7.65	0.0010
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	2	24	0.0055	620.00	0.0818	0.0001	9.54	0.0013
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	18	24	0.0055	620.00	0.0818	0.0009	100.10	0.0132
		Cruising - VSR to CW	24.5	14.7	1.67	16.1	0.761	12,477	15,828	54	24	0.0055	620.00	0.0818	0.0026	294.41	0.0388
PANAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	15.8	0.805	10,300	12,979	44	12	0.0055	620.00	0.0818	0.0011	120.70	0.0159
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	14	12	0.0055	620.00	0.0818	0.0003	38.47	0.0051
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	2	12	0.0055	620.00	0.0818	0.0000	5.59	0.0007
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	0	12	0.0060	682.00	0.0902	0.0000	0.72	0.0001
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	1	12	0.0060	682.00	0.0902	0.0000	3.34	0.0004
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	2	12	0.0055	620.00	0.0818	0.0000	4.16	0.0005
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	16	12	0.0055	620.00	0.0818	0.0004	43.71	0.0058
		Cruising - VSR to CW	24.5	14.7	1.67	15.8	0.805	10,300	13,825	47	12	0.0055	620.00	0.0818	0.0011	128.57	0.0170
SUEZMAX	North In	Cruising - CW to VSR	22	15.54	1.42	17	0.764	16,000	17,302	59	60	0.0055	620.00	0.0818	0.0071	804.55	0.1061
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	34	60	0.0055	620.00	0.0818	0.0040	457.94	0.0604
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	3	60	0.0055	620.00	0.0818	0.0003	34.88	0.0046
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	0	60	0.0060	682.00	0.0902	0.0000	4.50	0.0006
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	1	60	0.0060	682.00	0.0902	0.0002	20.82	0.0028
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	2	60	0.0055	620.00	0.0818	0.0002	28.20	0.0037
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	34	60	0.0055	620.00	0.0818	0.0040	457.94	0.0604
		Cruising - VSR to CW	22	15.54	1.42	17	0.764	16,000	17,302	59	60	0.0055	620.00	0.0818	0.0071	804.55	0.1061
														TOTAL	**0.0645**	**7338.62**	**0.9682**

Table H.2.PP.Un.GHG.2015-2. 2015 Proposed Project Auxiliary Generator Average Daily Unmitigated GHG Emissions

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	3.84	3,600	0.278	3,840	13	51	0.0055	620.00	0.0818	0.0013	151.78	0.0200
		Maneuvering	2.00	3,600	0.278	2,002	7	51	0.0060	682.00	0.0902	0.0008	87.02	0.0115
	North Out	Maneuvering	1.50	3,600	0.278	1,501	5	51	0.0060	682.00	0.0902	0.0006	65.27	0.0086
		Cruising	3.71	3,600	0.278	3,712	13	51	0.0055	620.00	0.0818	0.0013	146.70	0.0194
AFRAMAX	South In	Cruising	3.15	3,600	0.278	3,155	11	24	0.0055	620.00	0.0818	0.0005	58.69	0.0077
		Maneuvering	2.00	3,600	0.278	2,002	7	24	0.0060	682.00	0.0902	0.0004	40.95	0.0054
	South Out	Maneuvering	1.50	3,600	0.278	1,501	5	24	0.0060	682.00	0.0902	0.0003	30.71	0.0041
		Cruising	3.21	3,600	0.278	3,211	11	24	0.0055	620.00	0.0818	0.0005	59.72	0.0079
PANAMAX	South In	Cruising	3.15	3,600	0.28	3,178	11	12	0.0055	620.00	0.0818	0.0003	29.55	0.0039
		Maneuvering	2.00	3,600	0.28	2,016	7	12	0.0060	682.00	0.0902	0.0002	20.62	0.0027
	South Out	Maneuvering	1.5	3,600	0.28	1,512	5	12	0.0060	682.00	0.0902	0.0001	15.47	0.0020
		Cruising	3.21	3,600	0.28	3,234	11	12	0.0055	620.00	0.0818	0.0003	30.08	0.0040
SUEZMAX	North In	Cruising	3.84	3,600	0.28	3,868	13	60	0.0055	620.00	0.0818	0.0016	179.85	0.0237
		Maneuvering	2.00	3,600	0.28	2,016	7	60	0.0060	682.00	0.0902	0.0009	103.12	0.0136
	North Out	Maneuvering	1.5	3,600	0.28	1,512	5	60	0.0060	682.00	0.0902	0.0007	77.34	0.0102
		Cruising	3.71	3,600	0.28	3,738	13	60	0.0055	620.00	0.0818	0.0015	173.83	0.0229
								TOTAL				**0.0112**	**1270.71**	**0.1678**

Table H.2.PP.Un.GHG.2015-3. 2015 Proposed Project Boiler Warm-Up Average Daily Unmitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	HFO	2.70	107.96	30%	3	50,000	15,525	0.0559	6,596.00	0.8390	0.0016	185.31	0.0236
51.0	VLCC	HFO	2.70	84.93	30%	3	90,000	46,717	0.0559	6,596.00	0.8390	0.0047	557.63	0.0709
12.0	Panamax	HFO	2.70	63.30	30%	3	35,000	3,186	0.0559	6,596.00	0.8390	0.0003	38.03	0.0048
60.0	Suezmax	HFO	2.70	87.54	30%	3	70,000	44,061	0.0559	6,596.00	0.8390	0.0045	525.93	0.0669
										TOTAL		**0.0111**	**1,306.90**	**0.1662**

Table H.2.PP.Un.GHG.2015-4. 2015 Proposed Project Berth Operations Average Daily Unmitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	HFO	2.70	3,600	28%	2.5	8.5	150	0.0064	722.0	0.0952	0.0005	54.19	0.0071
51.0	VLCC	2,000,000	HFO	2.70	3,600	28%	2.5	8.5	150	0.0064	722.0	0.0952	0.0010	115.16	0.0152
12.0	Panamax	350,000	HFO	2.70	3,600	28%	2.5	8.6	150	0.0064	722.0	0.0952	0.0002	27.29	0.0036
60.0	Suezmax	1,000,000	HFO	2.70	3,600	28%	2.5	8.6	150	0.0064	722.0	0.0952	0.0012	136.46	0.0180
						TOTAL							**0.0029**	**333.10**	**0.0439**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	HFO	2.70	107.96	30%	2.5	50,000	43,126	0.0559	6,596.0	0.8390	0.0013	154.43	0.0196
51.0	VLCC	2,000,000	HFO	2.70	84.93	30%	2.5	90,000	129,770	0.0559	6,596.0	0.8390	0.0039	464.69	0.0591
12.0	Panamax	350,000	HFO	2.70	59.91	30%	2.5	35,000	8,376	0.0559	6,596.0	0.8390	0.0003	29.99	0.0038
60.0	Suezmax	1,000,000	HFO	2.70	82.85	30%	2.5	70,000	115,836	0.0559	6,596.0	0.8390	0.0035	414.79	0.0528
						TOTAL							**0.0090**	**1063.91**	**0.1353**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	MDO	0.52	3,600	56%	15.0	102.4	140	0.0064	722.0	0.0952	0.0057	650.32	0.0857
51.0	VLCC	2,000,000	MDO	0.52	3,600	56%	23.2	158.4	140	0.0064	722.0	0.0952	0.0189	2137.38	0.2818
12.0	Panamax	350,000	MDO	0.52	3,600	56%	11.0	75.7	140	0.0064	722.0	0.0952	0.0021	240.17	0.0317
60.0	Suezmax	1,000,000	MDO	0.52	3,600	56%	15.3	105.2	140	0.0064	722.0	0.0952	0.0148	1670.25	0.2202
						TOTAL							**0.0416**	**4698.12**	**0.6195**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	MDO	0.52	102.17	28.06	15.0	50,000	177,631	0.0559	6,596.0	0.8390	0.0180	2120.25	0.2697
51.0	VLCC	2,000,000	MDO	0.52	80.38	28.06	23.2	90,000	741,836	0.0559	6,596.0	0.8390	0.0750	8854.75	1.1263
12.0	Panamax	350,000	MDO	0.52	59.91	28.06	11.0	35,000	19,593	0.0559	6,596.0	0.8390	0.0020	233.87	0.0297
60.0	Suezmax	1,000,000	MDO	0.52	82.85	28.06	15.3	70,000	468,816	0.0559	6,596.0	0.8390	0.0474	5595.91	0.7118
							TOTAL						**0.1424**	**16804.79**	**2.1375**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0002	21.68	0.0029
51.0	VLCC	2,000,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0004	46.06	0.0061
12.0	Panamax	350,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0001	10.92	0.0014
60.0	Suezmax	1,000,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0005	54.58	0.0072
						TOTAL							**0.0012**	**133.24**	**0.0176**

Table H.2.PP.Un.GHG.2015-5. 2015 Proposed Project Summary of Average Daily Unmitigated Vessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0639	7265.17	0.9585
Cruising	Aux Generator	0.0073	830.20	0.1095
Maneuvering	Main Engines	0.0006	73.45	0.0097
Maneuvering	Aux Generator	0.0039	440.51	0.0583
Boiler Warm-up	Boiler	0.0111	1306.90	0.1662
Berth Operations	Boiler	0.1514	17868.70	2.2729
Berth Operations	Aux Generator	0.0457	5164.46	0.6810
Propulsion	TOTAL	0.0757	8609.34	1.1360
Non-Propulsion	TOTAL	0.2082	24340.06	3.12
Total Emissions		**0.2839**	**32949.40**	**4.2561**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	1.75E-04	19.90	2.63E-03
Cruising	Aux Generator	2.00E-05	2.27	3.00E-04
Maneuvering	Main Engines	1.77E-06	0.20	2.66E-05
Maneuvering	Aux Generator	1.06E-05	1.21	1.60E-04
Boiler Warm-up	Boiler	3.03E-05	3.58	4.55E-04
Berth Operations	Boiler	4.15E-04	48.96	6.23E-03
Berth Operations	Aux Generator	1.25E-04	14.15	1.87E-03
Propulsion	TOTAL	2.07E-04	23.59	3.11E-03
Non-Propulsion	TOTAL	5.70E-04	66.69	8.55E-03
Total Emissions		**7.78E-04**	**90.27**	**1.17E-02**

Table H.2.PP.Un.GHG.2015-6. 2015 Proposed Project Tug Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	4,800	0.50	2400	8.2	51.0	0.00636	645.0	0.0890	0.0010	98.6850	0.0136
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	51.0	0.00636	645.0	0.0890	0.0010	98.6850	0.0136
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	24.0	0.00636	645.0	0.0890	0.0005	46.4400	0.0064
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	24.0	0.00636	645.0	0.0890	0.0005	46.4400	0.0064
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	12.0	0.00636	645.0	0.0890	0.0002	23.2200	0.0032
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	12.0	0.00636	645.0	0.0890	0.0002	23.2200	0.0032
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	4,800	0.50	2400	8.2	60.0	0.00636	645.0	0.0890	0.0011	116.1000	0.0160
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	60.0	0.00636	645.0	0.0890	0.0011	116.1000	0.0160
								TOTAL				**0.0056**	**568.8900**	**0.0785**

Table H.2.PP.Un.GHG.2015-7. 2015 Proposed Project Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	300	1.00	300	1.0	51.0	0.0068	690.0	0.0952	0.00013	13.20	0.00182
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	51.0	0.0068	690.0	0.0952	0.00013	13.20	0.00182
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	24.0	0.0068	690.0	0.0952	0.00006	6.21	0.00086
	Maneuvering - Berth to Pilc	1.00	2	300	1.00	300	1.0	24.0	0.0068	690.0	0.0952	0.00006	6.21	0.00086
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	12.0	0.0068	690.0	0.0952	0.00003	3.11	0.00043
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	12.0	0.0068	690.0	0.0952	0.00003	3.11	0.00043
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	300	1.00	300	1.0	60.0	0.0068	690.0	0.0952	0.00015	15.53	0.00214
	Maneuvering - Berth to Pilc	1.00	2	300	1.00	300	1.0	60.0	0.0068	690.0	0.0952	0.00015	15.53	0.00214
								TOTAL				**0.00075**	**76.07**	**0.01050**

Table H.2.PP.Un.GHG.2015-8. 2015 Proposed Project Summary of Tug Average Daily Unmitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0056	568.89	0.0785
Tug Assist	Aux Generator	0.00075	76.07	0.01050
	TOTAL	**0.0064**	**644.96**	**0.0890**

Table H.2.PP.Un.GHG.2025-1. 2025 Proposed Project Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	15.54	1.42	16.9	0.777	25,400	27,957	95	69	0.0055	620.00	0.0818	0.0131	1495.03	0.1972
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	54	69	0.0055	620.00	0.0818	0.0075	850.95	0.1123
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	4	69	0.0055	620.00	0.0818	0.0006	64.81	0.0086
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	0	69	0.0060	682.00	0.0902	0.0001	8.36	0.0011
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	2	69	0.0060	682.00	0.0902	0.0003	38.69	0.0051
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	3	69	0.0055	620.00	0.0818	0.0005	52.40	0.0069
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	54	69	0.0055	620.00	0.0818	0.0075	850.95	0.1123
		Cruising - VSR to CW	22	15.54	1.42	16.9	0.777	25,400	27,957	95	69	0.0055	620.00	0.0818	0.0131	1495.03	0.1972
AFRAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	16.1	0.761	12,477	14,859	51	36	0.0055	620.00	0.0818	0.0036	414.57	0.0547
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	16	36	0.0055	620.00	0.0818	0.0012	132.13	0.0174
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	2	36	0.0055	620.00	0.0818	0.0002	19.21	0.0025
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	0	36	0.0060	682.00	0.0902	0.0000	2.48	0.0003
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	1	36	0.0060	682.00	0.0902	0.0001	11.47	0.0015
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	2	36	0.0055	620.00	0.0818	0.0001	14.31	0.0019
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	18	36	0.0055	620.00	0.0818	0.0013	150.14	0.0198
		Cruising - VSR to CW	24.5	14.7	1.67	16.1	0.761	12,477	15,828	54	36	0.0055	620.00	0.0818	0.0039	441.61	0.0583
PANAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	15.8	0.805	10,300	12,979	44	18	0.0055	620.00	0.0818	0.0016	181.05	0.0239
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	14	18	0.0055	620.00	0.0818	0.0005	57.70	0.0076
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	2	18	0.0055	620.00	0.0818	0.0001	8.39	0.0011
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	0	18	0.0060	682.00	0.0902	0.0000	1.08	0.0001
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	1	18	0.0060	682.00	0.0902	0.0000	5.01	0.0007
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	2	18	0.0055	620.00	0.0818	0.0001	6.25	0.0008
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	16	18	0.0055	620.00	0.0818	0.0006	65.57	0.0087
		Cruising - VSR to CW	24.5	14.7	1.67	15.8	0.805	10,300	13,825	47	18	0.0055	620.00	0.0818	0.0017	192.86	0.0254
SUEZMAX	North In	Cruising - CW to VSR	22	15.54	1.42	17	0.764	16,000	17,302	59	78	0.0055	620.00	0.0818	0.0092	1045.91	0.1380
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	34	78	0.0055	620.00	0.0818	0.0052	595.32	0.0785
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	3	78	0.0055	620.00	0.0818	0.0004	45.34	0.0060
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	0	78	0.0060	682.00	0.0902	0.0001	5.85	0.0008
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	1	78	0.0060	682.00	0.0902	0.0002	27.07	0.0036
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	2	78	0.0055	620.00	0.0818	0.0003	36.66	0.0048
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	34	78	0.0055	620.00	0.0818	0.0052	595.32	0.0785
		Cruising - VSR to CW	22	15.54	1.42	17	0.764	16,000	17,302	59	78	0.0055	620.00	0.0818	0.0092	1045.91	0.1380
														TOTAL	**0.0875**	**9957.41**	**1.3138**

Table H.2.PP.Un.GHG.2025-2. 2025 Proposed Project Auxiliary Generator Average Daily Unmitigated GHG Emissions

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	3.84	3,600	0.278	3,840	13	69	0.0055	620.00	0.0818	0.0018	205.35	0.0271
		Maneuvering	2.00	3,600	0.278	2,002	7	69	0.0060	682.00	0.0902	0.0010	117.74	0.0156
	North Out	Maneuvering	1.50	3,600	0.278	1,501	5	69	0.0060	682.00	0.0902	0.0008	88.30	0.0117
		Cruising	3.71	3,600	0.278	3,712	13	69	0.0055	620.00	0.0818	0.0017	198.47	0.0262
AFRAMAX	South In	Cruising	3.15	3,600	0.278	3,155	11	36	0.0055	620.00	0.0818	0.0008	88.03	0.0116
		Maneuvering	2.00	3,600	0.278	2,002	7	36	0.0060	682.00	0.0902	0.0005	61.43	0.0081
	South Out	Maneuvering	1.50	3,600	0.278	1,501	5	36	0.0060	682.00	0.0902	0.0004	46.07	0.0061
		Cruising	3.21	3,600	0.278	3,211	11	36	0.0055	620.00	0.0818	0.0008	89.58	0.0118
PANAMAX	South In	Cruising	3.15	3,600	0.28	3,178	11	18	0.0055	620.00	0.0818	0.0004	44.33	0.0058
		Maneuvering	2.00	3,600	0.28	2,016	7	18	0.0060	682.00	0.0902	0.0003	30.94	0.0041
	South Out	Maneuvering	1.5	3,600	0.28	1,512	5	18	0.0060	682.00	0.0902	0.0002	23.20	0.0031
		Cruising	3.21	3,600	0.28	3,234	11	18	0.0055	620.00	0.0818	0.0004	45.11	0.0060
SUEZMAX	North In	Cruising	3.84	3,600	0.28	3,868	13	78	0.0055	620.00	0.0818	0.0021	233.81	0.0308
		Maneuvering	2.00	3,600	0.28	2,016	7	78	0.0060	682.00	0.0902	0.0012	134.05	0.0177
	North Out	Maneuvering	1.5	3,600	0.28	1,512	5	78	0.0060	682.00	0.0902	0.0009	100.54	0.0133
		Cruising	3.71	3,600	0.28	3,738	13	78	0.0055	620.00	0.0818	0.0020	225.98	0.0298
								TOTAL				**0.0152**	**1732.95**	**0.2288**

Table H.2.PP.Un.GHG.2025-3. 2025 Proposed Project Boiler Warm-Up Average Daily Unmitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	HFO	2.70	107.96	30%	3	50,000	23,288	0.0559	6,596.00	0.8390	0.0024	277.97	0.0354
69.0	VLCC	HFO	2.70	84.93	30%	3	90,000	63,206	0.0559	6,596.00	0.8390	0.0064	754.44	0.0960
18.0	Panamax	HFO	2.70	63.30	30%	3	35,000	4,779	0.0559	6,596.00	0.8390	0.0005	57.04	0.0073
78.0	Suezmax	HFO	2.70	87.54	30%	3	70,000	57,280	0.0559	6,596.00	0.8390	0.0058	683.71	0.0870
										TOTAL		**0.0150**	**1,773.16**	**0.2255**

Table H.2.PP.Un.GHG.2025-4. 2025 Proposed Project Berth Operations Average Daily Unmitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	HFO	2.70	3,600	28%	2.5	8.5	150	0.0064	722.0	0.0952	0.0007	81.29	0.0107
69.0	VLCC	2,000,000	HFO	2.70	3,600	28%	2.5	8.5	150	0.0064	722.0	0.0952	0.0014	155.81	0.0205
18.0	Panamax	350,000	HFO	2.70	3,600	28%	2.5	8.6	150	0.0064	722.0	0.0952	0.0004	40.94	0.0054
78.0	Suezmax	1,000,000	HFO	2.70	3,600	28%	2.5	8.6	150	0.0064	722.0	0.0952	0.0016	177.40	0.0234
						TOTAL							**0.0040**	**455.43**	**0.0601**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	HFO	2.70	107.96	30%	2.5	50,000	64,689	0.0559	6,596.0	0.8390	0.0020	231.64	0.0295
69.0	VLCC	2,000,000	HFO	2.70	84.93	30%	2.5	90,000	175,571	0.0559	6,596.0	0.8390	0.0053	628.70	0.0800
18.0	Panamax	350,000	HFO	2.70	59.91	30%	2.5	35,000	12,564	0.0559	6,596.0	0.8390	0.0004	44.99	0.0057
78.0	Suezmax	1,000,000	HFO	2.70	82.85	30%	2.5	70,000	150,586	0.0559	6,596.0	0.8390	0.0046	539.23	0.0686
						TOTAL							**0.0122**	**1444.56**	**0.1837**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	MDO	0.52	3,600	56%	15.0	102.4	140	0.0064	722.0	0.0952	0.0086	975.48	0.1286
69.0	VLCC	2,000,000	MDO	0.52	3,600	56%	23.2	158.4	140	0.0064	722.0	0.0952	0.0256	2891.76	0.3813
18.0	Panamax	350,000	MDO	0.52	3,600	56%	11.0	75.7	140	0.0064	722.0	0.0952	0.0032	360.25	0.0475
78.0	Suezmax	1,000,000	MDO	0.52	3,600	56%	15.3	105.2	140	0.0064	722.0	0.0952	0.0192	2171.32	0.2863
						TOTAL							**0.0567**	**6398.80**	**0.8437**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	MDO	0.52	102.17	28.06	15.0	50,000	266,446	0.0559	6,596.0	0.8390	0.0270	3180.37	0.4045
69.0	VLCC	2,000,000	MDO	0.52	80.38	28.06	23.2	90,000	1,003,660	0.0559	6,596.0	0.8390	0.1015	11979.96	1.5238
18.0	Panamax	350,000	MDO	0.52	59.91	28.06	11.0	35,000	29,390	0.0559	6,596.0	0.8390	0.0030	350.81	0.0446
78.0	Suezmax	1,000,000	MDO	0.52	82.85	28.06	15.3	70,000	609,460	0.0559	6,596.0	0.8390	0.0617	7274.69	0.9253
							TOTAL						**0.1931**	**22785.83**	**2.8983**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0003	32.52	0.0043
69.0	VLCC	2,000,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0006	62.32	0.0082
18.0	Panamax	350,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0001	16.37	0.0022
78.0	Suezmax	1,000,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0006	70.96	0.0094
						TOTAL							**0.0016**	**182.17**	**0.0240**

Table H.2.PP.Un.GHG.2025-5. 2025 Proposed Project Summary of Average Daily Unmitigated Vessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0866	9857.41	1.3005
Cruising	Aux Generator	0.0099	1130.68	0.1492
Maneuvering	Main Engines	0.0009	100.00	0.0132
Maneuvering	Aux Generator	0.0053	602.28	0.0797
Boiler Warm-up	Boiler	0.0150	1773.16	0.2255
Berth Operations	Boiler	0.2053	24230.40	3.0821
Berth Operations	Aux Generator	0.0623	7036.40	0.9278
Propulsion	TOTAL	0.1028	11690.37	1.5426
Non-Propulsion	TOTAL	0.2826	33039.96	4.24
Total Emissions		**0.3854**	**44730.33**	**5.7780**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	2.37E-04	27.01	3.56E-03
Cruising	Aux Generator	2.72E-05	3.10	4.09E-04
Maneuvering	Main Engines	2.41E-06	0.27	3.62E-05
Maneuvering	Aux Generator	1.45E-05	1.65	2.18E-04
Boiler Warm-up	Boiler	4.12E-05	4.86	6.18E-04
Berth Operations	Boiler	5.63E-04	66.38	8.44E-03
Berth Operations	Aux Generator	1.71E-04	19.28	2.54E-03
Propulsion	TOTAL	2.82E-04	32.03	4.23E-03
Non-Propulsion	TOTAL	7.74E-04	90.52	1.16E-02
Total Emissions		**1.06E-03**	**122.55**	**1.58E-02**

Table H.2.PP.Un.GHG.2025-6. 2025 Proposed Project Tug Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	4,800	0.50	2400	8.2	69	0.00636	645.0	0.0890	0.0013	133.5150	0.0184
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	69	0.00636	645.0	0.0890	0.0013	133.5150	0.0184
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	36	0.00636	645.0	0.0890	0.0007	69.6600	0.0096
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	36	0.00636	645.0	0.0890	0.0007	69.6600	0.0096
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	18	0.00636	645.0	0.0890	0.0003	34.8300	0.0048
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	18	0.00636	645.0	0.0890	0.0003	34.8300	0.0048
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	4,800	0.50	2400	8.2	78	0.00636	645.0	0.0890	0.0015	150.9300	0.0208
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	78	0.00636	645.0	0.0890	0.0015	150.9300	0.0208
								TOTAL				**0.0077**	**777.8700**	**0.1073**

Table H.2.PP.Un.GHG.2025-7. 2025 Proposed Project Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	300	1.00	300	1.0	69	0.0068	690.0	0.0952	0.00018	17.85	0.00246
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	69	0.0068	690.0	0.0952	0.00018	17.85	0.00246
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	36	0.0068	690.0	0.0952	0.00009	9.32	0.00129
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	36	0.0068	690.0	0.0952	0.00009	9.32	0.00129
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	18	0.0068	690.0	0.0952	0.00005	4.66	0.00064
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	18	0.0068	690.0	0.0952	0.00005	4.66	0.00064
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	300	1.00	300	1.0	78	0.0068	690.0	0.0952	0.00020	20.18	0.00278
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	78	0.0068	690.0	0.0952	0.00020	20.18	0.00278
								TOTAL				**0.00103**	**104.02**	**0.01435**

Table H.2.PP.Un.GHG.2025-8. 2025 Proposed Project Summary of Tug Average Daily Unmitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0077	777.87	0.1073
Tug Assist	Aux Generator	0.00103	104.02	0.01435
	TOTAL	**0.0087**	**881.89**	**0.1217**

Table H.2.PP.Un.GHG.2040-1. 2040 Proposed Project Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	15.54	1.42	16.9	0.777	25,400	27,957	95	69	0.0055	620.00	0.0818	0.0131	1495.03	0.1972
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	54	69	0.0055	620.00	0.0818	0.0075	850.95	0.1123
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	4	69	0.0055	620.00	0.0818	0.0006	64.81	0.0086
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	0	69	0.0060	682.00	0.0902	0.0001	8.36	0.0011
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	2	69	0.0060	682.00	0.0902	0.0003	38.69	0.0051
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	3	69	0.0055	620.00	0.0818	0.0005	52.40	0.0069
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	54	69	0.0055	620.00	0.0818	0.0075	850.95	0.1123
		Cruising - VSR to CW	22	15.54	1.42	16.9	0.777	25,400	27,957	95	69	0.0055	620.00	0.0818	0.0131	1495.03	0.1972
AFRAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	16.1	0.761	12,477	14,859	51	36	0.0055	620.00	0.0818	0.0036	414.57	0.0547
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	16	36	0.0055	620.00	0.0818	0.0012	132.13	0.0174
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	2	36	0.0055	620.00	0.0818	0.0002	19.21	0.0025
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	0	36	0.0060	682.00	0.0902	0.0000	2.48	0.0003
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	1	36	0.0060	682.00	0.0902	0.0001	11.47	0.0015
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	2	36	0.0055	620.00	0.0818	0.0001	14.31	0.0019
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	18	36	0.0055	620.00	0.0818	0.0013	150.14	0.0198
		Cruising - VSR to CW	24.5	14.7	1.67	16.1	0.761	12,477	15,828	54	36	0.0055	620.00	0.0818	0.0039	441.61	0.0583
PANAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	15.8	0.805	10,300	12,979	44	18	0.0055	620.00	0.0818	0.0016	181.05	0.0239
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	14	18	0.0055	620.00	0.0818	0.0005	57.70	0.0076
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	2	18	0.0055	620.00	0.0818	0.0001	8.39	0.0011
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	0	18	0.0060	682.00	0.0902	0.0000	1.08	0.0001
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	1	18	0.0060	682.00	0.0902	0.0000	5.01	0.0007
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	2	18	0.0055	620.00	0.0818	0.0001	6.25	0.0008
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	16	18	0.0055	620.00	0.0818	0.0006	65.57	0.0087
		Cruising - VSR to CW	24.5	14.7	1.67	15.8	0.805	10,300	13,825	47	18	0.0055	620.00	0.0818	0.0017	192.86	0.0254
SUEZMAX	North In	Cruising - CW to VSR	22	15.54	1.42	17	0.764	16,000	17,302	59	78	0.0055	620.00	0.0818	0.0092	1045.91	0.1380
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	34	78	0.0055	620.00	0.0818	0.0052	595.32	0.0785
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	3	78	0.0055	620.00	0.0818	0.0004	45.34	0.0060
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	0	78	0.0060	682.00	0.0902	0.0001	5.85	0.0008
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	1	78	0.0060	682.00	0.0902	0.0002	27.07	0.0036
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	2	78	0.0055	620.00	0.0818	0.0003	36.66	0.0048
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	34	78	0.0055	620.00	0.0818	0.0052	595.32	0.0785
		Cruising - VSR to CW	22	15.54	1.42	17	0.764	16,000	17,302	59	78	0.0055	620.00	0.0818	0.0092	1045.91	0.1380
														TOTAL	**0.0875**	**9957.41**	**1.3138**

Table H.2.PP.Un.GHG.2040-2. 2040 Proposed Project Auxiliary Generator Average Daily Unmitigated GHG Emissions

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Energy (MMBtu)	Fuel Type	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	3.84	3,600	0.278	3,840	13	HFO	69	0.0055	620.00	0.0818	0.0018	205.35	0.0271
		Maneuvering	2.00	3,600	0.278	2,002	7	HFO	69	0.0060	682.00	0.0902	0.0010	117.74	0.0156
	North Out	Maneuvering	1.50	3,600	0.278	1,501	5	HFO	69	0.0060	682.00	0.0902	0.0008	88.30	0.0117
		Cruising	3.71	3,600	0.278	3,712	13	HFO	69	0.0055	620.00	0.0818	0.0017	198.47	0.0262
AFRAMAX	South In	Cruising	3.15	3,600	0.278	3,155	11	HFO	36	0.0055	620.00	0.0818	0.0008	88.03	0.0116
		Maneuvering	2.00	3,600	0.278	2,002	7	HFO	36	0.0060	682.00	0.0902	0.0005	61.43	0.0081
	South Out	Maneuvering	1.50	3,600	0.278	1,501	5	HFO	36	0.0060	682.00	0.0902	0.0004	46.07	0.0061
		Cruising	3.21	3,600	0.278	3,211	11	HFO	36	0.0055	620.00	0.0818	0.0008	89.58	0.0118
PANAMAX	South In	Cruising	3.15	3,600	0.28	3,178	11	HFO	18	0.0055	620.00	0.0818	0.0004	44.33	0.0058
		Maneuvering	2.00	3,600	0.28	2,016	7	HFO	18	0.0060	682.00	0.0902	0.0003	30.94	0.0041
	South Out	Maneuvering	1.5	3,600	0.28	1,512	5	HFO	18	0.0060	682.00	0.0902	0.0002	23.20	0.0031
		Cruising	3.21	3,600	0.28	3,234	11	HFO	18	0.0055	620.00	0.0818	0.0004	45.11	0.0060
SUEZMAX	North In	Cruising	3.84	3,600	0.28	3,868	13	HFO	78	0.0055	620.00	0.0818	0.0021	233.81	0.0308
		Maneuvering	2.00	3,600	0.28	2,016	7	HFO	78	0.0060	682.00	0.0902	0.0012	134.05	0.0177
	North Out	Maneuvering	1.5	3,600	0.28	1,512	5	HFO	78	0.0060	682.00	0.0902	0.0009	100.54	0.0133
		Cruising	3.71	3,600	0.28	3,738	13	HFO	78	0.0055	620.00	0.0818	0.0020	225.98	0.0298
									TOTAL				**0.0152**	**1732.95**	**0.2288**

Table H.2.PP.Un.GHG.2040-3. 2040 Proposed Project Boiler Warm-Up Average Daily Unmitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36	Aframax	2.70	107.96	30%	3	50,000	23,288	0.0559	6,596.00	0.8390	0.0024	277.97	0.0354
69	VLCC	2.70	84.93	30%	3	90,000	63,206	0.0559	6,596.00	0.8390	0.0064	754.44	0.0960
18	Panamax	2.70	63.30	30%	3	35,000	4,779	0.0559	6,596.00	0.8390	0.0005	57.04	0.0073
78	Suezmax	2.70	87.54	30%	3	70,000	57,280	0.0559	6,596.00	0.8390	0.0058	683.71	0.0870
									TOTAL		**0.0150**	**1,773.16**	**0.2255**

Table H.2.PP.Un.GHG.2040-4. 2040 Proposed Project Berth Operations Average Daily Unmitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36	Aframax	700,000	2.70	3,600	28%	2.5	8.5	150	0.0064	722.0	0.0952	0.0007	81.29	0.0107
69	VLCC	2,000,000	2.70	3,600	28%	2.5	8.5	150	0.0064	722.0	0.0952	0.0014	155.81	0.0205
18	Panamax	350,000	2.70	3,600	28%	2.5	8.6	150	0.0064	722.0	0.0952	0.0004	40.94	0.0054
78	Suezmax	1,000,000	2.70	3,600	28%	2.5	8.6	150	0.0064	722.0	0.0952	0.0016	177.40	0.0234
					TOTAL							**0.0040**	**455.43**	**0.0601**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36	Aframax	700,000	2.70	107.96	30%	2.5	50,000	64,689	0.0559	6,596.0	0.8390	0.0020	231.64	0.0295
69	VLCC	2,000,000	2.70	84.93	30%	2.5	90,000	175,571	0.0559	6,596.0	0.8390	0.0053	628.70	0.0800
18	Panamax	350,000	2.70	59.91	30%	2.5	35,000	12,564	0.0559	6,596.0	0.8390	0.0004	44.99	0.0057
78	Suezmax	1,000,000	2.70	82.85	30%	2.5	70,000	150,586	0.0559	6,596.0	0.8390	0.0046	539.23	0.0686
					TOTAL							**0.0122**	**1444.56**	**0.1837**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36	Aframax	700,000	0.52	3,600	56%	15.0	102.4	140	0.0064	722.0	0.0952	0.0086	975.48	0.1286
69	VLCC	2,000,000	0.52	3,600	56%	23.2	158.4	140	0.0064	722.0	0.0952	0.0256	2891.76	0.3813
18	Panamax	350,000	0.52	3,600	56%	11.0	75.7	140	0.0064	722.0	0.0952	0.0032	360.25	0.0475
78	Suezmax	1,000,000	0.52	3,600	56%	15.3	105.2	140	0.0064	722.0	0.0952	0.0192	2171.32	0.2863
					TOTAL							**0.0567**	**6398.80**	**0.8437**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36	Aframax	700,000	0.52	102.17	28.06	15.0	50,000	266,446	0.0559	6,596.0	0.8390	0.0270	3180.37	0.4045
69	VLCC	2,000,000	0.52	80.38	28.06	23.2	90,000	1,003,660	0.0559	6,596.0	0.8390	0.1015	11979.96	1.5238
18	Panamax	350,000	0.52	59.91	28.06	11.0	35,000	29,390	0.0559	6,596.0	0.8390	0.0030	350.81	0.0446
78	Suezmax	1,000,000	0.52	82.85	28.06	15.3	70,000	609,460	0.0559	6,596.0	0.8390	0.0617	7274.69	0.9253
						TOTAL						**0.1931**	**22785.83**	**2.8983**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36	Aframax	700,000	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0003	32.52	0.0043
69	VLCC	2,000,000	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0006	62.32	0.0082
18	Panamax	350,000	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0001	16.37	0.0022
78	Suezmax	1,000,000	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0006	70.96	0.0094
					TOTAL							**0.0016**	**182.17**	**0.0240**

Table H.2.PP.Un.GHG.2040-5. 2040 Proposed Project Summary of Average Daily Unmitigated Vessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0866	9857.41	1.3005
Cruising	Aux Generator	0.0099	1130.68	0.1492
Maneuvering	Main Engines	0.0009	100.00	0.0132
Maneuvering	Aux Generator	0.0053	602.28	0.0797
Boiler Warm-up	Boiler	0.0150	1773.16	0.2255
Berth Operations	Boiler	0.2053	24230.40	3.0821
Berth Operations	Aux Generator	0.0623	7036.40	0.9278
Propulsion	TOTAL	0.1028	11690.37	1.5426
Non-Propulsion	TOTAL	0.2826	33039.96	4.2354
Total Emissions		**0.3854**	**44730.33**	**5.7780**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	2.37E-04	27.01	3.56E-03
Cruising	Aux Generator	2.72E-05	3.10	4.09E-04
Maneuvering	Main Engines	2.41E-06	0.27	3.62E-05
Maneuvering	Aux Generator	1.45E-05	1.65	2.18E-04
Boiler Warm-up	Boiler	4.12E-05	4.86	6.18E-04
Berth Operations	Boiler	5.63E-04	66.38	8.44E-03
Berth Operations	Aux Generator	1.71E-04	19.28	2.54E-03
Propulsion	TOTAL	2.82E-04	32.03	4.23E-03
Non-Propulsion	TOTAL	7.74E-04	90.52	1.16E-02
Total Emissions		**1.06E-03**	**122.55**	**1.58E-02**

Table H.2.PP.Un.GHG.2040-6. 2040 Proposed Project Tug Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	4,800	0.50	2400	8.2	69	0.00636	645.0	0.0890	0.0013	133.5150	0.0184
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	69	0.00636	645.0	0.0890	0.0013	133.5150	0.0184
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	36	0.00636	645.0	0.0890	0.0007	69.6600	0.0096
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	36	0.00636	645.0	0.0890	0.0007	69.6600	0.0096
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	18	0.00636	645.0	0.0890	0.0003	34.8300	0.0048
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	18	0.00636	645.0	0.0890	0.0003	34.8300	0.0048
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	4,800	0.50	2400	8.2	78	0.00636	645.0	0.0890	0.0015	150.9300	0.0208
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	78	0.00636	645.0	0.0890	0.0015	150.9300	0.0208
								TOTAL				**0.0077**	**777.8700**	**0.1073**

Table H.2.PP.Un.GHG.2040-7. 2040 Proposed Project Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	300	1.00	300	1.0	69	0.0068	690.0	0.0952	0.00018	17.85	0.00246
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	69	0.0068	690.0	0.0952	0.00018	17.85	0.00246
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	36	0.0068	690.0	0.0952	0.00009	9.32	0.00129
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	36	0.0068	690.0	0.0952	0.00009	9.32	0.00129
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	18	0.0068	690.0	0.0952	0.00005	4.66	0.00064
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	18	0.0068	690.0	0.0952	0.00005	4.66	0.00064
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	300	1.00	300	1.0	78	0.0068	690.0	0.0952	0.00020	20.18	0.00278
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	78	0.0068	690.0	0.0952	0.00020	20.18	0.00278
								TOTAL				**0.00103**	**104.02**	**0.01435**

Table H.2.PP.Un.GHG.2040-8. 2040 Proposed Project Summary of Tug Average Daily Unmitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0077	777.87	0.1073
Tug Assist	Aux Generator	0.00103	104.02	0.01435
	TOTAL	**0.0087**	**881.89**	**0.1217**

Table H.2.PP.Un.GHG.Bar.2010-1. 2010 Proposed Project Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	North In	Volpak to Berth 408	5	3	1.67	3	0.50	4,800	4,000.00	MGO	6.0	0.00636	645.0	0.0890	0.0002	21.3106	0.0029
Barge	North Out	Volpak to Berth 408	5	3	1.67	3.0	0.50	4,800	4,000.00	MGO	6.0	0.00636	645.0	0.0890	0.0002	21.3106	0.0029
														TOTAL	**0.0004**	**42.62**	**0.0059**

Table H.2.PP.Un.GHG.Bar.2010-2. 2010 Proposed Project Tug Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	4,800	0.50	MGO	6.0	0.00636	645.0	0.0890	0.0001	12.79	0.0018
	Maneuvering - Berth to Pilot	1.00	1	4,800	0.50	MGO	6.0	0.00636	645.0	0.0890	0.0001	12.79	0.0018
										TOTAL	**0.0003**	**25.57**	**0.0035**

Table H.2.PP.Un.GHG.Bar.2010-3. 2010 Proposed Project Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	300	1.00	MGO	6.0	0.00636	645.0	0.0890	0.00002	1.60	0.0002
	Maneuvering - Berth to Pilot	1.00	1	300	1.00	MGO	6.0	0.00636	645.0	0.0890	0.00002	1.60	0.0002
										TOTAL	**0.00003**	**3.20**	**0.0004**

Table H.2.PP.Un.GHG.Bar.2010-4. 2010 Proposed Project Summary of Tug Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0003	25.57	0.0035
Tug Assist	Aux Generator	0.00003	3.20	0.0004
	TOTAL	**0.0003**	**28.77**	**0.0040**

Table H.2.PP.Un.GHG.Bar.2010-5. 2010 Proposed Project Summary of Average Daily Unmitigated Vessel GHG Emissions from Barge Fuel Deliveries for OGV.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Barge	0.0004	42.62	0.0059	43
Tug Assistance	0.0003	28.77	0.0040	29
TOTAL	**0.0007**	**71.39**	**0.0099**	**72**

Table H.2.PP.Un.GHG.Bar.2015-1. 2015 Proposed Project Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	North In	Volpak to Berth 408	5	3	1.67	3	0.50	4,800	4,000.00	MGO	8.0	0.00636	645.0	0.0890	0.0003	28.4141	0.0039
Barge	North Out	Volpak to Berth 408	5	3	1.67	3.0	0.50	4,800	4,000.00	MGO	8.0	0.00636	645.0	0.0890	0.0003	28.4141	0.0039
														TOTAL	**0.0006**	**56.83**	**0.0078**

Table H.2.PP.Un.GHG.Bar.2015-2. 2015 Proposed Project Tug Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	4,800	0.50	MGO	8.0	0.00636	645.0	0.0890	0.0002	17.05	0.0024
	Maneuvering - Berth to Pilot	1.00	1	4,800	0.50	MGO	8.0	0.00636	645.0	0.0890	0.0002	17.05	0.0024
										TOTAL	**0.0003**	**34.10**	**0.0047**

Table H.2.PP.Un.GHG.Bar.2015-3. 2015 Proposed Project Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	300	1.00	MGO	8.0	0.00636	645.0	0.0890	0.00002	2.13	0.0003
	Maneuvering - Berth to Pilot	1.00	1	300	1.00	MGO	8.0	0.00636	645.0	0.0890	0.00002	2.13	0.0003
										TOTAL	**0.00004**	**4.26**	**0.0006**

Table H.2.PP.Un.GHG.Bar.2015-4. 2015 Proposed Project Summary of Tug Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0003	34.10	0.0047
Tug Assist	Aux Generator	0.00004	4.26	0.0006
	TOTAL	**0.0004**	**38.36**	**0.0053**

Table H.2.PP.Un.GHG.Bar.2015-5. 2015 Proposed Project Summary of Average Daily Unmitigated Vessel GHG Emissions from Barge Fuel Deliveries for OGV.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Barge	0.0006	56.83	0.0078	57
Tug Assistance	0.0004	38.36	0.0053	39
TOTAL	**0.0009**	**95.19**	**0.0131**	**96**

Table H.2.PP.Un.GHG.Bar.2025-1. 2025 Proposed Project Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	North In	Volpak to Berth 408	5	3	1.67	3	0.50	4,800	4,000.00	MGO	12.0	0.00636	645.0	0.0890	0.0004	42.6211	0.0059
Barge	North Out	Volpak to Berth 408	5	3	1.67	3.0	0.50	4,800	4,000.00	MGO	12.0	0.00636	645.0	0.0890	0.0004	42.6211	0.0059
														TOTAL	0.0008	85.24	0.0118

Table H.2.PP.Un.GHG.Bar.2025-2. 2025 Proposed Project Tug Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	4,800	0.50	MGO	12.0	0.00636	645.0	0.0890	0.0003	25.57	0.0035
	Maneuvering - Berth to Pilot	1.00	1	4,800	0.50	MGO	12.0	0.00636	645.0	0.0890	0.0003	25.57	0.0035
										TOTAL	**0.0005**	**51.15**	**0.0071**

Table H.2.PP.Un.GHG.Bar.2025-3. 2025 Proposed Project Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	300	1.00	MGO	12.0	0.00636	645.0	0.0890	0.00003	3.20	0.0004
	Maneuvering - Berth to Pilot	1.00	1	300	1.00	MGO	12.0	0.00636	645.0	0.0890	0.00003	3.20	0.0004
										TOTAL	**0.00006**	**6.39**	**0.0009**

Table H.2.PP.Un.GHG.Bar.2025-4. 2025 Proposed Project Summary of Tug Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0005	51.15	0.0071
Tug Assist	Aux Generator	0.00006	6.39	0.0009
	TOTAL	**0.0006**	**57.54**	**0.0079**

Table H.2.PP.Un.GHG.Bar.2025-5. 2025 Proposed Project Summary of Average Daily Unmitigated Vessel GHG Emissions from Barge Fuel Deliveries for OGV.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Barge	0.0008	85.24	0.0118	86
Tug Assistance	0.0006	57.54	0.0079	58
TOTAL	**0.0014**	**142.78**	**0.0197**	**144**

Table H.2.PP.Un.GHG.Bar.2040-1. 2040 Proposed Project Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	North In	Volpak to Berth 408	5	3	1.67	3	0.50	4,800	4,000.00	MGO	12.0	0.00636	645.0	0.0890	0.0004	42.6211	0.0059
Barge	North Out	Volpak to Berth 408	5	3	1.67	3.0	0.50	4,800	4,000.00	MGO	12.0	0.00636	645.0	0.0890	0.0004	42.6211	0.0059
														TOTAL	0.0008	85.24	0.0118

Table H.2.PP.Un.GHG.Bar.2040-2. 2040 Proposed Project Tug Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	4,800	0.50	MGO	12.0	0.00636	645.0	0.0890	0.0003	25.57	0.0035
	Maneuvering - Berth to Pilot	1.00	1	4,800	0.50	MGO	12.0	0.00636	645.0	0.0890	0.0003	25.57	0.0035
										TOTAL	**0.0005**	**51.15**	**0.0071**

Table H.2.PP.Un.GHG.Bar.2040-3. 2040 Proposed Project Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	300	1.00	MGO	12.0	0.00636	645.0	0.0890	0.00003	3.20	0.0004
	Maneuvering - Berth to Pilot	1.00	1	300	1.00	MGO	12.0	0.00636	645.0	0.0890	0.00003	3.20	0.0004
										TOTAL	**0.00006**	**6.39**	**0.0009**

Table H.2.PP.Un.GHG.Bar.2040-4. 2040 Proposed Project Summary of Tug Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0005	51.15	0.0071
Tug Assist	Aux Generator	0.00006	6.39	0.0009
	TOTAL	**0.0006**	**57.54**	**0.0079**

Table H.2.PP.Un.GHG.Bar.2040-5. 2040 Proposed Project Summary of Average Daily Unmitigated Vessel GHG Emissions from Barge Fuel Deliveries for OGV.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Barge	0.0008	85.24	0.0118	86
Tug Assistance	0.0006	57.54	0.0079	58
TOTAL	**0.0014**	**142.78**	**0.0197**	**144**

Table H.2.PP.Mit.GHG.2010-1. 2010 Proposed Project Main Engines Average Daily Mitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	12	1.83	16.9	0.358	25,400	16,671	26.0	0.0058	588.00	0.0811	0.0031	318.58	0.0439
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	26.0	0.0058	588.00	0.0811	0.0030	304.10	0.0419
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	26.0	0.0058	588.00	0.0811	0.0002	23.16	0.0032
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	26.0	0.00639	647.00	0.0895	0.0000	2.99	0.0004
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0064**	**648.83**	**0.0895**
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	26.0	0.00639	647.00	0.0895	0.0001	13.83	0.0019
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	26.0	0.0058	588.00	0.0811	0.0002	18.72	0.0026
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	26.0	0.0058	588.00	0.0811	0.0030	304.10	0.0419
		Cruising - VSR to CW	22	12	1.83	16.9	0.358	25,400	16,671	26.0	0.0058	588.00	0.0811	0.0031	318.58	0.0439
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0065**	**655.24**	**0.0904**
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	32.0	0.0058	588.00	0.0811	0.0023	232.90	0.0321
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	32.0	0.0058	588.00	0.0811	0.0011	111.38	0.0154
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	32.0	0.0058	588.00	0.0811	0.0002	16.19	0.0022
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	32.0	0.00639	647.00	0.0895	0.0000	2.09	0.0003
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0036**	**362.56**	**0.0500**
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	32.0	0.00639	647.00	0.0895	0.0001	9.67	0.0013
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	32.0	0.0058	588.00	0.0811	0.0001	12.06	0.0017
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	32.0	0.0058	588.00	0.0811	0.0012	126.57	0.0175
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	32.0	0.0058	588.00	0.0811	0.0024	248.08	0.0342
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0039**	**396.39**	**0.0547**
PANAMAX	South In	Cruising - CW to VSR	23	12	1.92	15.8	0.438	10,300	8,649	26	0.0058	588.00	0.0811	0.0016	165.28	0.0228
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	26	0.0058	588.00	0.0811	0.0008	79.05	0.0109
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	26	0.0058	588.00	0.0811	0.0001	11.49	0.0016
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	26	0.00639	647.00	0.0895	0.0000	1.48	0.0002
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0025**	**257.30**	**0.0355**
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	26	0.00639	647.00	0.0895	0.0001	6.86	0.0009
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	26	0.0058	588.00	0.0811	0.0001	8.56	0.0012
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	26	0.0058	588.00	0.0811	0.0009	89.83	0.0124
		Cruising - VSR to CW	24.5	12	2.04	15.8	0.438	10,300	9,213	26	0.0058	588.00	0.0811	0.0017	176.06	0.0243
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0028**	**281.31**	**0.0388**
SUEZMAX	North In	Cruising - CW to VSR	22	12	1.83	17	0.352	16,000	10,317	45	0.0058	588.00	0.0811	0.0034	341.24	0.0471
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	45	0.0058	588.00	0.0811	0.0032	325.73	0.0449
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	45	0.0058	588.00	0.0811	0.0002	24.81	0.0034
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	45	0.00639	647.00	0.0895	0.0000	3.20	0.0004
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0069**	**694.97**	**0.0959**
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	45	0.00639	647.00	0.0895	0.0001	14.82	0.0020
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	45	0.0058	588.00	0.0811	0.0002	20.06	0.0028
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	45	0.0058	588.00	0.0811	0.0032	325.73	0.0449
		Cruising - VSR to CW	22	12	1.83	17	0.352	16,000	10,317	45	0.0058	588.00	0.0811	0.0034	341.24	0.0471
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0069**	**701.84**	**0.0968**
										GRAND TOTAL	**0.1903**	**19288.00**	**2.6624**	**0.0394**	**3998.43**	**0.5515**

Table H.2.PP.Mit.GHG.2010-2. 2010 Proposed Project Auxiliary Generator Average Daily Mitigated GHG Emissions.

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	4.25	3,600	0.280	4,289	26.0	0.0068	690.00	0.0952	0.0009	96.18	0.0133
		Maneuvering	2.00	3,600	0.280	2,016	26.0	0.0068	690.00	0.0952	0.0004	45.21	0.0062
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0014**	**141.39**	**0.0195**
	North Out	Maneuvering	1.50	3,600	0.280	1,512	26.0	0.0068	690.00	0.0952	0.0003	33.91	0.0047
		Cruising	4.13	3,600	0.280	4,159	26.0	0.0068	690.00	0.0952	0.0009	93.27	0.0129
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0013**	**127.18**	**0.0175**
AFRAMAX	South In	Cruising	3.50	3,600	0.280	3,533	32.0	0.0068	690.00	0.0952	0.0010	97.51	0.0135
		Maneuvering	2.00	3,600	0.280	2,016	32.0	0.0068	690.00	0.0952	0.0005	55.64	0.0077
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0015**	**153.15**	**0.0211**
	South Out	Maneuvering	1.50	3,600	0.278	1,501	32.0	0.0068	690.00	0.0952	0.0004	41.43	0.0057
		Cruising	3.58	3,600	0.278	3,586	32.0	0.0068	690.00	0.0952	0.0010	98.98	0.0137
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0014**	**140.41**	**0.0194**
PANAMAX	South In	Cruising	3.50	3,600	0.28	3,533	26	0.0068	690.00	0.0952	0.0008	79.22	0.0109
		Maneuvering	2.00	3,600	0.28	2,016	26	0.0068	690.00	0.0952	0.0004	45.21	0.0062
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0012**	**124.43**	**0.0172**
	South Out	Maneuvering	1.5	3,600	0.28	1,512	26	0.0068	690.00	0.0952	0.0003	33.91	0.0047
		Cruising	3.58	3,600	0.28	3,612	26	0.0068	690.00	0.0952	0.0008	81.00	0.0112
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0011**	**114.91**	**0.0159**
SUEZMAX	North In	Cruising	4.25	3,600	0.28	4,289	45	0.0068	690.00	0.0952	0.0016	166.46	0.0230
		Maneuvering	2.00	3,600	0.28	2,016	45	0.0068	690.00	0.0952	0.0008	78.25	0.0108
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0024**	**244.71**	**0.0338**
	North Out	Maneuvering	1.5	3,600	0.28	1,512	45	0.0068	690.00	0.0952	0.0006	58.68	0.0081
		Cruising	4.13	3,600	0.28	4,159	45	0.0068	690.00	0.0952	0.0016	161.43	0.0223
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0022**	**220.11**	**0.0304**
							GRAND TOTAL	**0.1088**	**11040.00**	**1.5232**	**0.0125**	**1266.28**	**0.1747**

Table H.2.PP.Mit.GHG.2010-3. 2010 Proposed Project Summary of Average Daily Mitigated Vessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0389	3,943.49	0.5439
Cruising	Aux Generator	0.0086	874.04	0.1206
Maneuvering	Main Engines	0.0005	54.9418	0.0076
Maneuvering	Aux Generator	0.0039	392.24	0.0541
Maneuvering	**TOTAL**	**0.0044**	**447.18**	**0.0617**
Propulsion	**TOTAL**	**0.0519**	**5,264.71**	**0.7262**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	1.07E-04	1.08E+01	1.49E-03
Cruising	Aux Generator	2.36E-05	2.39E+00	3.30E-04
Maneuvering	Main Engines	1.49E-06	1.51E-01	2.08E-05
Maneuvering	Aux Generator	1.06E-05	1.07E+00	1.48E-04
Maneuvering	**TOTAL**	**1.21E-05**	**1.23E+00**	**1.69E-04**
Propulsion	**TOTAL**	**1.42E-04**	**1.44E+01**	**1.99E-03**

Table H.2.PP.Mit.GHG.2010-4. 2010 Proposed Project Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	MDO	0.52	102.17	30%	3	50,000	19,591	0.0627	6360.00	0.8770	0.0022	225.48	0.0311
26.0	VLCC	MDO	0.52	80.38	30%	3	90,000	22,541	0.0627	6360.00	0.8770	0.0026	259.42	0.0358
26.0	Panamax	MDO	0.52	59.91	30%	3	35,000	6,533	0.0627	6360.00	0.8770	0.0007	75.19	0.0104
45.0	Suezmax	MDO	0.52	82.85	30%	3	70,000	31,276	0.0627	6360.00	0.8770	0.0035	359.96	0.0496
											TOTAL	**0.0091**	**920.06**	**0.1269**

Table H.2.PP.Mit.GHG.2010-5. 2010 Proposed Project Summary of Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Boiler Warm-up	Boiler	0.0091	920.06	0.1269

Table H.2.PP.Mit.GHG.2010-6. 2010 Proposed Project Berth Operations Average Daily Mitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	Dist at 0.2%S	0.20	3,600	28%	2.5	8.6	140.0	0.0068	690.0	0.0952	0.0007	69.5520	0.0096
26.0	VLCC	2,000,000	Dist at 0.2%S	0.20	3,600	28%	2.5	8.6	140.0	0.0068	690.0	0.0952	0.0006	56.5110	0.0078
26.0	Panamax	350,000	Dist at 0.2%S	0.20	3,600	28%	2.5	8.6	140.0	0.0068	690.0	0.0952	0.0006	56.5110	0.0078
45.0	Suezmax	1,000,000	Dist at 0.2%S	0.20	3,600	28%	2.5	8.6	140.0	0.0068	690.0	0.0952	0.0010	97.8075	0.0135
												TOTAL	**0.0028**	**280.3815**	**0.0387**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	Dist at 0.2%S	0.20	102.17	30%	2.5	50,000	54,420.2	0.0627	6,360.00	0.8770	0.0019	187.9001	0.0259
26.0	VLCC	2,000,000	Dist at 0.2%S	0.20	80.38	30%	2.5	90,000	62,612.9	0.0627	6,360.00	0.8770	0.0021	216.1874	0.0298
26.0	Panamax	350,000	Dist at 0.2%S	0.20	59.91	30%	2.5	35,000	18,148.5	0.0627	6,360.00	0.8770	0.0006	62.6624	0.0086
45.0	Suezmax	1,000,000	Dist at 0.2%S	0.20	82.85	30%	2.5	70,000	86,876.7	0.0627	6,360.00	0.8770	0.0030	299.9644	0.0414
												TOTAL	**0.0076**	**766.7143**	**0.1057**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	Dist at 0.2%S	0.20	3,600	56%	15.0	102.4	140.0	0.0068	690.0	0.0952	0.0082	828.6624	0.1143
26.0	VLCC	2,000,000	Dist at 0.2%S	0.20	3,600	56%	23.2	158.4	140.0	0.0068	690.0	0.0952	0.0103	1,041.3524	0.1437
26.0	Panamax	350,000	Dist at 0.2%S	0.20	3,600	56%	11.0	75.7	140.0	0.0068	690.0	0.0952	0.0049	497.2968	0.0686
45.0	Suezmax	1,000,000	Dist at 0.2%S	0.20	3,600	56%	15.3	105.2	140.0	0.0068	690.0	0.0952	0.0118	1,197.1638	0.1652
												TOTAL	**0.0351**	**3,564.4754**	**0.4918**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	Dist at 0.2%S	0.20	102.17	28.06	15.0	50,000	236,841.0	0.0627	6,360.00	0.8770	0.0269	2,725.8514	0.3759
26.0	VLCC	2,000,000	Dist at 0.2%S	0.20	80.38	28.06	23.2	90,000	378,190.7	0.0627	6,360.00	0.8770	0.0429	4,352.6741	0.6002
26.0	Panamax	350,000	Dist at 0.2%S	0.20	59.91	28.06	11.0	35,000	42,452.5	0.0627	6,360.00	0.8770	0.0048	488.5948	0.0674
45.0	Suezmax	1,000,000	Dist at 0.2%S	0.20	82.85	28.06	15.3	70,000	351,611.7	0.0627	6,360.00	0.8770	0.0399	4,046.7709	0.5580
												TOTAL	**0.1145**	**11,613.8912**	**1.6015**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	Dist at 0.2%S	0.20	3,600	28%	1.0	3.4	140.0	0.0068	690.0	0.0952	0.0003	27.6221	0.0038
26.0	VLCC	2,000,000	Dist at 0.2%S	0.20	3,600	28%	1.0	3.4	140.0	0.0068	690.0	0.0952	0.0002	22.4429	0.0031
26.0	Panamax	350,000	Dist at 0.2%S	0.20	3,600	28%	1.0	3.4	140.0	0.0068	690.0	0.0952	0.0002	22.6044	0.0031
45.0	Suezmax	1,000,000	Dist at 0.2%S	0.20	3,600	28%	1.0	3.4	140.0	0.0068	690.0	0.0952	0.0004	39.1230	0.0054
												TOTAL	**0.0011**	**111.7924**	**0.0154**

Table H.2.PP.Mit.GHG.2010-7. 2010 Proposed Project Summary of Berth Operations Average Daily Mitigated GHG Emissions.
Year 2010 (No AMP)

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Berth Operations	Boiler	0.1221	12380.61	1.7072
Berth Operations	Aux Generator	0.0390	3956.65	0.5459

Table H.2.PP.Mit.GHG.2015-1. 2015 Proposed Project Main Engines Average Daily Mitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	12	1.83	16.9	0.358	25,400	16,671	51.0	0.0058	588.00	0.0811	0.0062	624.91	0.0862
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	51.0	0.0058	588.00	0.0811	0.0059	596.50	0.0823
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	51.0	0.0058	588.00	0.0811	0.0004	45.43	0.0063
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	51.0	0.00639	647.00	0.0895	0.0001	5.86	0.0008
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0126**	**1272.70**	**0.1755**
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	51.0	0.00639	647.00	0.0895	0.0003	27.13	0.0038
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	51.0	0.0058	588.00	0.0811	0.0004	36.73	0.0051
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	51.0	0.0058	588.00	0.0811	0.0059	596.50	0.0823
		Cruising - VSR to CW	22	12	1.83	16.9	0.358	25,400	16,671	51.0	0.0058	588.00	0.0811	0.0062	624.91	0.0862
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0127**	**1285.27**	**0.1773**
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	24.0	0.0058	588.00	0.0811	0.0017	174.67	0.0241
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	24.0	0.0058	588.00	0.0811	0.0008	83.54	0.0115
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	24.0	0.0058	588.00	0.0811	0.0001	12.15	0.0017
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	24.0	0.00639	647.00	0.0895	0.0000	1.57	0.0002
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0027**	**271.92**	**0.0375**
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	24.0	0.00639	647.00	0.0895	0.0001	7.25	0.0010
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	24.0	0.0058	588.00	0.0811	0.0001	9.04	0.0012
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	24.0	0.0058	588.00	0.0811	0.0009	94.93	0.0131
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	24.0	0.0058	588.00	0.0811	0.0018	186.06	0.0257
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0029**	**297.29**	**0.0410**
PANAMAX	South In	Cruising - CW to VSR	23	12	1.92	15.8	0.438	10,300	8,649	12	0.0058	588.00	0.0811	0.0008	76.28	0.0105
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	12	0.0058	588.00	0.0811	0.0004	36.48	0.0050
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	12	0.0058	588.00	0.0811	0.0001	5.30	0.0007
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	12	0.00639	647.00	0.0895	0.0000	0.68	0.0001
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0012**	**118.75**	**0.0164**
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	12	0.00639	647.00	0.0895	0.0000	3.17	0.0004
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	12	0.0058	588.00	0.0811	0.0000	3.95	0.0005
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	12	0.0058	588.00	0.0811	0.0004	41.46	0.0057
		Cruising - VSR to CW	24.5	12	2.04	15.8	0.438	10,300	9,213	12	0.0058	588.00	0.0811	0.0008	81.26	0.0112
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0013**	**129.83**	**0.0179**
SUEZMAX	North In	Cruising - CW to VSR	22	12	1.83	17	0.352	16,000	10,317	60	0.0058	588.00	0.0811	0.0045	454.98	0.0628
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	60	0.0058	588.00	0.0811	0.0043	434.30	0.0599
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	60	0.0058	588.00	0.0811	0.0003	33.08	0.0046
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	60	0.00639	647.00	0.0895	0.0000	4.27	0.0006
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0091**	**926.63**	**0.1278**
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	60	0.00639	647.00	0.0895	0.0002	19.75	0.0027
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	60	0.0058	588.00	0.0811	0.0003	26.74	0.0037
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	60	0.0058	588.00	0.0811	0.0043	434.30	0.0599
		Cruising - VSR to CW	22	12	1.83	17	0.352	16,000	10,317	60	0.0058	588.00	0.0811	0.0045	454.98	0.0628
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0092**	**935.78**	**0.1291**
										GRAND TOTAL	**0.1903**	**19288.00**	**2.6624**	**0.0517**	**5238.19**	**0.7225**

Table H.2.PP.Mit.GHG.2015-2. 2015 Proposed Project Auxiliary Generator Average Daily Mitigated GHG Emissions.

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	4.25	3,600	0.280	4,289	51.0	0.0068	690.00	0.0952	0.0019	188.65	0.0260
		Maneuvering	2.00	3,600	0.280	2,016	51.0	0.0068	690.00	0.0952	0.0009	88.68	0.0122
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0027**	**277.33**	**0.0383**
	North Out	Maneuvering	1.50	3,600	0.280	1,512	51.0	0.0068	690.00	0.0952	0.0007	66.51	0.0092
		Cruising	4.13	3,600	0.280	4,159	51.0	0.0068	690.00	0.0952	0.0018	182.95	0.0252
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0025**	**249.46**	**0.0344**
AFRAMAX	South In	Cruising	3.50	3,600	0.280	3,533	24.0	0.0068	690.00	0.0952	0.0007	73.13	0.0101
		Maneuvering	2.00	3,600	0.280	2,016	24.0	0.0068	690.00	0.0952	0.0004	41.73	0.0058
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0011**	**114.86**	**0.0158**
	South Out	Maneuvering	1.50	3,600	0.278	1,501	24.0	0.0068	690.00	0.0952	0.0003	31.07	0.0043
		Cruising	3.58	3,600	0.278	3,586	24.0	0.0068	690.00	0.0952	0.0007	74.23	0.0102
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0010**	**105.31**	**0.0145**
PANAMAX	South In	Cruising	3.50	3,600	0.28	3,533	12	0.0068	690.00	0.0952	0.0004	36.56	0.0050
		Maneuvering	2.00	3,600	0.28	2,016	12	0.0068	690.00	0.0952	0.0002	20.87	0.0029
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0006**	**57.43**	**0.0079**
	South Out	Maneuvering	1.5	3,600	0.28	1,512	12	0.0068	690.00	0.0952	0.0002	15.65	0.0022
		Cruising	3.58	3,600	0.28	3,612	12	0.0068	690.00	0.0952	0.0004	37.38	0.0052
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0005**	**53.03**	**0.0073**
SUEZMAX	North In	Cruising	4.25	3,600	0.28	4,289	60	0.0068	690.00	0.0952	0.0022	221.95	0.0306
		Maneuvering	2.00	3,600	0.28	2,016	60	0.0068	690.00	0.0952	0.0010	104.33	0.0144
							Total	**0.0136**	**1380.00**	**0.1904**	**0.0032**	**326.27**	**0.0450**
	North Out	Maneuvering	1.5	3,600	0.28	1,512	60	0.0068	690.00	0.0952	0.0008	78.25	0.0108
		Cruising	4.13	3,600	0.28	4,159	60	0.0068	690.00	0.0952	0.0021	215.24	0.0297
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0029**	**293.48**	**0.0405**
							GRAND TOTAL	**0.1088**	**11040.00**	**1.5232**	**0.0146**	**1477.19**	**0.2038**

Table H.2.PP.Mit.GHG.2015-3. 2015 Proposed Project Summary of Average Daily Mitigated Vessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0510	5,169	0.7129
Cruising	Aux Generator	0.0102	1,030	0.1421
Maneuvering	Main Engines	0.0007	70	0.0096
Maneuvering	Aux Generator	0.0044	447	0.0617
Maneuvering	**TOTAL**	**0.0051**	**517**	**0.0713**
Propulsion	**TOTAL**	**0.0662**	**6,715**	**0.9263**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	0.0001	14	0.0020
Cruising	Aux Generator	0.0000	3	0.0004
Maneuvering	Main Engines	0.0000	0	0.0000
Maneuvering	Aux Generator	0.0000	1	0.0002
Maneuvering	**TOTAL**	**0.0000**	**1**	**0.0002**
Propulsion	**TOTAL**	**0.0002**	**18**	**0.0025**

Table H.2.PP.Mit.GHG.2015-4. 2015 Proposed Project Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	Dist at 0.2	0.20	102.17	30%	3	50,000	14,693	0.0627	6,360.00	0.8770	0.0017	169.11	0.0233
51.0	VLCC	Dist at 0.2	0.20	80.38	30%	3	90,000	44,214	0.0627	6,360.00	0.8770	0.0050	508.87	0.0702
12	Panamax	Dist at 0.2	0.20	59.91	30%	3	35,000	2,513	0.0627	6,360.00	0.8770	0.0003	28.92	0.0040
60	Suezmax	Dist at 0.2	0.20	82.85	30%	3	70,000	34,751	0.0627	6,360.00	0.8770	0.0039	399.95	0.0552
							TOTAL		**0.2508**	**25,440.00**	**3.5080**	**0.0109**	**1106.86**	**0.1526**

Table H.2.PP.Mit.GHG.2015-5. 2015 Proposed Project Summary of Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Boiler Warm-up	Boiler	0.0109	1,106.86	0.1526

Table H.2.PP.Mit.GHG.2015-6. 2015 Proposed Project Berth Operations Average Daily Mitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	3,600	28%	2.5	8.5	150	0.0068	690.0	0.0952	0.0005	51.79	0.0071
51.0	VLCC	2,000,000	Dist at 0.2	0.20	3,600	28%	2.5	8.5	150	0.0068	690.0	0.0952	0.0011	110.06	0.0152
12.0	Panamax	350,000	Dist at 0.2	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0003	26.08	0.0036
60.0	Suezmax	1,000,000	Dist at 0.2	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0013	130.41	0.0180
						TOTAL							**0.0031**	**318.34**	**0.0439**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	102.17	30%	2.5	50,000	40,815	0.0627	6,360.0	0.8770	0.0014	140.93	0.0194
51.0	VLCC	2,000,000	Dist at 0.2	0.20	80.38	30%	2.5	90,000	122,818	0.0627	6,360.0	0.8770	0.0042	424.06	0.0585
12.0	Panamax	350,000	Dist at 0.2	0.20	59.91	30%	2.5	35,000	8,376	0.0627	6,360.0	0.8770	0.0003	28.92	0.0040
60.0	Suezmax	1,000,000	Dist at 0.2	0.20	82.85	30%	2.5	70,000	115,836	0.0627	6,360.0	0.8770	0.0039	399.95	0.0552
						TOTAL							**0.0098**	**993.86**	**0.1370**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	3,600	56%	15.0	102.4	140	0.0068	690.0	0.0952	0.0061	621.50	0.0857
51.0	VLCC	2,000,000	Dist at 0.2	0.20	3,600	56%	23.2	158.4	140	0.0068	690.0	0.0952	0.0201	2042.65	0.2818
12.0	Panamax	350,000	Dist at 0.2	0.20	3,600	56%	11.0	75.7	140	0.0068	690.0	0.0952	0.0023	229.52	0.0317
60.0	Suezmax	1,000,000	Dist at 0.2	0.20	3,600	56%	15.3	105.2	140	0.0068	690.0	0.0952	0.0157	1596.22	0.2202
						TOTAL							**0.0442**	**4489.89**	**0.6195**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	102.17	28.06	15.0	50,000	177,631	0.0627	6,360.0	0.8770	0.0202	2044.39	0.2819
51.0	VLCC	2,000,000	Dist at 0.2	0.20	80.38	28.06	23.2	90,000	741,836	0.0627	6,360.0	0.8770	0.0842	8537.94	1.1773
12.0	Panamax	350,000	Dist at 0.2	0.20	59.91	28.06	11.0	35,000	19,593	0.0627	6,360.0	0.8770	0.0022	225.51	0.0311
60.0	Suezmax	1,000,000	Dist at 0.2	0.20	82.85	28.06	15.3	70,000	468,816	0.0627	6,360.0	0.8770	0.0532	5395.69	0.7440
							TOTAL						**0.1597**	**16203.53**	**2.2344**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0002	20.72	0.0029
51.0	VLCC	2,000,000	Dist at 0.2	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0004	44.02	0.0061
12.0	Panamax	350,000	Dist at 0.2	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0001	10.43	0.0014
60.0	Suezmax	1,000,000	Dist at 0.2	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0005	52.16	0.0072
						TOTAL							**0.0013**	**127.34**	**0.0176**

Table H.2.PP.Mit.GHG.2015-7. 2015 Proposed Project Summary of Berth Operations Average Daily Mitigated GHG Emissions.

No AMP

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Berth Operations	Boiler	0.1695	17197.38	2.3714
Berth Operations	Aux Generator	0.0486	4935.5658	0.6810

Mitigated Emissions with AMP - Year 2015

AMP Reduction 15%

Berth Operations	Boiler	0.1695	17197.38	2.3714
Berth Operations	Aux Generator	0.0413	4195.23	0.5788

Table H.2.PP.Mit.GHG.2025-1. 2025 Proposed Project Main Engines Average Daily Mitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	12	1.83	16.9	0.358	25,400	16,671	69.0	0.0058	588.00	0.0811	0.0083	845.46	0.1166
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	69.0	0.0058	588.00	0.0811	0.0080	807.03	0.1113
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	69.0	0.0058	588.00	0.0811	0.0006	61.46	0.0085
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	69.0	0.00639	647.00	0.0895	0.0001	7.93	0.0011
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0170**	**1721.89**	**0.2375**
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	69.0	0.00639	647.00	0.0895	0.0004	36.71	0.0051
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	69.0	0.0058	588.00	0.0811	0.0005	49.69	0.0069
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	69.0	0.0058	588.00	0.0811	0.0080	807.03	0.1113
		Cruising - VSR to CW	22	12	1.83	16.9	0.358	25,400	16,671	69.0	0.0058	588.00	0.0811	0.0083	845.46	0.1166
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0172**	**1738.90**	**0.2399**
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	36.0	0.0058	588.00	0.0811	0.0026	262.01	0.0361
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	36.0	0.0058	588.00	0.0811	0.0012	125.31	0.0173
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	36.0	0.0058	588.00	0.0811	0.0002	18.22	0.0025
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	36.0	0.00639	647.00	0.0895	0.0000	2.35	0.0003
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0040**	**407.88**	**0.0563**
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	36.0	0.00639	647.00	0.0895	0.0001	10.88	0.0015
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	36.0	0.0058	588.00	0.0811	0.0001	13.57	0.0019
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	36.0	0.0058	588.00	0.0811	0.0014	142.40	0.0196
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	36.0	0.0058	588.00	0.0811	0.0028	279.09	0.0385
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0044**	**445.94**	**0.0615**
PANAMAX	South In	Cruising - CW to VSR	23	12	1.92	15.8	0.438	10,300	8,649	18	0.0058	588.00	0.0811	0.0011	114.42	0.0158
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	18	0.0058	588.00	0.0811	0.0005	54.72	0.0075
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	18	0.0058	588.00	0.0811	0.0001	7.96	0.0011
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	18	0.00639	647.00	0.0895	0.0000	1.03	0.0001
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0018**	**178.13**	**0.0246**
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	18	0.00639	647.00	0.0895	0.0000	4.75	0.0007
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	18	0.0058	588.00	0.0811	0.0001	5.93	0.0008
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	18	0.0058	588.00	0.0811	0.0006	62.19	0.0086
		Cruising - VSR to CW	24.5	12	2.04	15.8	0.438	10,300	9,213	18	0.0058	588.00	0.0811	0.0012	121.89	0.0168
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0019**	**194.75**	**0.0269**
SUEZMAX	North In	Cruising - CW to VSR	22	12	1.83	17	0.352	16,000	10,317	78	0.0058	588.00	0.0811	0.0058	591.48	0.0816
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	78	0.0058	588.00	0.0811	0.0056	564.59	0.0779
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	78	0.0058	588.00	0.0811	0.0004	43.00	0.0059
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	78	0.00639	647.00	0.0895	0.0001	5.55	0.0008
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0119**	**1204.62**	**0.1661**
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	78	0.00639	647.00	0.0895	0.0003	25.68	0.0036
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	78	0.0058	588.00	0.0811	0.0003	34.76	0.0048
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	78	0.0058	588.00	0.0811	0.0056	564.59	0.0779
		Cruising - VSR to CW	22	12	1.83	17	0.352	16,000	10,317	78	0.0058	588.00	0.0811	0.0058	591.48	0.0816
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0120**	**1216.52**	**0.1678**
										GRAND TOTAL	**0.1903**	**19288.00**	**2.6624**	**0.0701**	**7108.63**	**0.9805**

Table H.2.PP.Mit.GHG.2025-2. 2025 Proposed Project Auxiliary Generator Average Daily Mitigated GHG Emissions.

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	4.25	3,600	0.280	4,289	69.0	0.0068	690.00	0.0952	0.0025	255.24	0.0352
		Maneuvering	2.00	3,600	0.280	2,016	69.0	0.0068	690.00	0.0952	0.0012	119.98	0.0166
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0037**	**375.21**	**0.0518**
	North Out	Maneuvering	1.50	3,600	0.280	1,512	69.0	0.0068	690.00	0.0952	0.0009	89.98	0.0124
		Cruising	4.13	3,600	0.280	4,159	69.0	0.0068	690.00	0.0952	0.0024	247.52	0.0342
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0033**	**337.51**	**0.0466**
AFRAMAX	South In	Cruising	3.50	3,600	0.280	3,533	36.0	0.0068	690.00	0.0952	0.0011	109.69	0.0151
		Maneuvering	2.00	3,600	0.280	2,016	36.0	0.0068	690.00	0.0952	0.0006	62.60	0.0086
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0017**	**172.29**	**0.0238**
	South Out	Maneuvering	1.50	3,600	0.278	1,501	36.0	0.0068	690.00	0.0952	0.0005	46.61	0.0064
		Cruising	3.58	3,600	0.278	3,586	36.0	0.0068	690.00	0.0952	0.0011	111.35	0.0154
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0016**	**157.96**	**0.0218**
PANAMAX	South In	Cruising	3.50	3,600	0.28	3,533	18	0.0068	690.00	0.0952	0.0005	54.85	0.0076
		Maneuvering	2.00	3,600	0.28	2,016	18	0.0068	690.00	0.0952	0.0003	31.30	0.0043
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0008**	**86.15**	**0.0119**
	South Out	Maneuvering	1.5	3,600	0.28	1,512	18	0.0068	690.00	0.0952	0.0002	23.47	0.0032
		Cruising	3.58	3,600	0.28	3,612	18	0.0068	690.00	0.0952	0.0006	56.08	0.0077
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0008**	**79.55**	**0.0110**
SUEZMAX	North In	Cruising	4.25	3,600	0.28	4,289	78	0.0068	690.00	0.0952	0.0028	288.53	0.0398
		Maneuvering	2.00	3,600	0.28	2,016	78	0.0068	690.00	0.0952	0.0013	135.63	0.0187
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0042**	**424.16**	**0.0585**
	North Out	Maneuvering	1.5	3,600	0.28	1,512	78	0.0068	690.00	0.0952	0.0010	101.72	0.0140
		Cruising	4.13	3,600	0.28	4,159	78	0.0068	690.00	0.0952	0.0028	279.81	0.0386
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0038**	**381.53**	**0.0526**
							GRAND TOTAL	**0.1088**	**11040.00**	**1.5232**	**0.0199**	**2014.36**	**0.2779**

Table H.2.PP.Mit.GHG.2025-3. 2025 Proposed Project Summary of Average Daily Mitigated Vessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0692	7013.76	0.9674
Cruising	Aux Generator	0.0138	1403.07	0.1936
Maneuvering	Main Engines	0.0009	94.87	0.0131
Maneuvering	Aux Generator	0.0060	611.29	0.0843
Maneuvering	**TOTAL**	**0.0070**	**706.16**	**0.0975**
Propulsion	**TOTAL**	**0.0900**	**9,123**	**1.2584**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	1.90E-04	1.92E+01	2.65E-03
Cruising	Aux Generator	3.79E-05	3.84E+00	5.30E-04
Maneuvering	Main Engines	2.57E-06	2.60E-01	3.60E-05
Maneuvering	Aux Generator	1.65E-05	1.67E+00	2.31E-04
Maneuvering	**TOTAL**	**1.91E-05**	**1.93E+00**	**2.67E-04**
Propulsion	**TOTAL**	**2.46E-04**	**2.50E+01**	**3.45E-03**

Table H.2.PP.Mit.GHG.2025-4. 2025 Proposed Project Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	0.20	102.17	30%	3	50,000	22,040	0.0559	6,596.00	0.8390	0.0022	263.08	0.0335
69.0	VLCC	0.20	80.38	30%	3	90,000	59,819	0.0559	6,596.00	0.8390	0.0061	714.02	0.0908
18	Panamax	0.20	59.91	30%	3	35,000	3,769	0.0559	6,596.00	0.8390	0.0004	44.99	0.0057
78	Suezmax	0.20	82.85	30%	3	70,000	45,176	0.0559	6,596.00	0.8390	0.0046	539.23	0.0686
						TOTAL		**0.2236**	**26,384.00**	**3.3560**	**0.0132**	**1561.32**	**0.1986**

Table H.2.PP.Mit.GHG.2025-5. 2025 Proposed Project Summary of Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Boiler Warm-up	Boiler	0.0132	1,561.32	0.1986

Table H.2.PP.Mit.GHG.2025-6. 2025 Proposed Project Berth Operations Average Daily Mitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	Dist at 0.2	0.20	3,600	28%	2.5	8.5	150	0.0068	690.0	0.0952	0.0008	77.69	0.0107
69.0	VLCC	########	Dist at 0.2	0.20	3,600	28%	2.5	8.5	150	0.0068	690.0	0.0952	0.0015	148.90	0.0205
18.0	Panamax	350,000	Dist at 0.2	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0004	39.12	0.0054
78.0	Suezmax	########	Dist at 0.2	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0017	169.53	0.0234
						TOTAL							**0.0043**	**435.24**	**0.0601**

Auxiliary Generator Usage per Ship Visit

Shipcalls (vessels/yr)	Vessel Type	Auxiliary kW per Vessel	Load Factor	Hours/visit	kW-Hrs/Visit	AMP Reduction	AMPed kW-Hr per year
36.0	Aframax	3,600	28%	2.5	9,000	0.4	194,400
69.0	VLCC	3,600	28%	2.5	9,000	0.4	372,600
18.0	Panamax	3,600	28%	2.5	9,000	0.4	97,200
78.0	Suezmax	3,600	28%	2.5	9,000	0.4	421,200
						TOTAL AMPed kW-Hr per year	**1,085,400**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	Dist at 0.2	0.20	102.17	30%	2.5	50,000	61,223	0.0627	6,360.0	0.8770	0.0021	211.39	0.0291
69.0	VLCC	########	Dist at 0.2	0.20	80.38	30%	2.5	90,000	166,165	0.0627	6,360.0	0.8770	0.0057	573.73	0.0791
18.0	Panamax	350,000	Dist at 0.2	0.20	59.91	30%	2.5	35,000	12,564	0.0627	6,360.0	0.8770	0.0004	43.38	0.0060
78.0	Suezmax	########	Dist at 0.2	0.20	82.85	30%	2.5	70,000	150,586	0.0627	6,360.0	0.8770	0.0051	519.94	0.0717
						TOTAL							**0.0133**	**1348.44**	**0.1859**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	Dist at 0.2	0.20	3,600	56%	15.0	102.4	140	0.0068	690.0	0.0952	0.0092	932.25	0.1286
69.0	VLCC	########	Dist at 0.2	0.20	3,600	56%	23.2	158.4	140	0.0068	690.0	0.0952	0.0272	2763.59	0.3813
18.0	Panamax	350,000	Dist at 0.2	0.20	3,600	56%	11.0	75.7	140	0.0068	690.0	0.0952	0.0034	344.28	0.0475
78.0	Suezmax	########	Dist at 0.2	0.20	3,600	56%	15.3	105.2	140	0.0068	690.0	0.0952	0.0205	2075.08	0.2863
						TOTAL							**0.0603**	**6115.20**	**0.8437**

Auxiliary Generator Usage per Ship Visit

Shipcalls (vessels/yr)	Vessel Type	Auxiliary kW per Vessel	Load Factor	Hours/visit	kW-Hrs/Visit	AMP Reduction	AMPed kW-Hr per year
36.0	Aframax	3,600	56%	15.0	54,000	0.4	1,166,400
69.0	VLCC	3,600	56%	23.2	83,520	0.4	3,457,728
18.0	Panamax	3,600	56%	11.0	39,600	0.4	427,680
78.0	Suezmax	3,600	56%	15.3	55,080	0.4	2,577,744
						TOTAL AMPed kW-Hr per year	**7,629,552**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	Dist at 0.2	0.20	102.17	28.06	15.0	50,000	266,446	0.0627	6,360.0	0.8770	0.0302	3066.58	0.4229
69.0	VLCC	########	Dist at 0.2	0.20	80.38	28.06	23.2	90,000	1,003,660	0.0627	6,360.0	0.8770	0.1139	11551.33	1.5928
18.0	Panamax	350,000	Dist at 0.2	0.20	59.91	28.06	11.0	35,000	29,390	0.0627	6,360.0	0.8770	0.0033	338.26	0.0466
78.0	Suezmax	########	Dist at 0.2	0.20	82.85	28.06	15.3	70,000	609,460	0.0627	6,360.0	0.8770	0.0692	7014.40	0.9672
						TOTAL							**0.2166**	**21970.57**	**3.0296**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	Dist at 0.2	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0003	31.07	0.0043
69.0	VLCC	########	Dist at 0.2	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0006	59.56	0.0082
18.0	Panamax	350,000	Dist at 0.2	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0002	15.65	0.0022
78.0	Suezmax	########	Dist at 0.2	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0007	67.81	0.0094
						TOTAL							**0.0017**	**174.10**	**0.0240**

Auxiliary Generator Usage per Ship Visit

Shipcalls (vessels/yr)	Vessel Type	Auxiliary kW per Vessel	Load Factor	Hours/visit	kW-Hrs/Visit	AMP Reduction	AMPed kW-Hr per year
36.0	Aframax	3,600	28%	1.0	3,600	0.4	77,760
69.0	VLCC	3,600	28%	1.0	3,600	0.4	149,040
18.0	Panamax	3,600	28%	1.0	3,600	0.4	38,880
78.0	Suezmax	3,600	28%	1.0	3,600	0.4	168,480
						TOTAL AMPed kW-Hr per year	**434,160**
						Total AMPed kW-Hr per year	**9,149,112**

GHG Emissions from AMPed Electricity

	CO_2	CH_4	N_2O
	Emission Factors		
Lb/MW-Hrs	804.54	0.0037	0.01
Project Year	*Pounds Per Year*		
2010	**7,360,827**	**34**	**61**

Table H.2.PP.Mit.GHG.2025-7. 2025 Proposed Project Summary of Berth Operations Average Daily Mitigated GHG Emissions.

No AMP

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Berth Operations	Boiler	0.2299	23319.01	3.2155
Berth Operations	Aux Generator	0.0663	6724.5413	0.9278

Mitigated Emissions with AMP - Year 2025

AMP Reduction **40%**

Berth Operations	Boiler	0.2299	23319.01	3.2155
Berth Operations	Aux Generator	0.0398	4034.72	0.5567

Table H.2.PP.Mit.GHG.2040-1. 2040 Proposed Project Main Engines Average Daily Mitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	12	1.83	16.9	0.358	25,400	16,671	69.0	0.0058	588.00	0.0811	0.0083	845.46	0.1166
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	69.0	0.0058	588.00	0.0811	0.0080	807.03	0.1113
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	69.0	0.0058	588.00	0.0811	0.0006	61.46	0.0085
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	69.0	0.00639	647.00	0.0895	0.0001	7.93	0.0011
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0170**	**1721.89**	**0.2375**
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	69.0	0.00639	647.00	0.0895	0.0004	36.71	0.0051
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	69.0	0.0058	588.00	0.0811	0.0005	49.69	0.0069
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	69.0	0.0058	588.00	0.0811	0.0080	807.03	0.1113
		Cruising - VSR to CW	22	12	1.83	16.9	0.358	25,400	16,671	69.0	0.0058	588.00	0.0811	0.0083	845.46	0.1166
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0172**	**1738.90**	**0.2399**
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	36.0	0.0058	588.00	0.0811	0.0026	262.01	0.0361
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	36.0	0.0058	588.00	0.0811	0.0012	125.31	0.0173
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	36.0	0.0058	588.00	0.0811	0.0002	18.22	0.0025
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	36.0	0.00639	647.00	0.0895	0.0000	2.35	0.0003
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0040**	**407.88**	**0.0563**
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	36.0	0.00639	647.00	0.0895	0.0001	10.88	0.0015
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	36.0	0.0058	588.00	0.0811	0.0001	13.57	0.0019
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	36.0	0.0058	588.00	0.0811	0.0014	142.40	0.0196
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	36.0	0.0058	588.00	0.0811	0.0028	279.09	0.0385
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0044**	**445.94**	**0.0615**
PANAMAX	South In	Cruising - CW to VSR	23	12	1.92	15.8	0.438	10,300	8,649	18	0.0058	588.00	0.0811	0.0011	114.42	0.0158
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	18	0.0058	588.00	0.0811	0.0005	54.72	0.0075
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	18	0.0058	588.00	0.0811	0.0001	7.96	0.0011
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	18	0.00639	647.00	0.0895	0.0000	1.03	0.0001
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0018**	**178.13**	**0.0246**
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	18	0.00639	647.00	0.0895	0.0000	4.75	0.0007
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	18	0.0058	588.00	0.0811	0.0001	5.93	0.0008
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	18	0.0058	588.00	0.0811	0.0006	62.19	0.0086
		Cruising - VSR to CW	24.5	12	2.04	15.8	0.438	10,300	9,213	18	0.0058	588.00	0.0811	0.0012	121.89	0.0168
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0019**	**194.75**	**0.0269**
SUEZMAX	North In	Cruising - CW to VSR	22	12	1.83	17	0.352	16,000	10,317	78	0.0058	588.00	0.0811	0.0058	591.48	0.0816
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	78	0.0058	588.00	0.0811	0.0056	564.59	0.0779
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	78	0.0058	588.00	0.0811	0.0004	43.00	0.0059
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	78	0.00639	647.00	0.0895	0.0001	5.55	0.0008
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0119**	**1204.62**	**0.1661**
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	78	0.00639	647.00	0.0895	0.0003	25.68	0.0036
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	78	0.0058	588.00	0.0811	0.0003	34.76	0.0048
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	78	0.0058	588.00	0.0811	0.0056	564.59	0.0779
		Cruising - VSR to CW	22	12	1.83	17	0.352	16,000	10,317	78	0.0058	588.00	0.0811	0.0058	591.48	0.0816
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0120**	**1216.52**	**0.1678**
										GRAND TOTAL	**0.1903**	**19288.00**	**2.6624**	**0.0701**	**7108.63**	**0.9805**

Table H.2.PP.Mit.GHG.2040-2. 2040 Proposed Project Auxiliary Generator Average Daily Mitigated GHG Emissions.

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	4.25	3,600	0.280	4,289	69.0	0.0068	690.00	0.0952	0.0025	255.24	0.0352
		Maneuvering	2.00	3,600	0.280	2,016	69.0	0.0068	690.00	0.0952	0.0012	119.98	0.0166
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0037**	**375.21**	**0.0518**
	North Out	Maneuvering	1.50	3,600	0.280	1,512	69.0	0.0068	690.00	0.0952	0.0009	89.98	0.0124
		Cruising	4.13	3,600	0.280	4,159	69.0	0.0068	690.00	0.0952	0.0024	247.52	0.0342
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0033**	**337.51**	**0.0466**
AFRAMAX	South In	Cruising	3.50	3,600	0.280	3,533	36.0	0.0068	690.00	0.0952	0.0011	109.69	0.0151
		Maneuvering	2.00	3,600	0.280	2,016	36.0	0.0068	690.00	0.0952	0.0006	62.60	0.0086
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0017**	**172.29**	**0.0238**
	South Out	Maneuvering	1.50	3,600	0.278	1,501	36.0	0.0068	690.00	0.0952	0.0005	46.61	0.0064
		Cruising	3.58	3,600	0.278	3,586	36.0	0.0068	690.00	0.0952	0.0011	111.35	0.0154
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0016**	**157.96**	**0.0218**
PANAMAX	South In	Cruising	3.50	3,600	0.28	3,533	18	0.0068	690.00	0.0952	0.0005	54.85	0.0076
		Maneuvering	2.00	3,600	0.28	2,016	18	0.0068	690.00	0.0952	0.0003	31.30	0.0043
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0008**	**86.15**	**0.0119**
	South Out	Maneuvering	1.5	3,600	0.28	1,512	18	0.0068	690.00	0.0952	0.0002	23.47	0.0032
		Cruising	3.58	3,600	0.28	3,612	18	0.0068	690.00	0.0952	0.0006	56.08	0.0077
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0008**	**79.55**	**0.0110**
SUEZMAX	North In	Cruising	4.25	3,600	0.28	4,289	78	0.0068	690.00	0.0952	0.0028	288.53	0.0398
		Maneuvering	2.00	3,600	0.28	2,016	78	0.0068	690.00	0.0952	0.0013	135.63	0.0187
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0042**	**424.16**	**0.0585**
	North Out	Maneuvering	1.5	3,600	0.28	1,512	78	0.0068	690.00	0.0952	0.0010	101.72	0.0140
		Cruising	4.13	3,600	0.28	4,159	78	0.0068	690.00	0.0952	0.0028	279.81	0.0386
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0038**	**381.53**	**0.0526**
							GRAND TOTAL	**0.1088**	**11040.00**	**1.5232**	**0.0199**	**2014.36**	**0.2779**

Table H.2.PP.Mit.GHG.2040-3. 2040 Proposed Project Summary of Average Daily Mitigated Vessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0692	7013.76	0.9674
Cruising	Aux Generator	0.0138	1403.07	0.1936
Maneuvering	Main Engines	0.0009	94.87	0.0131
Maneuvering	Aux Generator	0.0060	611.29	0.0843
Maneuvering	**TOTAL**	**0.0070**	**706.16**	**0.0975**
Propulsion	**TOTAL**	**0.0900**	**9122.98**	**1.2584**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	1.90E-04	1.92E+01	2.65E-03
Cruising	Aux Generator	3.79E-05	3.84E+00	5.30E-04
Maneuvering	Main Engines	2.57E-06	2.60E-01	3.60E-05
Maneuvering	Aux Generator	1.65E-05	1.67E+00	2.31E-04
Maneuvering	**TOTAL**	**1.91E-05**	**1.93E+00**	**2.67E-04**
Propulsion	**TOTAL**	**2.46E-04**	**2.50E+01**	**3.45E-03**

Table H.2.PP.Mit.GHG.2040-4. 2040 Proposed Project Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	0.20	102.17	30%	3	50,000	22,040	0.0068	690.00	0.0952	0.0003	27.52	0.0038
69.0	VLCC	0.20	80.38	30%	3	90,000	59,819	0.0068	690.00	0.0952	0.0007	74.69	0.0103
18	Panamax	0.20	59.91	30%	3	35,000	3,769	0.0068	690.00	0.0952	0.0000	4.71	0.0006
78	Suezmax	0.20	82.85	30%	3	70,000	45,176	0.0068	690.00	0.0952	0.0006	56.41	0.0078
						TOTAL		**0.0272**	**2,760.00**	**0.3808**	**0.0016**	**163.33**	**0.0225**

Table H.2.PP.Mit.GHG.2040-5. 2040 Proposed Project Summary of Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Boiler Warm-up	Boiler	0.0016	163.33	0.0225

Table H.2.PP.Mit.GHG.2040-6. 2040 Proposed Project Berth Operations Average Daily Mitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0008	78.25	0.0108
69.0	VLCC	2,000,000	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0015	149.97	0.0207
18.0	Panamax	350,000	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0004	39.12	0.0054
78.0	Suezmax	1,000,000	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0017	169.53	0.0234
					TOTAL							**0.0043**	**436.87**	**0.0603**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	0.20	102.17	30%	2.5	50,000	61,223	0.0627	6,360.0	0.8770	0.0021	211.39	0.0291
69.0	VLCC	2,000,000	0.20	80.38	30%	2.5	90,000	166,165	0.0627	6,360.0	0.8770	0.0057	573.73	0.0791
18.0	Panamax	350,000	0.20	59.91	30%	2.5	35,000	12,564	0.0627	6,360.0	0.8770	0.0004	43.38	0.0060
78.0	Suezmax	1,000,000	0.20	82.85	30%	2.5	70,000	150,586	0.0627	6,360.0	0.8770	0.0051	519.94	0.0717
					TOTAL							**0.0133**	**1348.44**	**0.1859**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	0.20	3,600	56%	15.0	103.2	140	0.0068	690.0	0.0952	0.0093	938.95	0.1295
69.0	VLCC	2,000,000	0.20	3,600	56%	23.2	159.6	140	0.0068	690.0	0.0952	0.0274	2783.47	0.3840
18.0	Panamax	350,000	0.20	3,600	56%	11.0	75.7	140	0.0068	690.0	0.0952	0.0034	344.28	0.0475
78.0	Suezmax	1,000,000	0.20	3,600	56%	15.3	105.2	140	0.0068	690.0	0.0952	0.0205	2075.08	0.2863
					TOTAL							**0.0605**	**6141.79**	**0.8474**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	0.20	102.17	28.06	15.0	50,000	266,446	0.0627	6,360.0	0.8770	0.0302	3066.58	0.4229
69.0	VLCC	2,000,000	0.20	80.38	28.06	23.2	90,000	1,003,660	0.0627	6,360.0	0.8770	0.1139	11551.33	1.5928
18.0	Panamax	350,000	0.20	59.91	28.06	11.0	35,000	29,390	0.0627	6,360.0	0.8770	0.0033	338.26	0.0466
78.0	Suezmax	1,000,000	0.20	82.85	28.06	15.3	70,000	609,460	0.0627	6,360.0	0.8770	0.0692	7014.40	0.9672
					TOTAL							**0.2166**	**21970.57**	**3.0296**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
36.0	Aframax	700,000	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0003	31.30	0.0043
69.0	VLCC	2,000,000	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0006	59.99	0.0083
18.0	Panamax	350,000	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0002	15.65	0.0022
78.0	Suezmax	1,000,000	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0007	67.81	0.0094
					TOTAL							**0.0017**	**174.75**	**0.0241**

Table H.2.PP.Mit.GHG.2040-7. 2040 Proposed Project Summary of Berth Operations Average Daily Mitigated GHG Emissions.

No AMP

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Berth Operations	Boiler	0.2299	23319.01	3.2155
Berth Operations	Aux Generator	0.0666	6753.41	0.9318

Mitigated Emissions with AMP - Year 204(

AMP Reduction 70%

Berth Operations	Boiler	0.2299	23319.01	3.2155
Berth Operations	Aux Generator	0.0200	2026.02	0.2795

Table H.2.NFA/NPA.BP.GHG.2010-1. 2010 No Federal Action/No Project Alternative Main Engines Average Daily GHG Emissions (BP).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	29	0.00545	620.00	0.0818	0.0020	222.55	0.0294
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	29	0.00545	620.00	0.0818	0.0009	106.44	0.0140
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	29	0.00545	620.00	0.0818	0.0001	15.47	0.0020
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	29	0.00601	682.00	0.0902	0.0000	2.00	0.0003
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	29	0.00601	682.00	0.0902	0.0001	9.24	0.0012
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	29	0.00545	620.00	0.0811	0.0001	11.52	0.0015
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	29	0.00545	620.00	0.0811	0.0011	120.95	0.0158
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	29	0.00545	620.00	0.0811	0.0021	237.06	0.0310
										TOTAL	**0**	**5,084**	**1**	**0.0064**	**725.23**	**0.0953**

Table H.2.NFA/NPA.BP.GHG.2010-2. 2010 No Federal Action/No Project Alternative Auxiliary Generator Average Daily Unmitigated Emissions (BP).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising	3.50	3,600	0.28	3,533	29	0.00635	722.00	0.0952	0.0008	92.4622	0.0122
		Maneuvering	2.00	3,600	0.28	2,016	29	0.00635	722.00	0.0952	0.0005	52.7638	0.0070
	South Out	Maneuvering	1.5	3,600	0.28	1,512	29	0.00635	722.00	0.0952	0.0003	39.5728	0.0052
		Cruising	3.50	3,600	0.28	3,528	29	0.00635	722.00	0.0952	0.0008	92.3366	0.0122
							TOTAL	**0**	**2,888**	**0**	**0.0024**	**277.14**	**0.0365**

Table H.2.NFA/NPA.BP.GHG.2010-3. 2010 No Federal Action/No Project Alternative Boiler Warm-Up Average Daily GHG Emissions (BP).

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
29.0	Aframax	0.20	102.17	30%	3	50,000	17,754	0.0559	6,596.00	0.8390	0.00180	211.91552	0.02696
						TOTAL		**0**	**6,596**	**1**	**0.00180**	**211.92**	**0.0270**

Table H.2.NFA/NPA.BP.GHG.2010-4. 2010 No Federal Action/No Project Alternative Berth Operations Average Daily GHG Emissions (BP).

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
29.0	Aframax	400,000	0.20	3,600	28%	2.5	0.0064	722.0	0.0952	0.00058	65.95	0.0087
AMP Reduction		0%										
					TOTAL		**0**	**722**	**0**	**0.00058**	**65.95**	**0.0087**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
29.0	Aframax	400,000	0.20	102.17	30%	2.5	50,000	49,316	0.0559	6,596.0	0.8390	0.00150	176.60	0.02246
					TOTAL				**0.0559**	**6,596.00**	**0.8390**	**0.00150**	**176.60**	**0.0225**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
29.0	Aframax	400,000	0.20	3,600	56%	15.0	0.0064	722.00	0.0952	0.0070	791.4564	0.1044
AMP Reduction		0%										
					TOTAL		**0.0064**	**722.00**	**0.0952**	**0.0070**	**791.46**	**0.1044**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
29.0	Aframax	400,000	0.20	102.17	28.06	15.0	50,000	214,633	0.0559	6,596.00	0.8390	0.0217	2,561.92	0.3259
					TOTAL				**0**	**6,596**	**1**	**0.0217**	**2,561.92**	**0.3259**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
29.0	Aframax	400,000	0.20	3,600	28%	1.0	0.0064	722.00	0.0952	0.00023	26.38188	0.00348
AMP Reduction		0%										
					TOTAL		**0.0064**	**722.00**	**0.0952**	**0.00023**	**26.38**	**0.0035**

Table H.2.NFA/NPA.BP.GHG.2010-5.
2010 No Federal Action/No Project Alternative Summary of Berth Operations Average Daily GHG Emissions (BP).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0063	713.9929	0.0938
Cruising	Aux Generator	0.0016	184.7988	0.0244
Maneuvering	Main Engines	0.0001	11.2349	0.0015
Maneuvering	Aux Generator	0.0008	92.3366	0.0122
Boiler Warm-up	Boiler	0.0018	211.9155	0.0270
Berth Operations	Boiler	0.0232	2738.5126	0.3483
Berth Operations	Aux Generator	0.0078	883.7930	0.1165
Propulsion	TOTAL	0.0088	1002.36	0.1318
Non-Propulsion	TOTAL	0.0328	3834.22	0.4918
Total Emissions		**0.0416**	**4836.58**	**0.6236**

Mode	Equipment	N_2O Emissions (tons/day	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	0.0000	1.96	0.0003
Cruising	Aux Generator	0.0000	0.51	0.0001
Maneuvering	Main Engines	0.0000	0.03	0.0000
Maneuvering	Aux Generator	0.0000	0.25	0.0000
Boiler Warm-up	Boiler	0.0000	0.58	0.0001
Berth Operations	Boiler	0.0001	7.50	0.0010
Berth Operations	Aux Generator	0.0000	2.42	0.0003
Propulsion	TOTAL	0.0000	2.75	0.0004
Non-Propulsion	TOTAL	0.0001	10.50	0.0013
Total Emissions		**0.0001**	**13.25**	**0.0017**

Table H.2.NFA/NPA.BP.GHG.2010-6. 2010 No Federal Action/No Project Alternative Tug Main Engines Average Daily GHG Emissions (BP)

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	29.0	0.00636	645.0	0.0890	0.0006	56.1150	0.0077
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	29.0	0.00636	645.0	0.0890	0.0006	56.1150	0.0077
								TOTAL				**0.0011**	**112.2300**	**0.0155**

Table H.2.NFA/NPA.BP.GHG.2010-7. 2010 No Federal Action/No Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated Emissions (BP).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	29.0	0.0068	690.0	0.0952	0.00007	7.50375	0.00104
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	29.0	0.0068	690.0	0.0952	0.00007	7.50375	0.00104
								TOTAL				**0.00015**	**15.01**	**0.00207**

Table H.2.NFA/NPA.BP.GHG.2010-8.
2010 No Federal Action/No Project Alternative Summary of Tug Average Daily GHG Emissions (BP)

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0011	112.2300	0.0155
Tug Assist	Aux Generator	0.00015	15.00750	0.00207
	TOTAL	**0.0013**	**127.24**	**0.0176**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Tug Assist	Main Engines	3.03E-06	3.07E-01	4.24E-05
Tug Assist	Aux Generator	4.05E-07	4.11E-02	5.67E-06
	TOTAL	**3.44E-06**	**3.49E-01**	**4.81E-05**

Table H.2.NFA/NPA.BP.GHG.2010-12. 2010 No Federal Action/No Project Alternative BP Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0088	1,002.36	0.1318	1007.86
Tanker Hoteling	0.0078	883.79	0.1165	888.67
Offloading Emissions	0.0232	2,738.51	0.3483	2753.02
Transiting Operations	0.0018	211.92	0.0270	213.04
Tug Assistance	0.0013	127.24	0.0176	128.00
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.0165	8,722.23	0.9750	8747.83
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.0594**	**13,686.05**	**1.6162**	**13738.41**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	2.41E-05	2.75	3.61E-04	2.76
Tanker Hoteling	2.15E-05	2.42	3.19E-04	2.43
Offloading Emissions	6.36E-05	7.50	9.54E-04	7.54
Transiting Operations	4.92E-06	0.58	7.39E-05	0.58
Tug Assistance	3.44E-06	0.35	4.81E-05	0.35
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	4.53E-05	23.90	2.67E-03	23.97
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**1.63E-04**	**37.50**	**4.43E-03**	**37.64**

Table H.2.NFA/NPA.Ts.GHG.2010-1. 2010 No Federal Action/No Project Alternative Main Engines Average Daily GHG Emissions (Tesoro).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	75	0.0058	588.00	0.0811	0.0054	545.85	0.0753
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	75	0.0058	588.00	0.0811	0.0026	261.06	0.0360
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	75	0.0058	588.00	0.0811	0.0004	37.96	0.0052
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	75	0.0064	647.00	0.0895	0.0000	4.90	0.0007
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	75	0.0064	647.00	0.0895	0.0002	22.67	0.0031
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	75	0.0058	588.00	0.0811	0.0003	28.26	0.0039
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	75	0.0058	588.00	0.0811	0.0029	296.66	0.0409
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	75	0.0058	588.00	0.0811	0.0057	581.45	0.0802
										TOTAL	**0**	**4,822**	**1**	**0.0175**	**1,778.79**	**0.2454**

Table H.2.NFA/NPA.Ts.GHG.2010-2. 2010 No Federal Action/No Project Alternative Auxiliary Generator Average Daily Unmitigated Emissions (Tesoro).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising	3.50	3,600	0.28	3,533	75	0.0068	690.00	0.0952	0.0023	228.5280	0.0315
		Maneuvering	2.00	3,600	0.28	2,016	75	0.0068	690.00	0.0952	0.0013	130.4100	0.0180
	South Out	Maneuvering	1.5	3,600	0.28	1,512	75	0.0068	690.00	0.0952	0.0010	97.8075	0.0135
		Cruising	3.50	3,600	0.28	3,528	75	0.0068	690.00	0.0952	0.0022	228.2175	0.0315
							TOTAL	**0**	**2,760**	**0**	**0.0068**	**684.96**	**0.0945**

Table H.2.NFA/NPA.Ts.GHG.2010-3. 2010 No Federal Action/No Project Alternative Boiler Warm-Up Average Daily GHG Emissions (Tesoro).

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
75.0	Aframax	0.20	102.17	30%	3	50,000	45,915	0.0627	6,360.00	0.8770	0.00521	528.44830	0.07287
						TOTAL		**0**	**6,360**	**1**	**0.00521**	**528.45**	**0.0729**

Table H.2.NFA/NPA.Ts.GHG.2010-4. 2010 No Federal Action/No Project Alternative Berth Operations Average Daily GHG Emissions (Tesoro).

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
75.0	Aframax	400,000	0.20	3,600	28%	2.5	0.0068	690.00	0.0952	0.00161	163.01	0.0225
AMP Reduction		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.00161**	**163.01**	**0.0225**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
75.0	Aframax	400,000	0.20	102.17	30%	2.5	50,000	127542.44	0.0627	6,360.0	0.8770	0.00434	440.37	0.06072
					TOTAL				**0.0627**	**6,360.00**	**0.8770**	**0.00434**	**440.37**	**0.0607**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
75.0	Aframax	400,000	0.20	3,600	56%	15.0	0.0068	690.00	0.0952	0.0193	1,956.1500	0.2699
AMP Reduction		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.0193**	**1,956.15**	**0.2699**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
75.0	Aframax	400,000	0.20	102.17	28.06	15.0	50,000	555084.89	0.0627	6,360.00	0.8770	0.0630	6,388.58	0.8809
					TOTAL				**0**	**6,360**	**1**	**0.0630**	**6,388.58**	**0.8809**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
75.0	Aframax	400,000	0.20	3,600	28%	1.0	0.0068	690.00	0.0952	0.00064	65.20500	0.00900
AMP Reduction		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.00064**	**65.21**	**0.0090**

Table H.2.NFA/NPA.Ts.GHG.2010-5.
2010 No Federal Action/No Project Alternative Summary of Berth Operations Average Daily GHG Emissions (Tesoro).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0173	1751.23	0.2415
Cruising	Aux Generator	0.0045	456.75	0.0630
Maneuvering	Main Engines	0.0003	27.56	0.0038
Maneuvering	Aux Generator	0.0022	228.22	0.0315
Boiler Warm-up	Boiler	0.0052	528.45	0.0729
Berth Operations	Boiler	0.0673	6828.96	0.9417
Berth Operations	Aux Generator	0.0215	2184.37	0.3014
Propulsion	TOTAL	0.0243	2463.76	0.3399
Non-Propulsion	TOTAL	0.0941	9541.77	1.3159
Total Emissions		**0.1184**	**12005.53**	**1.6558**

Mode	Equipment	N_2O Emissions (tons/day	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	4.73E-05	4.80	6.62E-04
Cruising	Aux Generator	1.23E-05	1.25	1.73E-04
Maneuvering	Main Engines	7.46E-07	0.08	1.04E-05
Maneuvering	Aux Generator	6.16E-06	0.63	8.63E-05
Boiler Warm-up	Boiler	1.43E-05	1.45	2.00E-04
Berth Operations	Boiler	1.84E-04	18.71	2.58E-03
Berth Operations	Aux Generator	5.90E-05	5.98	8.26E-04
Propulsion	TOTAL	6.66E-05	6.75	9.31E-04
Non-Propulsion	TOTAL	2.58E-04	26.14	3.61E-03
Total Emissions		**3.24E-04**	**32.89**	**4.54E-03**

Table H.2.NFA/NPA.Ts.GHG.2010-6. 2010 No Federal Action/No Project Alternative Tug Main Engines Average Daily GHG Emissions (Tesoro).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	75.0	0.00636	645.0	0.0890	0.0014	145.1250	0.0200
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	75.0	0.00636	645.0	0.0890	0.0014	145.1250	0.0200
								TOTAL				**0.0029**	**290.2500**	**0.0401**

Table H.2.NFA/NPA.Ts.GHG.2010-7. 2010 No Federal Action/No Project Alternative Tug Auxiliary Generator Engines Average Daily Unmit Emissions (Tesoro).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	75.0	0.0068	690.0	0.0952	0.00019	19.40625	0.00268
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	75.0	0.0068	690.0	0.0952	0.00019	19.40625	0.00268
								TOTAL				**0.00038**	**38.81**	**0.00536**

Table H.2.NFA/NPA.Ts.GHG.2010-8. 2010 No Federal Action/No Project Alternative Summary of Tug Average Daily GHG Emissions (Tesoro).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0029	290.2500	0.0401
Tug Assist	Aux Generator	0.00038	38.81250	0.00536
	TOTAL	**0.0032**	**329.06**	**0.0454**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	7.84E-06	7.95E-01	1.10E-04
Tug Assist	Aux Generator	1.05E-06	1.06E-01	1.47E-05
	TOTAL	**8.89E-06**	**9.02E-01**	**1.24E-04**

Table H.2.NFA/NPA.Ts.GHG.2010-12. 2010 No Federal Action/No Project Alternative Tesoro Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0243	2,463.76	0.3399	2478.42
Tanker Hoteling	0.0215	2,184.37	0.3014	2197.37
Offloading Emissions	0.0673	6,828.96	0.9417	6869.60
Transiting Operations	0.0052	528.45	0.0729	531.59
Tug Assistance	0.0032	329.06	0.0454	331.02
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.0176	9,276.95	1.0370	9304.18
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.1392**	**21,611.54**	**2.7382**	**21712.19**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	6.66E-05	6.75	9.31E-04	6.79
Tanker Hoteling	5.90E-05	5.98	8.26E-04	6.02
Offloading Emissions	1.84E-04	18.71	2.58E-03	18.82
Transiting Operations	1.43E-05	1.45	2.00E-04	1.46
Tug Assistance	8.89E-06	0.90	1.24E-04	0.91
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	4.82E-05	25.42	2.84E-03	25.49
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**3.81E-04**	**59.21**	**7.50E-03**	**59.49**

Table H.2.NFA/NPA.Ex.GHG.2010-1. 2010 No Federal Action/No Project Alternative Main Engines Average Daily GHG Emissions (Exxon Mobil).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	South In	Cruising - CW to VSR	23	12	1.92	15.8	0.438	10,300	8,649	30	125	0.0055	620.00	0.0818	0.0074	837.85	0.1105
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	14	125	0.0055	620.00	0.0818	0.0035	400.71	0.0529
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	2	125	0.0055	620.00	0.0818	0.0005	58.26	0.0077
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	0	125	0.0060	682.00	0.0902	0.0001	7.51	0.0010
PANAMAX	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	1	125	0.0060	682.00	0.0902	0.0003	34.78	0.0046
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	2	125	0.0055	620.00	0.0818	0.0004	43.39	0.0057
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	16	125	0.0055	620.00	0.0818	0.0040	455.36	0.0601
		Cruising - VSR to CW	24.5	12	2.04	15.8	0.438	10,300	9,213	31	125	0.0055	620.00	0.0818	0.0078	892.50	0.1178
														TOTAL	**0.0240**	**2730.36**	**0.3602**

Table H.2.NFA/NPA.Ex.GHG.2010-2. 2010 No Federal Action/No Project Alternative Auxiliary Generator Average Daily Unmitigated Emissions (Exxon Mobil).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	South In	Cruising	3.50	3,600	0.28	3,528	12	125	0.00635	722.00	0.0952	0.0035	398.00	0.0525
		Maneuvering	2.00	3,600	0.28	2,016	7	125	0.00635	722.00	0.0952	0.0020	227.43	0.0300
PANAMAX	South Out	Maneuvering	1.5	3,600	0.28	1,512	5	125	0.00635	722.00	0.0952	0.0015	170.57	0.0225
		Cruising	3.58	3,600	0.28	3,609	12	125	0.00635	722.00	0.0952	0.0036	407.10	0.0537
								TOTAL				**0.0106**	**1203.10**	**0.1586**

Table H.2.NFA/NPA.Ex.GHG.2010-3. 2010 No Federal Action/No Project Alternative Boiler Warm-Up Average Daily GHG Emissions (Exxon Mobil).

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
125.0	Panamax	0.20	59.91	30%	3	35,000	31,411	0.0559	6,596.00	0.8390	0.00318	374.93	0.0477
									TOTAL		**0.00318**	**374.93**	**0.0477**

Table H.2.NFA/NPA.Ex.GHG.2010-4. 2010 No Federal Action/No Project Alternative Berth Operations Average Daily GHG Emissions (Exxon Mobil)

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
125.0	Panamax	300,000	0.20	3,600	28%	2.5	8.6	150	0.0064	722.0	0.0952	0.0025	284.29	0.0375
					TOTAL							**0.0025**	**284.29**	**0.0375**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
125.0	Panamax	300,000	0.20	59.91	30%	2.5	35,000	87,252	0.0559	6,596.0	0.8390	0.0026	312.44	0.0397
					TOTAL							**0.0026**	**312.44**	**0.0397**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
125.0	Panamax	300,000	0.20	3,600	56%	11.0	75.7	140	0.0064	722.0	0.0952	0.0222	2501.73	0.3299
					TOTAL							**0.0222**	**2501.73**	**0.3299**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
125.0	Panamax	300,000	0.20	59.91	28.06	11.0	35,000	204,099	0.0559	6,596.0	0.8390	0.0206	2436.18	0.3099
					TOTAL							**0.0206**	**2436.18**	**0.3099**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
125.0	Panamax	300,000	0.20	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0010	113.72	0.0150
					TOTAL							**0.0010**	**113.72**	**0.0150**

Table H.2.NFA/NPA.Ex.GHG.2010-5.
2010 No Federal Action/No Project Alternative Summary of Berth Operations Average Daily GHG Emissions (Exxon Mobil).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	2.36E-02	2688.06	3.55E-01
Cruising	Aux Generator	7.08E-03	805.10	1.06E-01
Maneuvering	Main Engines	3.73E-04	42.30	5.59E-03
Maneuvering	Aux Generator	3.50E-03	398.00	5.25E-02
Boiler Warm-up	Boiler	3.18E-03	374.93	4.77E-02
Berth Operations	Boiler	2.33E-02	2748.62	3.50E-01
Berth Operations	Aux Generator	2.57E-02	2899.73	3.82E-01
Propulsion	TOTAL	3.46E-02	3933.46	5.19E-01
Non-Propulsion	TOTAL	0.05	6023.28	0.78
Total Emissions		**8.67E-02**	**9956.74**	**1.30E+00**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	6.47E-05	7.36	9.72E-04
Cruising	Aux Generator	1.94E-05	2.21	2.91E-04
Maneuvering	Main Engines	1.02E-06	0.12	1.53E-05
Maneuvering	Aux Generator	9.59E-06	1.09	1.44E-04
Boiler Warm-up	Boiler	8.71E-06	1.03	1.31E-04
Berth Operations	Boiler	6.38E-05	7.53	9.58E-04
Berth Operations	Aux Generator	7.04E-05	7.94	1.05E-03
Propulsion	TOTAL	9.47E-05	10.78	1.42E-03
Non-Propulsion	TOTAL	1.43E-04	16.50	2.14E-03
Total Emissions		**2.38E-04**	**27.28**	**3.56E-03**

Table H.2.NFA/NPA.Ex.GHG.2010-6. 2010 No Federal Action/No Project Alternative Tug Main Engines Average Daily GHG Emissions (Exxon Mobil).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	125.0	0.00636	645.0	0.0890	0.0024	241.88	0.0334
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	125.0	0.00636	645.0	0.0890	0.0024	241.88	0.0334
								TOTAL				**0.0048**	**483.75**	**0.0668**

Table H.2.NFA/NPA.Ex.GHG.2010-7. 2010 No Federal Action/No Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated Emissions (Exxon Mobil).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	125.0	0.0068	690.0	0.0952	0.00032	32.34375	0.0045
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	125.0	0.0068	690.0	0.0952	0.00032	32.34375	0.0045
								TOTAL				**0.00064**	**64.69**	**0.0089**

Table H.2.NFA/NPA.Ex.GHG.2010-8.
2010 No Federal Action/No Project Alternative Summary of Tug Average Daily GHG Emissions (Exxon Mobil).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0048	483.75	0.0668
Tug Assist	Aux Generator	0.00064	64.69	0.0089
	TOTAL	**0.0054**	**548.44**	**0.0757**

Table H.2.NFA/NPA.Ex.GHG.2010-12. 2010 No Federal Action/No Project Alternative Exxon Mobil Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0346	3,933.46	0.5189	3955.08
Tanker Hoteling	0.0257	2,899.73	0.3823	2915.72
Offloading Emissions	0.0233	2,748.62	0.3496	2763.18
Transiting Operations	0.0032	374.93	0.0477	376.92
Tug Assistance	0.0054	548.44	0.0757	551.70
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.0187	9,879.91	1.1044	9908.91
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.1109**	**20,385.09**	**2.4786**	**20471.51**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	9.47E-05	10.78	1.42E-03	10.84
Tanker Hoteling	7.04E-05	7.94	1.05E-03	7.99
Offloading Emissions	6.38E-05	7.53	9.58E-04	7.57
Transiting Operations	8.71E-06	1.03	1.31E-04	1.03
Tug Assistance	1.48E-05	1.50	2.07E-04	1.51
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	5.13E-05	27.07	3.03E-03	27.15
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**3.04E-04**	**55.85**	**6.79E-03**	**56.09**

Table H.2.NFA/NPA.BP.GHG.2015-1. 2015 No Federal Action/No Project Alternative Main Engines Average Daily GHG Emissions (BP).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	34	0.00545	620.00	0.0818	0.0023	260.92	0.0344
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	34	0.00545	620.00	0.0818	0.0011	124.79	0.0165
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	34	0.00545	620.00	0.0818	0.0002	18.14	0.0024
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	34	0.00601	682.00	0.0902	0.0000	2.34	0.0003
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	34	0.00601	682.00	0.0902	0.0001	10.83	0.0014
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	34	0.00545	620.00	0.0818	0.0001	13.51	0.0018
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	34	0.00545	620.00	0.0818	0.0012	141.80	0.0187
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	34	0.00545	620.00	0.0818	0.0024	277.93	0.0367
										TOTAL	**0**	**5,084**	**1**	**0.0075**	**850.27**	**0.1122**

Table H.2.NFA/NPA.BP.GHG.2015-2. 2015 No Federal Action/No Project Alternative Auxiliary Generator Average Daily Unmitigated Emissions (BP).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising	3.50	3,600	0.28	3,533	34	0.00635	722.00	0.0952	0.0010	108.4040	0.0143
		Maneuvering	2.00	3,600	0.28	2,016	34	0.00635	722.00	0.0952	0.0005	61.8610	0.0082
	South Out	Maneuvering	1.5	3,600	0.28	1,512	34	0.00635	722.00	0.0952	0.0004	46.3957	0.0061
		Cruising	3.50	3,600	0.28	3,528	34	0.00635	722.00	0.0952	0.0010	108.2567	0.0143
							TOTAL	**0**	**2,888**	**0**	**0.0029**	**324.92**	**0.0428**

Table H.2.NFA/NPA.BP.GHG.2015-3. 2015 No Federal Action/No Project Alternative Boiler Warm-Up Average Daily GHG Emissions (BP).

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	0.20	102.17	30%	3	50,000	20,815	0.0559	6,596.00	0.8390	0.00211	248.45268	0.03160
						TOTAL		**0**	**6,596**	**1**	**0.00211**	**248.45**	**0.0316**

Table H.2.NFA/NPA.BP.GHG.2015-4. 2015 No Federal Action/No Project Alternative Berth Operations Average Daily GHG Emissions (BP).

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	3,600	28%	2.5	0.0064	722.0	0.0952	0.00068	77.33	0.0102
AMP Reduction		0%										
					TOTAL		**0**	**722**	**0**	**0.00068**	**77.33**	**0.0102**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	102.17	30%	2.5	50,000	57,819	0.0559	6,596.0	0.8390	0.00175	207.04	0.02634
					TOTAL				**0.0559**	**6,596.00**	**0.8390**	**0.00175**	**207.04**	**0.0263**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	3,600	56%	15.0	0.0064	722.00	0.0952	0.0082	927.9144	0.1224
AMP Reduction		0%										
					TOTAL		**0.0064**	**722.00**	**0.0952**	**0.0082**	**927.91**	**0.1224**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	102.17	28.06	15.0	50,000	251,638	0.0559	6,596.00	0.8390	0.0255	3,003.63	0.3821
					TOTAL				**0**	**6,596**	**1**	**0.0255**	**3,003.63**	**0.3821**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	3,600	28%	1.0	0.0064	722.00	0.0952	0.00027	30.93048	0.00408
AMP Reduction		0%										
					TOTAL		**0.0064**	**722.00**	**0.0952**	**0.00027**	**30.93**	**0.0041**

Table H.2.NFA/NPA.BP.GHG.2015-5.
2015 No Federal Action/No Project Alternative Summary of Berth Operations Average Daily GHG Emissions (BP).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0074	837.0951	0.1104
Cruising	Aux Generator	0.0019	216.6606	0.0286
Maneuvering	Main Engines	0.0001	13.1719	0.0017
Maneuvering	Aux Generator	0.0010	108.2567	0.0143
Boiler Warm-up	Boiler	0.0021	248.4527	0.0316
Berth Operations	Boiler	0.0272	3210.6699	0.4084
Berth Operations	Aux Generator	0.0092	1036.1711	0.1366
Propulsion	TOTAL	0.0103	1175.18	0.1550
Non-Propulsion	TOTAL	0.0385	4495.29	0.5766
Total Emissions		**0.0488**	**5670.48**	**0.7316**

Mode	Equipment	N_2O Emissions (tons/day	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	0.0000	2.29	0.0003
Cruising	Aux Generator	0.0000	0.59	0.0001
Maneuvering	Main Engines	0.0000	0.04	0.0000
Maneuvering	Aux Generator	0.0000	0.30	0.0000
Boiler Warm-up	Boiler	0.0000	0.68	0.0001
Berth Operations	Boiler	0.0001	8.80	0.0011
Berth Operations	Aux Generator	0.0000	2.84	0.0004
Propulsion	TOTAL	0.0000	3.22	0.0004
Non-Propulsion	TOTAL	0.0001	12.32	0.0016
Total Emissions		**0.0001**	**15.54**	**0.0020**

Table H.2.NFA/NPA.BP.GHG.2015-6. 2015 No Federal Action/No Project Alternative Tug Main Engines Average Daily GHG Emissions (BP).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	34.0	0.00636	645.0	0.0890	0.0006	65.7900	0.0091
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	34.0	0.00636	645.0	0.0890	0.0006	65.7900	0.0091
								TOTAL				**0.0013**	**131.5800**	**0.0182**

Table H.2.NFA/NPA.BP.GHG.2015-7. 2015 No Federal Action/No Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated Emissions (BP).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	34.0	0.0068	690.0	0.0952	0.00009	8.79750	0.00121
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	34.0	0.0068	690.0	0.0952	0.00009	8.79750	0.00121
								TOTAL				**0.00017**	**17.60**	**0.00243**

Table H.2.NFA/NPA.BP.GHG.2015-8. 2015 No Federal Action/No Project Alternative Summary of Tug Average Daily GHG Emissions (BP).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0013	131.5800	0.0182
Tug Assist	Aux Generator	0.00017	17.59500	0.00243
	TOTAL	**0.0015**	**149.18**	**0.0206**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	3.55E-06	3.60E-01	4.97E-05
Tug Assist	Aux Generator	4.75E-07	4.82E-02	6.65E-06
	TOTAL	**4.03E-06**	**4.09E-01**	**5.64E-05**

Table H.2.NFA/NPA.BP.GHG.2015-12. 2015 No Federal Action/No Project Alternative BP Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0103	1,175.18	0.16	1181.64
Tanker Hoteling	0.0092	1,036.17	0.14	1041.89
Offloading Emissions	0.0272	3,210.67	0.41	3227.68
Transiting Operations	0.0021	248.45	0.03	249.77
Tug Assistance	0.0015	149.18	0.02	150.06
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.0166	8,782.52	0.98	8808.30
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.0669**	**14,602.18**	**1.73**	**14659.34**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	2.83E-05	3.22	4.25E-04	3.24
Tanker Hoteling	2.51E-05	2.84	3.74E-04	2.85
Offloading Emissions	7.45E-05	8.80	1.12E-03	8.84
Transiting Operations	5.77E-06	0.68	8.66E-05	0.68
Tug Assistance	4.03E-06	0.41	5.64E-05	0.41
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	4.56E-05	24.06	2.69E-03	24.13
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**1.83E-04**	**40.01**	**4.75E-03**	**40.16**

Table H.2.NFA/NPA.Ts.GHG.2015-1. 2015 No Federal Action/No Project Alternative Main Engines Average Daily GHG Emissions (Tesoro).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	87	0.0058	588.00	0.0811	0.0062	633.18	0.0873
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	87	0.0058	588.00	0.0811	0.0030	302.83	0.0418
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	87	0.0058	588.00	0.0811	0.0004	44.03	0.0061
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	87	0.0064	647.00	0.0895	0.0001	5.68	0.0008
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	87	0.0064	647.00	0.0895	0.0003	26.30	0.0036
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	87	0.0058	588.00	0.0811	0.0003	32.79	0.0045
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	87	0.0058	588.00	0.0811	0.0034	344.12	0.0475
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	87	0.0058	588.00	0.0811	0.0067	674.48	0.0930
										TOTAL	**0**	**4,822**	**1**	**0.0204**	**2,063.40**	**0.2846**

Table H.2.NFA/NPA.Ts.GHG.2015-2. 2015 No Federal Action/No Project Alternative Auxiliary Generator Average Daily Unmitigated Emissions (Tesoro).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Fuel Type	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising	3.50	3,600	0.28	3,533	Dist at 0.2	87	0.0068	690.00	0.0952	0.0026	265.0925	0.0366
		Maneuvering	2.00	3,600	0.28	2,016	Dist at 0.2	87	0.0068	690.00	0.0952	0.0015	151.2756	0.0209
	South Out	Maneuvering	1.5	3,600	0.28	1,512	Dist at 0.2	87	0.0068	690.00	0.0952	0.0011	113.4567	0.0157
		Cruising	3.50	3,600	0.28	3,528	Dist at 0.2	87	0.0068	690.00	0.0952	0.0026	264.7323	0.0365
								TOTAL	**0**	**2,760**	**0**	**0.0078**	**794.56**	**0.1096**

Table H.2.NFA/NPA.Ts.GHG.2015-3. 2015 No Federal Action/No Project Alternative Boiler Warm-Up Average Daily GHG Emissions (Tesoro).

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	0.20	102.17	30%	3	50,000	53,262	0.0627	6,360.00	0.8770	0.00604	613.00002	0.08453
						TOTAL		**0**	**6,360**	**1**	**0.00604**	**613.00**	**0.0845**

Table H.2.NFA/NPA.Ts.GHG.2015-4. 2015 No Federal Action/No Project Alternative Berth Operations Average Daily GHG Emissions (Tesoro).

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	Dist at 0.2	0.20	3,600	28%	2.5	0.0068	690.00	0.0952	0.00186	189.09	0.0261
AMP Reduction		0%											
						TOTAL		**0.0068**	**690.00**	**0.0952**	**0.00186**	**189.09**	**0.0261**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	Dist at 0.2	0.20	102.17	30%	2.5	50,000	147949.23	0.0627	6,360.0	0.8770	0.00504	510.83	0.07044
						TOTAL				**0.0627**	**6,360.00**	**0.8770**	**0.00504**	**510.83**	**0.0704**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	Dist at 0.2	0.20	3,600	56%	15.0	0.0068	690.00	0.0952	0.0224	2,269.1340	0.3131
AMP Reduction		0%											
						TOTAL		**0.0068**	**690.00**	**0.0952**	**0.0224**	**2,269.13**	**0.3131**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	Dist at 0.2	0.20	102.17	28.06	15.0	50,000	643898.47	0.0627	6,360.00	0.8770	0.0731	7,410.76	1.0219
						TOTAL				**0**	**6,360**	**1**	**0.0731**	**7,410.76**	**1.0219**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	Dist at 0.2	0.20	3,600	28%	1.0	0.0068	690.00	0.0952	0.00075	75.63780	0.01044
						TOTAL		**0.0068**	**690.00**	**0.0952**	**0.00075**	**75.64**	**0.0104**

Table H.2.NFA/NPA.Ts.GHG.2015-5.
2015 No Federal Action/No Project Alternative Summary of Berth Operations Average Daily GHG Emissions (Tesoro).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0200	2031.4249	0.2802
Cruising	Aux Generator	0.0052	529.8248	0.0731
Maneuvering	Main Engines	0.0003	31.9749	0.0044
Maneuvering	Aux Generator	0.0026	264.7323	0.0365
Boiler Warm-up	Boiler	0.0060	613.0000	0.0845
Berth Operations	Boiler	0.0050	510.8334	0.0704
Berth Operations	Aux Generator	0.0250	2533.8663	0.3496
Propulsion	TOTAL	0.0282	2857.96	0.3942
Non-Propulsion	TOTAL	0.0361	3657.70	0.5046
Total Emissions		**0.0642**	**6515.66**	**0.8988**

Mode	Equipment	N_2O Emissions (tons/day	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	5.49E-05	5.57E+00	7.68E-04
Cruising	Aux Generator	1.43E-05	1.45E+00	2.00E-04
Maneuvering	Main Engines	8.65E-07	8.76E-02	1.21E-05
Maneuvering	Aux Generator	7.15E-06	7.25E-01	1.00E-04
Boiler Warm-up	Boiler	1.66E-05	1.68E+00	2.32E-04
Berth Operations	Boiler	1.38E-05	1.40E+00	1.93E-04
Berth Operations	Aux Generator	6.84E-05	6.94E+00	9.58E-04
Propulsion	TOTAL	7.72E-05	7.83E+00	1.08E-03
Non-Propulsion	TOTAL	9.88E-05	1.00E+01	1.38E-03
Total Emissions		**0.0002**	**17.85**	**0.0025**

Table H.2.NFA/NPA.Ts.GHG.2015-6. 2015 No Federal Action/No Project Alternative Tug Main Engines Average Daily GHG Emissions (Tesoro).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	87.0	0.00636	645.0	0.0890	0.0017	168.3450	0.0232
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	87.0	0.00636	645.0	0.0890	0.0017	168.3450	0.0232
								TOTAL				**0.0033**	**336.6900**	**0.0465**

Table H.2.NFA/NPA.Ts.GHG.2015-7. 2015 No Federal Action/No Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated Emissions (Tesoro).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	87.0	0.0068	690.0	0.0952	0.00022	22.51125	0.00311
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	87.0	0.0068	690.0	0.0952	0.00022	22.51125	0.00311
								TOTAL				**0.00044**	**45.02**	**0.00621**

Table H.2.NFA/NPA.Ts.GHG.2015-8. 2015 No Federal Action/No Project Alternative Summary of Tug Average Daily GHG Emissions (Tesoro).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0033	336.6900	0.0465
Tug Assist	Aux Generator	0.00044	45.02250	0.00621
	TOTAL	**0.0038**	**381.71**	**0.0527**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	9.10E-06	9.22E-01	1.27E-04
Tug Assist	Aux Generator	1.22E-06	1.23E-01	1.70E-05
	TOTAL	**1.03E-05**	**1.05E+00**	**1.44E-04**

Table H.2.NFA/NPA.Ts.GHG.2015-12. 2015 No Federal Action/No Project Alternative Tesoro Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0282	2,857.96	0.39	2874.97
Tanker Hoteling	0.0250	2,533.87	0.35	2548.95
Offloading Emissions	0.0050	510.83	0.07	513.87
Transiting Operations	0.0060	613.00	0.08	616.65
Tug Assistance	0.0038	381.71	0.05	383.99
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.0179	9,421.66	1.05	9449.31
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.0858**	**16,319.03**	**2.00**	**16387.74**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	7.72E-05	7.83	1.08E-03	7.88
Tanker Hoteling	6.84E-05	6.94	9.58E-04	6.98
Offloading Emissions	1.38E-05	1.40	1.93E-04	1.41
Transiting Operations	1.66E-05	1.68	2.32E-04	1.69
Tug Assistance	1.03E-05	1.05	1.44E-04	1.05
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	4.89E-05	25.81	2.89E-03	25.89
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**2.35E-04**	**44.71**	**5.49E-03**	**44.90**

Table H.2.NFA/NPA.Ex.GHG.2015-1. 2015 No Federal Action/No Project Alternative Main Engines Average Daily GHG Emissions (Exxon Mobil).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	South In	Cruising - CW to VSR	23	12	1.92	15.8	0.438	10,300	8,649	30	146	0.0058	588.00	0.0811	0.0092	928.10	0.1280
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	14	146	0.0058	588.00	0.0811	0.0044	443.88	0.0612
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	2	146	0.0058	588.00	0.0811	0.0006	64.54	0.0089
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	0	146	0.0064	647.00	0.0895	0.0001	8.33	0.0012
PANAMAX	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	1	146	0.0064	647.00	0.0895	0.0004	38.54	0.0053
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	2	146	0.0058	588.00	0.0811	0.0005	48.06	0.0066
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	16	146	0.0058	588.00	0.0811	0.0050	504.40	0.0696
		Cruising - VSR to CW	24.5	12	2.04	15.8	0.438	10,300	9,213	31	146	0.0058	588.00	0.0811	0.0098	988.63	0.1364
														TOTAL	**0.0298**	**3024.48**	**0.4172**

Table H.2.NFA/NPA.Ex.GHG.2015-2. 2015 No Federal Action/No Project Alternative Auxiliary Generator Average Daily Unmitigated Emissions (Exxon Mobil).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	South In	Cruising	3.50	3,600	0.28	3,528	12	146	0.0068	690.00	0.0952	0.0044	444.26	0.0613
		Maneuvering	2.00	3,600	0.28	2,016	7	146	0.0068	690.00	0.0952	0.0025	253.86	0.0350
PANAMAX	South Out	Maneuvering	1.5	3,600	0.28	1,512	5	146	0.0068	690.00	0.0952	0.0019	190.40	0.0263
		Cruising	3.58	3,600	0.28	3,609	12	146	0.0068	690.00	0.0952	0.0045	454.42	0.0627
								TOTAL				**0.0132**	**1342.94**	**0.1853**

Table H.2.NFA/NPA.Ex.GHG.2015-3. 2015 No Federal Action/No Project Alternative Boiler Warm-Up Average Daily GHG Emissions (Exxon Mobil).

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	0.20	59.91	30%	3	35,000	36,688	0.0627	6,360.00	0.8770	0.00416	422.25	0.0582
									TOTAL		**0.00416**	**422.25**	**0.0582**

Table H.2.NFA/NPA.Ex.GHG.2015-4. 2015 No Federal Action/No Project Alternative Berth Operations Average Daily GHG Emissions (Exxon Mobil)

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0031	317.33	0.0438
AMP Reduction		15%			**TOTAL**							**0.0027**	**269.73**	**0.0372**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	59.91	30%	2.5	35,000	101,911	0.0627	6,360.0	0.8770	0.0035	351.87	0.0485
					TOTAL							**0.0035**	**351.87**	**0.0485**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	3,600	56%	11.0	75.7	140	0.0068	690.0	0.0952	0.0275	2792.51	0.3853
AMP Reduction		15%			**TOTAL**							**0.0234**	**2373.64**	**0.3275**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	59.91	28.06	11.0	35,000	238,387	0.0627	6,360.0	0.8770	0.0270	2743.65	0.3783
					TOTAL							**0.0270**	**2743.65**	**0.3783**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0013	126.93	0.0175
AMP Reduction		15%			**TOTAL**							**0.0011**	**107.89**	**0.0149**

Table H.2.NFA/NPA.Ex.GHG.2015-5. 2015 No Federal Action/No Project Alternative Summary of Berth Operations Average Daily GHG Emissions (Exxon Mobil).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	2.94E-02	2977.61	4.11E-01
Cruising	Aux Generator	8.86E-03	898.68	1.24E-01
Maneuvering	Main Engines	4.63E-04	46.87	6.48E-03
Maneuvering	Aux Generator	4.38E-03	444.26	6.13E-02
Boiler Warm-up	Boiler	4.16E-03	422.25	5.82E-02
Berth Operations	Boiler	3.05E-02	3095.52	4.27E-01
Berth Operations	Aux Generator	2.71E-02	2751.26	3.80E-01
Propulsion	TOTAL	4.31E-02	4367.42	6.02E-01
Non-Propulsion	TOTAL	0.06	6269.03	0.86
Total Emissions		**1.05E-01**	**10636.45**	**1.47E+00**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	8.05E-05	8.16	1.13E-03
Cruising	Aux Generator	2.43E-05	2.46	3.40E-04
Maneuvering	Main Engines	1.27E-06	0.13	1.78E-05
Maneuvering	Aux Generator	1.20E-05	1.22	1.68E-04
Boiler Warm-up	Boiler	1.14E-05	1.16	1.60E-04
Berth Operations	Boiler	8.36E-05	8.48	1.17E-03
Berth Operations	Aux Generator	7.43E-05	7.54	1.04E-03
Propulsion	TOTAL	1.18E-04	11.97	1.65E-03
Non-Propulsion	TOTAL	1.69E-04	17.18	2.37E-03
Total Emissions		**2.87E-04**	**29.14**	**4.02E-03**

Table H.2.NFA/NPA.Ex.GHG.2015-6. 2015 No Federal Action/No Project Alternative Tug Main Engines Average Daily GHG Emissions (Exxon Mobil).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	146.0	0.00636	645.0	0.0890	0.0028	282.51	0.0390
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	146.0	0.00636	645.0	0.0890	0.0028	282.51	0.0390
								TOTAL				**0.0056**	**565.02**	**0.0780**

Table H.2.NFA/NPA.Ex.GHG.2015-7. 2015 No Federal Action/No Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated Emissions (Exxon Mobil).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	146.0	0.0068	690.0	0.0952	0.00037	37.77750	0.0052
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	146.0	0.0068	690.0	0.0952	0.00037	37.77750	0.0052
								TOTAL				**0.00074**	**75.56**	**0.0104**

Table H.2.NFA/NPA.Ex.GHG.2015-8.
2015 No Federal Action/No Project Alternative Summary of Tug Average Daily GHG Emissions (Exxon Mobil).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0056	565.02	0.0780
Tug Assist	Aux Generator	0.00074	75.56	0.0104
	TOTAL	**0.0063**	**640.58**	**0.0884**

Table H.2.NFA/NPA.Ex.GHG.2015-12. 2015 No Federal Action/No Project Alternative Exxon Mobil Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0431	4,367.42	0.60	4393.43
Tanker Hoteling	0.0271	2,751.26	0.38	2767.64
Offloading Emissions	0.0305	3,095.52	0.43	3113.95
Transiting Operations	0.0042	422.25	0.06	424.76
Tug Assistance	0.0063	640.58	0.09	644.39
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.0192	10,133.15	1.13	10162.89
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.1304**	**21,410.18**	**2.69**	**21507.05**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	1.18E-04	11.97	1.65E-03	12.04
Tanker Hoteling	7.43E-05	7.54	1.04E-03	7.58
Offloading Emissions	8.36E-05	8.48	1.17E-03	8.53
Transiting Operations	1.14E-05	1.16	1.60E-04	1.16
Tug Assistance	1.73E-05	1.76	2.42E-04	1.77
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	5.26E-05	27.76	3.10E-03	27.84
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**3.57E-04**	**58.66**	**7.37E-03**	**58.92**

Table H.2.NFA/NPA.BP.GHG.2025-1. 2025 No Federal Action/No Project Alternative Main Engines Average Daily GHG Emissions (BP).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	34	0.0058	588.00	0.0811	0.0024	247.45	0.0341
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	34	0.0058	588.00	0.0811	0.0012	118.35	0.0163
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	34	0.0058	588.00	0.0811	0.0002	17.21	0.0024
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	34	0.0064	647.00	0.0895	0.0000	2.22	0.0003
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	34	0.0064	647.00	0.0895	0.0001	10.28	0.0014
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	34	0.0058	588.00	0.0811	0.0001	12.81	0.0018
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	34	0.0058	588.00	0.0811	0.0013	134.48	0.0185
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	34	0.0058	588.00	0.0811	0.0026	263.59	0.0364
										TOTAL	**0**	**4,822**	**1**	**0.0080**	**806.39**	**0.1112**

Table H.2.NFA/NPA.BP.GHG.2025-2. 2025 No Federal Action/No Project Alternative Auxiliary Generator Average Daily Unmit Emissions (BP).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising	3.50	3,600	0.28	3,533	34	0.0068	690.00	0.0952	0.0010	103.5994	0.0143
		Maneuvering	2.00	3,600	0.28	2,016	34	0.0068	690.00	0.0952	0.0006	59.1192	0.0082
	South Out	Maneuvering	1.5	3,600	0.28	1,512	34	0.0068	690.00	0.0952	0.0004	44.3394	0.0061
		Cruising	3.50	3,600	0.28	3,528	34	0.0068	690.00	0.0952	0.0010	103.4586	0.0143
							TOTAL	**0**	**2,760**	**0**	**0.0031**	**310.52**	**0.0428**

Table H.2.NFA/NPA.BP.GHG.2025-3. 2025 No Federal Action/No Project Alternative Boiler Warm-Up Average Daily GHG Emissions (Bl

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	0.20	102.17	30%	3	50,000	20,815	0.0627	6,360.00	0.8770	0.00236	239.56323	0.03303
						TOTAL		**0**	**6,360**	**1**	**0.00236**	**239.56**	**0.0330**

Table H.2.NFA/NPA.BP.GHG.2025-4. 2025 No Federal Action/No Project Alternative Berth Operations Average Daily GHG Emissions (BP).

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	3,600	28%	2.5	0.0068	690.0	0.0952	0.00073	73.90	0.0102
AMP Reduction		0%										
					TOTAL		**0**	**690**	**0**	**0.00073**	**73.90**	**0.0102**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	102.17	30%	2.5	50,000	57,819	0.0627	6,360.0	0.8770	0.00197	199.64	0.02753
					TOTAL				**0.0627**	**6,360.00**	**0.8770**	**0.00197**	**199.64**	**0.0275**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	3,600	56%	15.0	0.0068	690.00	0.0952	0.0087	886.7880	0.1224
AMP Reduction		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.0087**	**886.79**	**0.1224**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	102.17	28.06	15.0	50,000	251,638	0.0627	6,360.00	0.8770	0.0286	2,896.16	0.3994
					TOTAL				**0**	**6,360**	**1**	**0.0286**	**2,896.16**	**0.3994**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	3,600	28%	1.0	0.0068	690.00	0.0952	0.00029	29.55960	0.00408
AMP Reduction		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.00029**	**29.56**	**0.0041**

Table H.2.NFA/NPA.BP.GHG.2025-5.
2025 No Federal Action/No Project Alternative Summary of Berth Operations Average Daily GHG Emissions (BP).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0078	793.8902	0.1095
Cruising	Aux Generator	0.0020	207.0580	0.0286
Maneuvering	Main Engines	0.0001	12.4960	0.0017
Maneuvering	Aux Generator	0.0010	103.4586	0.0143
Boiler Warm-up	Boiler	0.0024	239.5632	0.0330
Berth Operations	Boiler	0.0305	3095.7945	0.4269
Berth Operations	Aux Generator	0.0098	990.2466	0.1366
Propulsion	TOTAL	0.0110	1116.90	0.1541
Non-Propulsion	TOTAL	0.0426	4325.60	0.5965
Total Emissions		**0.0537**	**5442.51**	**0.7506**

Mode	Equipment	N_2O Emissions (tons/day	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	0.0000	2.18	0.0003
Cruising	Aux Generator	0.0000	0.57	0.0001
Maneuvering	Main Engines	0.0000	0.03	0.0000
Maneuvering	Aux Generator	0.0000	0.28	0.0000
Boiler Warm-up	Boiler	0.0000	0.66	0.0001
Berth Operations	Boiler	0.0001	8.48	0.0012
Berth Operations	Aux Generator	0.0000	2.71	0.0004
Propulsion	TOTAL	0.0000	3.06	0.0004
Non-Propulsion	TOTAL	0.0001	11.85	0.0016
Total Emissions		**0.0001**	**14.91**	**0.0021**

Table H.2.NFA/NPA.BP.GHG.2025-6. 2025 No Federal Action/No Project Alternative Tug Main Engines Average Daily GHG Emissions (BP).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	34.0	0.00636	645.0	0.0890	0.0006	65.7900	0.0091
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	34.0	0.00636	645.0	0.0890	0.0006	65.7900	0.0091
								TOTAL				**0.0013**	**131.5800**	**0.0182**

Table H.2.NFA/NPA.BP.GHG.2025-7. 2025 No Federal Action/No Project Alternative Tug Auxiliary Generator Engines Average Daily Unmit Emissions (BP).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	34.0	0.0068	690.0	0.0952	0.00009	8.79750	0.00121
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	34.0	0.0068	690.0	0.0952	0.00009	8.79750	0.00121
								TOTAL				**0.00017**	**17.60**	**0.00243**

Table H.2.NFA/NPA.BP.GHG.2025-8. 2025 No Federal Action/No Project Alternative Summary of Tug Average Daily GHG Emissions (BP).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0013	131.5800	0.0182
Tug Assist	Aux Generator	0.00017	17.59500	0.00243
	TOTAL	**0.0015**	**149.18**	**0.0206**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	3.55E-06	3.60E-01	4.97E-05
Tug Assist	Aux Generator	4.75E-07	4.82E-02	6.65E-06
	TOTAL	**4.03E-06**	**4.09E-01**	**5.64E-05**

Table H.2.NFA/NPA.BP.GHG.2025-12. 2025 No Federal Action/No Project Alternative BP Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0110	1116.90	0.1541	1123.55
Tanker Hoteling	0.0098	990.25	0.1366	996.14
Offloading Emissions	0.0305	3095.79	0.4269	3114.22
Transiting Operations	0.0024	239.56	0.0330	240.99
Tug Assistance	0.0015	149.18	0.0206	150.06
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.0166	8782.52	0.9818	8808.30
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.0718**	**14374.21**	**1.7530**	**14433.27**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	3.02E-05	3.06	4.22E-04	3.08
Tanker Hoteling	2.67E-05	2.71	3.74E-04	2.73
Offloading Emissions	8.36E-05	8.48	1.17E-03	8.53
Transiting Operations	6.47E-06	0.66	9.05E-05	0.66
Tug Assistance	4.03E-06	0.41	5.64E-05	0.41
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	4.56E-05	24.06	2.69E-03	24.13
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**1.97E-04**	**39.38**	**4.80E-03**	**39.54**

Table H.2.NFA/NPA.Ts.GHG.2025-1. 2025 No Federal Action/No Project Alternative Main Engines Average Daily GHG Emissions (Tesoro).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	87	0.0058	588.00	0.0811	0.0062	633.18	0.0873
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	87	0.0058	588.00	0.0811	0.0030	302.83	0.0418
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	87	0.0058	588.00	0.0811	0.0004	44.03	0.0061
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	87	0.0064	647.00	0.0895	0.0001	5.68	0.0008
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	87	0.0064	647.00	0.0895	0.0003	26.30	0.0036
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	87	0.0058	588.00	0.0811	0.0003	32.79	0.0045
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	87	0.0058	588.00	0.0811	0.0034	344.12	0.0475
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	87	0.0058	588.00	0.0811	0.0067	674.48	0.0930
										TOTAL	**0**	**4,822**	**1**	**0.0204**	**2,063.40**	**0.2846**

Table H.2.NFA/NPA.Ts.GHG.2025-2. 2025 No Federal Action/No Project Alternative Auxiliary Generator Average Daily Unmitigated Emissions (Tesoro).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising	3.50	3,600	0.28	3,533	87	0.0068	690.00	0.0952	0.0026	265.0925	0.0366
		Maneuvering	2.00	3,600	0.28	2,016	87	0.0068	690.00	0.0952	0.0015	151.2756	0.0209
	South Out	Maneuvering	1.5	3,600	0.28	1,512	87	0.0068	690.00	0.0952	0.0011	113.4567	0.0157
		Cruising	3.50	3,600	0.28	3,528	87	0.0068	690.00	0.0952	0.0026	264.7323	0.0365
							TOTAL	**0**	**2,760**	**0**	**0.0078**	**794.56**	**0.1096**

Table H.2.NFA/NPA.Ts.GHG.2025-3. 2025 No Federal Action/No Project Alternative Boiler Warm-Up Average Daily GHG Emissions (Tesoro).

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	0.20	102.17	30%	3	50,000	53,262	0.0627	6,360.00	0.8770	0.00604	613.00002	0.08453
						TOTAL		**0**	**6,360**	**1**	**0.00604**	**613.00**	**0.0845**

Table H.2.NFA/NPA.Ts.GHG.2025-4. 2025 No Federal Action/No Project Alternative Berth Operations Average Daily GHG Emissions (Tesoro).

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	0.20	3,600	28%	2.5	0.0068	690.00	0.0952	0.00186	189.09	0.0261
		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.00186**	**189.09**	**0.0261**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	0.20	102.17	30%	2.5	50,000	147949.23	0.0627	6,360.0	0.8770	0.00504	510.83	0.07044
					TOTAL				**0.0627**	**6,360.00**	**0.8770**	**0.00504**	**510.83**	**0.0704**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	0.20	3,600	56%	15.0	0.0068	690.00	0.0952	0.0224	2,269.1340	0.3131
		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.0224**	**2,269.13**	**0.3131**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	0.20	102.17	28.06	15.0	50,000	643898.47	0.0627	6,360.00	0.8770	0.0731	7,410.76	1.0219
					TOTAL				**0**	**6,360**	**1**	**0.0731**	**7,410.76**	**1.0219**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	0.20	3,600	28%	1.0	0.0068	690.00	0.0952	0.00075	75.63780	0.01044
		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.00075**	**75.64**	**0.0104**

Table H.2.NFA/NPA.Ts.GHG.2025-5. 2025 No Federal Action/No Project Alternative Summary of Berth Operations Average Daily GHG Emissions (Tesoro).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0200	2031.42	0.2802
Cruising	Aux Generator	0.0052	529.8248	0.0731
Maneuvering	Main Engines	0.0003	31.9749	0.0044
Maneuvering	Aux Generator	0.0026	264.7323	0.0365
Boiler Warm-up	Boiler	0.0060	613.0000	0.0845
Berth Operations	Boiler	0.0781	7921.5918	1.0923
Berth Operations	Aux Generator	0.0250	2533.8663	0.3496
Propulsion	TOTAL	0.0282	2857.96	0.3942
Non-Propulsion	TOTAL	0.1091	11068.46	1.5265
Total Emissions		**0.1373**	**13926.42**	**1.9207**

Mode	Equipment	N_2O Emissions (tons/day	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	5.49E-05	5.57E+00	7.68E-04
Cruising	Aux Generator	1.43E-05	1.45E+00	2.00E-04
Maneuvering	Main Engines	8.65E-07	8.76E-02	1.21E-05
Maneuvering	Aux Generator	7.15E-06	7.25E-01	1.00E-04
Boiler Warm-up	Boiler	1.66E-05	1.68E+00	2.32E-04
Berth Operations	Boiler	2.14E-04	2.17E+01	2.99E-03
Berth Operations	Aux Generator	6.84E-05	6.94E+00	9.58E-04
Propulsion	TOTAL	7.72E-05	7.83E+00	1.08E-03
Non-Propulsion	TOTAL	2.99E-04	3.03E+01	4.18E-03
Total Emissions		**0.0004**	**38.15**	**0.0053**

Table H.2.NFA/NPA.Ts.GHG.2025-6. 2025 No Federal Action/No Project Alternative Tug Main Engines Average Daily GHG Emissions (Tesoro).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	87.0	0.00636	645.0	0.0890	0.0017	168.3450	0.0232
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	87.0	0.00636	645.0	0.0890	0.0017	168.3450	0.0232
								TOTAL				**0.0033**	**336.6900**	**0.0465**

Table H.2.NFA/NPA.Ts.GHG.2025-7. 2025 No Federal Action/No Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated Emissions (Tesoro).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	87.0	0.0068	690.0	0.0952	0.00022	22.51125	0.00311
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	87.0	0.0068	690.0	0.0952	0.00022	22.51125	0.00311
								TOTAL				**0.00044**	**45.02**	**0.00621**

Table H.2.NFA/NPA.Ts.GHG.2025-8. 2025 No Federal Action/No Project Alternative Summary of Tug Average Daily GHG Emissions (Tesoro).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0033	336.6900	0.0465
Tug Assist	Aux Generator	0.00044	45.02250	0.00621
	TOTAL	**0.0038**	**381.71**	**0.0527**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Tug Assist	Main Engines	9.10E-06	9.22E-01	1.27E-04
Tug Assist	Aux Generator	1.22E-06	1.23E-01	1.70E-05
	TOTAL	**1.03E-05**	**1.05E+00**	**1.44E-04**

Table H.2.NFA/NPA.Ts.GHG.2025-12. 2025 No Federal Action/No Project Alternative Tesoro Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0282	2857.96	0.3942	2874.97
Tanker Hoteling	0.0250	2533.87	0.3496	2548.95
Offloading Emissions	0.0781	7921.59	1.0923	7968.74
Transiting Operations	0.0060	613.00	0.0845	616.65
Tug Assistance	0.0038	381.71	0.0527	383.99
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.0179	9421.66	1.0532	9449.31
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.1589**	**23729.79**	**3.0266**	**23842.61**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	7.72E-05	7.83	1.08E-03	7.88
Tanker Hoteling	6.84E-05	6.94	9.58E-04	6.98
Offloading Emissions	2.14E-04	21.70	2.99E-03	21.83
Transiting Operations	1.66E-05	1.68	2.32E-04	1.69
Tug Assistance	1.03E-05	1.05	1.44E-04	1.05
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	4.89E-05	25.81	2.89E-03	25.89
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**4.35E-04**	**65.01**	**8.29E-03**	**65.32**

Table H.2.NFA/NPA.Ex.GHG.2025-1. 2025 No Federal Action/No Project Alternative Main Engines Average Daily GHG Emissions (Exxon Mobil).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	South In	Cruising - CW to VSR	23	12	1.92	15.8	0.438	10,300	8,649	30	146	0.0058	588.00	0.0811	0.0092	928.10	0.1280
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	14	146	0.0058	588.00	0.0811	0.0044	443.88	0.0612
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	2	146	0.0058	588.00	0.0811	0.0006	64.54	0.0089
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	0	146	0.0064	647.00	0.0895	0.0001	8.33	0.0012
PANAMAX	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	1	146	0.0064	647.00	0.0895	0.0004	38.54	0.0053
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	2	146	0.0058	588.00	0.0811	0.0005	48.06	0.0066
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	16	146	0.0058	588.00	0.0811	0.0050	504.40	0.0696
		Cruising - VSR to CW	24.5	12	2.04	15.8	0.438	10,300	9,213	31	146	0.0058	588.00	0.0811	0.0098	988.63	0.1364
														TOTAL	**0.0298**	**3024.48**	**0.4172**

Table H.2.NFA/NPA.Ex.GHG.2025-2. 2025 No Federal Action/No Project Alternative Auxiliary Generator Average Daily Unmitigated Emissions (Exxon Mobil).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	South In	Cruising	3.50	3,600	0.28	3,528	12	146	0.0068	690.00	0.0952	0.0044	444.26	0.0613
		Maneuvering	2.00	3,600	0.28	2,016	7	146	0.0068	690.00	0.0952	0.0025	253.86	0.0350
PANAMAX	South Out	Maneuvering	1.5	3,600	0.28	1,512	5	146	0.0068	690.00	0.0952	0.0019	190.40	0.0263
		Cruising	3.58	3,600	0.28	3,609	12	146	0.0068	690.00	0.0952	0.0045	454.42	0.0627
								TOTAL				**0.0132**	**1342.94**	**0.1853**

Table H.2.NFA/NPA.Ex.GHG.2025-3. 2025 No Federal Action/No Project Alternative Boiler Warm-Up Average Daily GHG Emissions (Exxon Mobil).

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	0.20	59.91	30%	3	35,000	36,688	0.0627	6,360.00	0.8770	0.00416	422.25	0.0582
									TOTAL		**0.00416**	**422.25**	**0.0582**

Table H.2.NFA/NPA.Ex.GHG.2025-4. 2025 No Federal Action/No Project Alternative Berth Operations Average Daily GHG Emissions (Exxon Mobil)

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0031	317.33	0.0438
AMP Reduction		70%			**TOTAL**							**0.0009**	**95.20**	**0.0131**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	59.91	30%	2.5	35,000	101,911	0.0627	6,360.0	0.8770	0.0035	351.87	0.0485
						TOTAL						**0.0035**	**351.87**	**0.0485**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	3,600	56%	11.0	75.7	140	0.0068	690.0	0.0952	0.0275	2792.51	0.3853
AMP Reduction		70%			**TOTAL**							**0.0083**	**837.75**	**0.1156**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	59.91	28.06	11.0	35,000	238,387	0.0627	6,360.0	0.8770	0.0270	2743.65	0.3783
					TOTAL							**0.0270**	**2743.65**	**0.3783**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0013	126.93	0.0175
AMP Reduction		70%			**TOTAL**							**0.0004**	**38.08**	**0.0053**

Table H.2.NFA/NPA.Ex.GHG.2025-5. 2025 No Federal Action/No Project Alternative Summary of Berth Operations Average Daily GHG Emissions (Exxon Mobil).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	2.94E-02	2977.61	4.11E-01
Cruising	Aux Generator	8.86E-03	898.68	1.24E-01
Maneuvering	Main Engines	4.63E-04	46.87	6.48E-03
Maneuvering	Aux Generator	4.38E-03	444.26	6.13E-02
Boiler Warm-up	Boiler	4.16E-03	422.25	5.82E-02
Berth Operations	Boiler	3.05E-02	3095.52	4.27E-01
Berth Operations	Aux Generator	9.57E-03	971.03	1.34E-01
Propulsion	TOTAL	4.31E-02	4367.42	6.02E-01
Non-Propulsion	TOTAL	0.04	4488.80	0.62
Total Emissions		**8.73E-02**	**8856.23**	**1.22E+00**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	8.05E-05	8.16	1.13E-03
Cruising	Aux Generator	2.43E-05	2.46	3.40E-04
Maneuvering	Main Engines	1.27E-06	0.13	1.78E-05
Maneuvering	Aux Generator	1.20E-05	1.22	1.68E-04
Boiler Warm-up	Boiler	1.14E-05	1.16	1.60E-04
Berth Operations	Boiler	8.36E-05	8.48	1.17E-03
Berth Operations	Aux Generator	2.62E-05	2.66	3.67E-04
Propulsion	TOTAL	1.18E-04	11.97	1.65E-03
Non-Propulsion	TOTAL	1.21E-04	12.30	1.70E-03
Total Emissions		**2.39E-04**	**24.26**	**3.35E-03**

Table H.2.NFA/NPA.Ex.GHG.2025-6. 2025 No Federal Action/No Project Alternative Tug Main Engines Average Daily GHG Emissions (Exxon Mobil).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	146.0	0.00636	645.0	0.0890	0.0028	282.51	0.0390
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	146.0	0.00636	645.0	0.0890	0.0028	282.51	0.0390
								TOTAL				**0.0056**	**565.02**	**0.0780**

Table H.2.NFA/NPA.Ex.GHG.2025-7. 2025 No Federal Action/No Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated Emissions (Exxon Mobil).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	146.0	0.0068	690.0	0.0952	0.00037	37.77750	0.0052
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	146.0	0.0068	690.0	0.0952	0.00037	37.77750	0.0052
								TOTAL				**0.00074**	**75.56**	**0.0104**

Table H.2.NFA/NPA.Ex.GHG.2025-8. 2025 No Federal Action/No Project Alternative Summary of Tug Average Daily GHG Emissions (Exxon Mobil).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0056	565.02	0.0780
Tug Assist	Aux Generatoı	0.00074	75.56	0.0104
	TOTAL	**0.0063**	**640.58**	**0.0884**

Table H.2.NFA/NPA.Ex.GHG.2025-12. 2025 No Federal Action/No Project Alternative Exxon Mobil Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0431	4367.42	0.6025	4393.43
Tanker Hoteling	0.0096	971.03	0.1340	976.81
Offloading Emissions	0.0305	3095.52	0.4269	3113.95
Transiting Operations	0.0042	422.25	0.0582	424.76
Tug Assistance	0.0063	640.58	0.0884	644.39
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.0192	10133.15	1.1327	10162.89
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.1128**	**19629.95**	**2.4426**	**19716.23**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	1.18E-04	11.97	1.65E-03	12.04
Tanker Hoteling	2.62E-05	2.66	3.67E-04	2.68
Offloading Emissions	8.36E-05	8.48	1.17E-03	8.53
Transiting Operations	1.14E-05	1.16	1.60E-04	1.16
Tug Assistance	1.73E-05	1.76	2.42E-04	1.77
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	5.26E-05	27.76	3.10E-03	27.84
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**3.09E-04**	**53.78**	**6.69E-03**	**54.02**

Table H.2.NFA/NPA.BP.GHG.2040-1. 2040 No Federal Action/No Project Alternative Main Engines Average Daily GHG Emissions (BP).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	34	0.0058	588.00	0.0811	0.0024	247.45	0.0341
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	34	0.0058	588.00	0.0811	0.0012	118.35	0.0163
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	34	0.0058	588.00	0.0811	0.0002	17.21	0.0024
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	34	0.0064	647.00	0.0895	0.0000	2.22	0.0003
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	34	0.0064	647.00	0.0895	0.0001	10.28	0.0014
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	34	0.0058	588.00	0.0811	0.0001	12.81	0.0018
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	34	0.0058	588.00	0.0811	0.0013	134.48	0.0185
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	34	0.0058	588.00	0.0811	0.0026	263.59	0.0364
										TOTAL	**0**	**4,822**	**1**	**0.0080**	**806.39**	**0.1112**

Table H.2.NFA/NPA.BP.GHG.2040-2. 2040 No Federal Action/No Project Alternative Auxiliary Generator Average Daily Unmitigated Emissions (BP).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising	3.50	3,600	0.28	3,533	34	0.0068	690.00	0.0952	0.0010	103.5994	0.0143
		Maneuvering	2.00	3,600	0.28	2,016	34	0.0068	690.00	0.0952	0.0006	59.1192	0.0082
	South Out	Maneuvering	1.5	3,600	0.28	1,512	34	0.0068	690.00	0.0952	0.0004	44.3394	0.0061
		Cruising	3.50	3,600	0.28	3,528	34	0.0068	690.00	0.0952	0.0010	103.4586	0.0143
							TOTAL	**0**	**2,760**	**0**	**0.0031**	**310.52**	**0.0428**

Table H.2.NFA/NPA.BP.GHG.2040-3. 2040 No Federal Action/No Project Alternative Boiler Warm-Up Average Daily GHG Emissions (Bl

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	0.20	102.17	30%	3	50,000	20,815	0.0627	6,360.00	0.8770	0.00236	239.56323	0.03303
						TOTAL		**0**	**6,360**	**1**	**0.00236**	**239.56**	**0.0330**

Table H.2.NFA/NPA.BP.GHG.2040-4. 2040 No Federal Action/No Project Alternative Berth Operations Average Daily GHG Emissions (BP).

Auxiliary Generator Pre-Pumpin

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	3,600	28%	2.5	0.0068	690.0	0.0952	0.00073	73.90	0.0102
AMP Reduction		0%										
					TOTAL		**0**	**690**	**0**	**0.00073**	**73.90**	**0.0102**

Boiler Pre-Pumpin

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	102.17	30%	2.5	50,000	57,819	0.0627	6,360.0	0.8770	0.00197	199.64	0.02753
						TOTAL			**0.0627**	**6,360.00**	**0.8770**	**0.00197**	**199.64**	**0.0275**

Auxiliary Generator Pumpin

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	3,600	56%	15.0	0.0068	690.00	0.0952	0.0087	886.7880	0.1224
AMP Reduction		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.0087**	**886.79**	**0.1224**

Boiler Pumpin

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	102.17	28.06	15.0	50,000	251,638	0.0627	6,360.00	0.8770	0.0286	2,896.16	0.3994
					TOTAL				**0**	**6,360**	**1**	**0.0286**	**2,896.16**	**0.3994**

Auxiliary Generator Post-Pumpin

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
34.0	Aframax	400,000	0.20	3,600	28%	1.0	0.0068	690.00	0.0952	0.00029	29.55960	0.00408
AMP Reduction		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.00029**	**29.56**	**0.0041**

Table H.2.NFA/NPA.BP.GHG.2040-5. 2040 No Federal Action/No Project Alternative Summary of Berth Operations Average Daily GHG Emissions (BP).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0078	793.8902	0.1095
Cruising	Aux Generator	0.0020	207.0580	0.0286
Maneuvering	Main Engines	0.0001	12.4960	0.0017
Maneuvering	Aux Generator	0.0010	103.4586	0.0143
Boiler Warm-up	Boiler	0.0024	239.5632	0.0330
Berth Operations	Boiler	0.0305	3095.7945	0.4269
Berth Operations	Aux Generator	0.0098	990.2466	0.1366
Propulsion	TOTAL	0.0110	1116.90	0.1541
Non-Propulsion	TOTAL	0.0426	4325.60	0.5965
Total Emissions		**0.0537**	**5442.51**	**0.7506**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	0.0000	2.18	0.0003
Cruising	Aux Generator	0.0000	0.57	0.0001
Maneuvering	Main Engines	0.0000	0.03	0.0000
Maneuvering	Aux Generator	0.0000	0.28	0.0000
Boiler Warm-up	Boiler	0.0000	0.66	0.0001
Berth Operations	Boiler	0.0001	8.48	0.0012
Berth Operations	Aux Generator	0.0000	2.71	0.0004
Propulsion	TOTAL	0.0000	3.06	0.0004
Non-Propulsion	TOTAL	0.0001	11.85	0.0016
Total Emissions		**0.0001**	**14.91**	**0.0021**

Table H.2.NFA/NPA.BP.GHG.2040-6. 2040 No Federal Action/No Project Alternative Tug Main Engines Average Daily GHG Emissions (BP).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	34.0	0.00636	645.0	0.0890	0.0006	65.7900	0.0091
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	34.0	0.00636	645.0	0.0890	0.0006	65.7900	0.0091
								TOTAL				**0.0013**	**131.5800**	**0.0182**

Table H.2.NFA/NPA.BP.GHG.2040-7. 2040 No Federal Action/No Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated Emissions (BP).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	34.0	0.0068	690.0	0.0952	0.00009	8.79750	0.00121
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	34.0	0.0068	690.0	0.0952	0.00009	8.79750	0.00121
								TOTAL				**0.00017**	**17.60**	**0.00243**

Table H.2.NFA/NPA.BP.GHG.2040-8.
2040 No Federal Action/No Project Alternative Summary of Tug Average Daily GHG Emissions (BP)

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0013	131.5800	0.0182
Tug Assist	Aux Generator	0.00017	17.59500	0.00243
	TOTAL	**0.0015**	**149.18**	**0.0206**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Tug Assist	Main Engines	3.55E-06	3.60E-01	4.97E-05
Tug Assist	Aux Generator	4.75E-07	4.82E-02	6.65E-06
	TOTAL	**4.03E-06**	**4.09E-01**	**5.64E-05**

Table H.2.NFA/NPA.BP.GHG.2040-12. 2040 No Federal Action/No Project Alternative BP Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0110	1,116.90	0.1541	1123.55
Tanker Hoteling	0.0098	990.25	0.1366	996.14
Offloading Emissions	0.0305	3,095.79	0.4269	3114.22
Transiting Operations	0.0024	239.56	0.0330	240.99
Tug Assistance	0.0015	149.18	0.0206	150.06
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.0166	8,782.52	0.9818	8808.30
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.0718**	**14,374.21**	**1.7530**	**14433.27**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	3.02E-05	3.06	4.22E-04	3.08
Tanker Hoteling	2.67E-05	2.71	3.74E-04	2.73
Offloading Emissions	8.36E-05	8.48	1.17E-03	8.53
Transiting Operations	6.47E-06	0.66	9.05E-05	0.66
Tug Assistance	4.03E-06	0.41	5.64E-05	0.41
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	4.56E-05	24.06	2.69E-03	24.13
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**1.97E-04**	**39.38**	**4.80E-03**	**39.54**

Table H.2.NFA/NPA.Ts.GHG.2040-1. 2040 No Federal Action/No Project Alternative Main Engines Average Daily GHG Emissions (Tesoro).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	87	0.0058	588.00	0.0811	0.0062	633.18	0.0873
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	87	0.0058	588.00	0.0811	0.0030	302.83	0.0418
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	87	0.0058	588.00	0.0811	0.0004	44.03	0.0061
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	87	0.0064	647.00	0.0895	0.0001	5.68	0.0008
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	87	0.0064	647.00	0.0895	0.0003	26.30	0.0036
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	87	0.0058	588.00	0.0811	0.0003	32.79	0.0045
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	87	0.0058	588.00	0.0811	0.0034	344.12	0.0475
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	87	0.0058	588.00	0.0811	0.0067	674.48	0.0930
										TOTAL	**0**	**4,822**	**1**	**0.0204**	**2,063.40**	**0.2846**

Table H.2.NFA/NPA.Ts.GHG.2040-2. 2040 No Federal Action/No Project Alternative Auxiliary Generator Average Daily Unmitigated Emissions (Tesoro).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising	3.50	3,600	0.28	3,533	87	0.0068	690.00	0.0952	0.0026	265.0925	0.0366
		Maneuvering	2.00	3,600	0.28	2,016	87	0.0068	690.00	0.0952	0.0015	151.2756	0.0209
	South Out	Maneuvering	1.5	3,600	0.28	1,512	87	0.0068	690.00	0.0952	0.0011	113.4567	0.0157
		Cruising	3.50	3,600	0.28	3,528	87	0.0068	690.00	0.0952	0.0026	264.7323	0.0365
							TOTAL	**0**	**2,760**	**0**	**0.0078**	**794.56**	**0.1096**

Table H.2.NFA/NPA.Ts.GHG.2040-3. 2040 No Federal Action/No Project Alternative Boiler Warm-Up Average Daily GHG Emissions (Tesoro).

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	0.20	102.17	30%	3	50,000	53,262	0.0627	6,360.00	0.8770	0.00604	613.00002	0.08453
						TOTAL		**0**	**6,360**	**1**	**0.00604**	**613.00**	**0.0845**

Table H.2.NFA/NPA.Ts.GHG.2040-4. 2040 No Federal Action/No Project Alternative Berth Operations Average Daily GHG Emissions (Tesoro).

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	0.20	3,600	28%	2.5	0.0068	690.00	0.0952	0.00186	189.09	0.0261
AMP Reduction		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.00186**	**189.09**	**0.0261**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	0.20	102.17	30%	2.5	50,000	147949.23	0.0627	6,360.0	0.8770	0.00504	510.83	0.07044
					TOTAL				**0.0627**	**6,360.00**	**0.8770**	**0.00504**	**510.83**	**0.0704**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	0.20	3,600	56%	15.0	0.0068	690.00	0.0952	0.0224	2,269.1340	0.3131
AMP Reduction		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.0224**	**2,269.13**	**0.3131**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	0.20	102.17	28.06	15.0	50,000	643898.47	0.0627	6,360.00	0.8770	0.0731	7,410.76	1.0219
					TOTAL				**0**	**6,360**	**1**	**0.0731**	**7,410.76**	**1.0219**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
87.0	Aframax	400,000	0.20	3,600	28%	1.0	0.0068	690.00	0.0952	0.00075	75.63780	0.01044
AMP Reduction		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.00075**	**75.64**	**0.0104**

Table H.2.NFA/NPA.Ts.GHG.2040-5. 2040 No Federal Action/No Project Alternative Summary of Berth Operations Average Daily GHG Emissions (Tesoro).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0200	2031.4249	0.2802
Cruising	Aux Generator	0.0052	529.8248	0.0731
Maneuvering	Main Engines	0.0003	31.9749	0.0044
Maneuvering	Aux Generator	0.0026	264.7323	0.0365
Boiler Warm-up	Boiler	0.0060	613.0000	0.0845
Berth Operations	Boiler	0.0781	7921.5918	1.0923
Berth Operations	Aux Generator	0.0250	2533.8663	0.3496
Propulsion	TOTAL	0.0282	2857.96	0.3942
Non-Propulsion	TOTAL	0.1091	11068.46	1.5265
Total Emissions		**0.1373**	**13926.42**	**1.9207**

Mode	Equipment	N_2O Emissions (tons/day	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	5.49E-05	5.57E+00	7.68E-04
Cruising	Aux Generator	1.43E-05	1.45E+00	2.00E-04
Maneuvering	Main Engines	8.65E-07	8.76E-02	1.21E-05
Maneuvering	Aux Generator	7.15E-06	7.25E-01	1.00E-04
Boiler Warm-up	Boiler	1.66E-05	1.68E+00	2.32E-04
Berth Operations	Boiler	2.14E-04	2.17E+01	2.99E-03
Berth Operations	Aux Generator	6.84E-05	6.94E+00	9.58E-04
Propulsion	TOTAL	7.72E-05	7.83E+00	1.08E-03
Non-Propulsion	TOTAL	2.99E-04	3.03E+01	4.18E-03
Total Emissions		**0.0004**	**38.15**	**0.0053**

Table H.2.NFA/NPA.Ts.GHG.2040-6. 2040 No Federal Action/No Project Alternative Tug Main Engines Average Daily GHG Emissions (Tesoro).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	87.0	0.00636	645.0	0.0890	0.0017	168.3450	0.0232
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	87.0	0.00636	645.0	0.0890	0.0017	168.3450	0.0232
								TOTAL				**0.0033**	**336.6900**	**0.0465**

Table H.2.NFA/NPA.Ts.GHG.2040-7. 2040 No Federal Action/No Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated Emissions (Tesoro).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	87.0	0.0068	690.0	0.0952	0.00022	22.51125	0.00311
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	87.0	0.0068	690.0	0.0952	0.00022	22.51125	0.00311
								TOTAL				**0.00044**	**45.02**	**0.00621**

Table H.2.NFA/NPA.Ts.GHG.2040-8. 2040 No Federal Action/No Project Alternative Summary of Tug Average Daily GHG Emissions (Tesoro).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0033	336.6900	0.0465
Tug Assist	Aux Generator	0.00044	45.02250	0.00621
	TOTAL	**0.0038**	**381.71**	**0.0527**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	9.10E-06	9.22E-01	1.27E-04
Tug Assist	Aux Generator	1.22E-06	1.23E-01	1.70E-05
	TOTAL	**1.03E-05**	**1.05E+00**	**1.44E-04**

Table H.2.NFA/NPA.Ts.GHG.2040-12. 2040 No Federal Action/No Project Alternative Tesoro Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0282	2,857.96	0.3942	2874.97
Tanker Hoteling	0.0250	2,533.87	0.3496	2548.95
Offloading Emissions	0.0781	7,921.59	1.0923	7968.74
Transiting Operations	0.0060	613.00	0.0845	616.65
Tug Assistance	0.0038	381.71	0.0527	383.99
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.0179	9,421.66	1.0532	9449.31
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.1589**	**23,729.79**	**3.0266**	**23842.61**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	7.72E-05	7.83	1.08E-03	7.88
Tanker Hoteling	6.84E-05	6.94	9.58E-04	6.98
Offloading Emissions	2.14E-04	21.70	2.99E-03	21.83
Transiting Operations	1.66E-05	1.68	2.32E-04	1.69
Tug Assistance	1.03E-05	1.05	1.44E-04	1.05
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	4.89E-05	25.81	2.89E-03	25.89
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**4.35E-04**	**65.01**	**8.29E-03**	**65.32**

Table H.2.NFA/NPA.Ex.GHG.2040-1. 2040 No Federal Action/No Project Alternative Main Engines Average Daily GHG Emissions (Exxon Mobil).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	South In	Cruising - CW to VSR	23	12	1.92	15.8	0.438	10,300	8,649	30	146	0.0058	588.00	0.0811	0.0092	928.10	0.1280
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	14	146	0.0058	588.00	0.0811	0.0044	443.88	0.0612
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	2	146	0.0058	588.00	0.0811	0.0006	64.54	0.0089
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	0	146	0.0064	647.00	0.0895	0.0001	8.33	0.0012
PANAMAX	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	1	146	0.0064	647.00	0.0895	0.0004	38.54	0.0053
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	2	146	0.0058	588.00	0.0811	0.0005	48.06	0.0066
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	16	146	0.0058	588.00	0.0811	0.0050	504.40	0.0696
		Cruising - VSR to CW	24.5	12	2.04	15.8	0.438	10,300	9,213	31	146	0.0058	588.00	0.0811	0.0098	988.63	0.1364
														TOTAL	**0.0298**	**3024.48**	**0.4172**

Table H.2.NFA/NPA.Ex.GHG.2040-2. 2040 No Federal Action/No Project Alternative Auxiliary Generator Average Daily Unmitigated Emissions (Exxon Mobil).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	South In	Cruising	3.50	3,600	0.28	3,528	12	146	0.0068	690.00	0.0952	0.0044	444.26	0.0613
		Maneuvering	2.00	3,600	0.28	2,016	7	146	0.0068	690.00	0.0952	0.0025	253.86	0.0350
PANAMAX	South Out	Maneuvering	1.5	3,600	0.28	1,512	5	146	0.0068	690.00	0.0952	0.0019	190.40	0.0263
		Cruising	3.58	3,600	0.28	3,609	12	146	0.0068	690.00	0.0952	0.0045	454.42	0.0627
								TOTAL				**0.0132**	**1342.94**	**0.1853**

Table H.2.NFA/NPA.Ex.GHG.2040-3. 2040 No Federal Action/No Project Alternative Boiler Warm-Up Average Daily GHG Emissions (Exxon Mobil).

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	0.20	59.91	30%	3	35,000	36,688	0.0627	6,360.00	0.8770	0.00416	422.25	0.0582
									TOTAL		**0.00416**	**422.25**	**0.0582**

Table H.2.NFA/NPA.Ex.GHG.2040-4. 2040 No Federal Action/No Project Alternative Berth Operations Average Daily GHG Emissions (Exxon Mobil).

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0031	317.33	0.0438
AMP Reduction		70%			**TOTAL**							**0.0009**	**95.20**	**0.0131**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	59.91	30%	2.5	35,000	101,911	0.0627	6,360.0	0.8770	0.0035	351.87	0.0485
					TOTAL							**0.0035**	**351.87**	**0.0485**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	3,600	56%	11.0	75.7	140	0.0068	690.0	0.0952	0.0275	2792.51	0.3853
AMP Reduction		70%			**TOTAL**							**0.0083**	**837.75**	**0.1156**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	59.91	28.06	11.0	35,000	238,387	0.0627	6,360.0	0.8770	0.0270	2743.65	0.3783
					TOTAL							**0.0270**	**2743.65**	**0.3783**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
146.0	Panamax	300,000	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0013	126.93	0.0175
AMP Reduction		70%			**TOTAL**							**0.0004**	**38.08**	**0.0053**

Table H.2.NFA/NPA.Ex.GHG.2040-5. 2040 No Federal Action/No Project Alternative Summary of Berth Operations Average Daily GHG Emissions (Exxon Mobil).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	2.94E-02	2977.61	4.11E-01
Cruising	Aux Generator	8.86E-03	898.68	1.24E-01
Maneuvering	Main Engines	4.63E-04	46.87	6.48E-03
Maneuvering	Aux Generator	4.38E-03	444.26	6.13E-02
Boiler Warm-up	Boiler	4.16E-03	422.25	5.82E-02
Berth Operations	Boiler	3.05E-02	3095.52	4.27E-01
Berth Operations	Aux Generator	9.57E-03	971.03	1.34E-01
Propulsion	TOTAL	4.31E-02	4367.42	6.02E-01
Non-Propulsion	TOTAL	0.04	4488.80	0.62
Total Emissions		**8.73E-02**	**8856.23**	**1.22E+00**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	8.05E-05	8.16	1.13E-03
Cruising	Aux Generator	2.43E-05	2.46	3.40E-04
Maneuvering	Main Engines	1.27E-06	0.13	1.78E-05
Maneuvering	Aux Generator	1.20E-05	1.22	1.68E-04
Boiler Warm-up	Boiler	1.14E-05	1.16	1.60E-04
Berth Operations	Boiler	8.36E-05	8.48	1.17E-03
Berth Operations	Aux Generator	2.62E-05	2.66	3.67E-04
Propulsion	TOTAL	1.18E-04	11.97	1.65E-03
Non-Propulsion	TOTAL	1.21E-04	12.30	1.70E-03
Total Emissions		**2.39E-04**	**24.26**	**3.35E-03**

Table H.2.NFA/NPA.Ex.GHG.2040-6. 2040 No Federal Action/No Project Alternative Tug Main Engines Average Daily GHG Emissions (Exxon Mobil).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	146.0	0.00636	645.0	0.0890	0.0028	282.51	0.0390
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	146.0	0.00636	645.0	0.0890	0.0028	282.51	0.0390
								TOTAL				**0.0056**	**565.02**	**0.0780**

Table H.2.NFA/NPA.Ex.GHG.2040-7. 2040 No Federal Action/No Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated Emissions (Exxon Mobil).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	146.0	0.0068	690.0	0.0952	0.00037	37.77750	0.0052
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	146.0	0.0068	690.0	0.0952	0.00037	37.77750	0.0052
								TOTAL				**0.00074**	**75.56**	**0.0104**

Table H.2.NFA/NPA.Ex.GHG.2040-8. 2040 No Federal Action/No Project Alternative Summary of Tug Average Daily GHG Emissions (Exxon Mobil).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0056	565.02	0.0780
Tug Assist	Aux Generator	0.00074	75.56	0.0104
	TOTAL	**0.0063**	**640.58**	**0.0884**

Table H.2.NFA/NPA.Ex.GHG.2040-12. 2040 No Federal Action/No Project Alternative Exxon Mobil Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0431	4,367.42	0.6025	4393.43
Tanker Hoteling	0.0096	971.03	0.1340	976.81
Offloading Emissions	0.0305	3,095.52	0.4269	3113.95
Transiting Operations	0.0042	422.25	0.0582	424.76
Tug Assistance	0.0063	640.58	0.0884	644.39
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.0192	10,133.15	1.1327	10162.89
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.1128**	**19,629.95**	**2.4426**	**19716.23**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	1.18E-04	11.97	1.65E-03	12.04
Tanker Hoteling	2.62E-05	2.66	3.67E-04	2.68
Offloading Emissions	8.36E-05	8.48	1.17E-03	8.53
Transiting Operations	1.14E-05	1.16	1.60E-04	1.16
Tug Assistance	1.73E-05	1.76	2.42E-04	1.77
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	5.26E-05	27.76	3.10E-03	27.84
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**3.09E-04**	**53.78**	**6.69E-03**	**54.02**

Table H.2.RPA.Un.GHG.2010-1. 2010 Reduced Project Alternative Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	15.54	1.42	16.9	0.777	25,400	27,957	26.0	0.0055	620.00	0.0818	0.0050	563.34	0.0743
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	26.0	0.0055	620.00	0.0818	0.0028	320.65	0.0423
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	26.0	0.0055	620.00	0.0818	0.0002	24.42	0.0032
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	26.0	0.0060	682.00	0.0902	0.0000	3.15	0.0004
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	26.0	0.0060	682.00	0.0902	0.0001	14.58	0.0019
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	26.0	0.0055	620.00	0.0818	0.0002	19.74	0.0026
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	26.0	0.0055	620.00	0.0818	0.0028	320.65	0.0423
		Cruising - VSR to CW	22	15.54	1.42	16.9	0.777	25,400	27,957	26.0	0.0055	620.00	0.0818	0.0050	563.34	0.0743
AFRAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	16.1	0.761	12,477	14,859	32.0	0.0055	620.00	0.0818	0.0032	368.51	0.0486
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	32.0	0.0055	620.00	0.0818	0.0010	117.45	0.0155
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	32.0	0.0055	620.00	0.0818	0.0002	17.08	0.0023
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	32.0	0.0060	682.00	0.0902	0.0000	2.20	0.0003
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	32.0	0.0060	682.00	0.0902	0.0001	10.19	0.0013
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	32.0	0.0055	620.00	0.0818	0.0001	12.72	0.0017
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	32.0	0.0055	620.00	0.0818	0.0012	133.46	0.0176
		Cruising - VSR to CW	24.5	14.7	1.67	16.1	0.761	12,477	15,828	32.0	0.0055	620.00	0.0818	0.0035	392.54	0.0518
PANAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	15.8	0.805	10,300	12,979	26	0.0055	620.00	0.0818	0.0023	261.52	0.0345
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	26	0.0055	620.00	0.0818	0.0007	83.35	0.0110
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	26	0.0055	620.00	0.0818	0.0001	12.12	0.0016
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	26	0.0060	682.00	0.0902	0.0000	1.56	0.0002
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	26	0.0060	682.00	0.0902	0.0001	7.24	0.0010
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	26	0.0055	620.00	0.0818	0.0001	9.02	0.0012
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	26	0.0055	620.00	0.0818	0.0008	94.71	0.0125
		Cruising - VSR to CW	24.5	14.7	1.67	15.8	0.805	10,300	13,825	26	0.0055	620.00	0.0818	0.0024	278.57	0.0368
SUEZMAX	North In	Cruising - CW to VSR	22	15.54	1.42	17	0.764	16,000	17,302	45	0.0055	620.00	0.0818	0.0053	603.41	0.0796
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	45	0.0055	620.00	0.0818	0.0030	343.45	0.0453
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	45	0.0055	620.00	0.0818	0.0002	26.16	0.0035
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	45	0.0060	682.00	0.0902	0.0000	3.37	0.0004
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	45	0.0060	682.00	0.0902	0.0001	15.62	0.0021
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	45	0.0055	620.00	0.0818	0.0002	21.15	0.0028
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	45	0.0055	620.00	0.0818	0.0030	343.45	0.0453
		Cruising - VSR to CW	22	15.54	1.42	17	0.764	16,000	17,302	45	0.0055	620.00	0.0818	0.0053	603.41	0.0796
										TOTAL	**0**	**20,336**	**3**	**0.0492**	**5592.14**	**0.7378**

Table H.2.RPA.Un.GHG.2010-2. 2010 Reduced Project Alternative Auxiliary Generator Average Daily Unmitigated GHG Emissions.

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	3.84	3,600	0.278	3,840	26.0	0.0055	620.00	0.0818	0.0007	77.38	0.0102
		Maneuvering	2.00	3,600	0.278	2,002	26.0	0.0060	682.00	0.0902	0.0004	44.37	0.0059
	North Out	Maneuvering	1.50	3,600	0.278	1,501	26.0	0.0060	682.00	0.0902	0.0003	33.27	0.0044
		Cruising	3.71	3,600	0.278	3,712	26.0	0.0055	620.00	0.0818	0.0007	74.79	0.0099
AFRAMAX	South In	Cruising	3.15	3,600	0.278	3,155	32.0	0.0055	620.00	0.0818	0.0007	78.25	0.0103
		Maneuvering	2.00	3,600	0.278	2,002	32.0	0.0060	682.00	0.0902	0.0005	54.60	0.0072
	South Out	Maneuvering	1.50	3,600	0.278	1,501	32.0	0.0060	682.00	0.0902	0.0004	40.95	0.0054
		Cruising	3.21	3,600	0.278	3,211	32.0	0.0055	620.00	0.0818	0.0007	79.63	0.0105
PANAMAX	South In	Cruising	3.15	3,600	0.28	3,178	26.0	0.0055	620.00	0.0818	0.0006	64.04	0.0084
		Maneuvering	2.00	3,600	0.28	2,016	26.0	0.0060	682.00	0.0902	0.0004	44.68	0.0059
	South Out	Maneuvering	1.5	3,600	0.28	1,512	26.0	0.0060	682.00	0.0902	0.0003	33.51	0.0044
		Cruising	3.21	3,600	0.28	3,234	26.0	0.0055	620.00	0.0818	0.0006	65.17	0.0086
SUEZMAX	North In	Cruising	3.84	3,600	0.28	3,868	45.0	0.0055	620.00	0.0818	0.0012	134.89	0.0178
		Maneuvering	2.00	3,600	0.28	2,016	45.0	0.0060	682.00	0.0902	0.0007	77.34	0.0102
	North Out	Maneuvering	1.5	3,600	0.28	1,512	45.0	0.0060	682.00	0.0902	0.0005	58.00	0.0077
		Cruising	3.71	3,600	0.28	3,738	45.0	0.0055	620.00	0.0818	0.0011	130.37	0.0172
							TOTAL	**0**	**10,416**	**1**	**0.0096**	**1091.25**	**0.1441**

Table H.2.RPA.Un.GHG.2010-3. 2010 Reduced Project Alternative Boiler Warm-Up Average Daily Unmitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	HFO	2.70	107.96	30%	3	50,000	20,700	0.0559	6,596.00	0.8390	0.0021	247.08	0.0314
26.0	VLCC	HFO	2.70	84.93	30%	3	90,000	23,817	0.0559	6,596.00	0.8390	0.0024	284.28	0.0362
26.0	Panamax	HFO	2.70	63.30	30%	3	35,000	6,903	0.0559	6,596.00	0.8390	0.0007	82.40	0.0105
45.0	Suezmax	HFO	2.70	87.54	30%	3	70,000	33,046	0.0559	6,596.00	0.8390	0.0033	394.45	0.0502
											TOTAL	**0.0085**	**1,008.21**	**0.1282**

Table H.2.RPA.Un.GHG.2010-4. 2010 Reduced Project Alternative Berth Operations Average Daily Unmitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	HFO	2.70	3,600	28%	2.5	0.0064	722.0	0.0952	0.0006	72.2578	0.0095
26.0	VLCC	2,000,000	HFO	2.70	3,600	28%	2.5	0.0064	722.0	0.0952	0.0005	58.7094	0.0077
26.0	Panamax	350,000	HFO	2.70	3,600	28%	2.5	0.0064	722.0	0.0952	0.0005	59.1318	0.0078
45.0	Suezmax	1,000,000	HFO	2.70	3,600	28%	2.5	0.0064	722.0	0.0952	0.0009	102.3435	0.0135
						TOTAL		**0**	**2,888**	**0**	**0.003**	**292.442**	**0.039**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	HFO	2.70	107.96	30%	2.5	50,000	57,501	0.0559	6,596.0	0.8390	0.0017	205.90	0.03
26.0	VLCC	2,000,000	HFO	2.70	84.93	30%	2.5	90,000	66,157	0.0559	6,596.0	0.8390	0.0020	236.90	0.03
26.0	Panamax	350,000	HFO	2.70	63.30	30%	2.5	35,000	19,175	0.0559	6,596.0	0.8390	0.0006	68.66	0.01
45.0	Suezmax	1,000,000	HFO	2.70	87.54	30%	2.5	70,000	91,795	0.0559	6,596.0	0.8390	0.0028	328.71	0.04
						TOTAL			**234,628**	**0**	**26,384**	**3**	**0.0071**	**840.18**	**0.1069**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	MDO	0.52	3,600	56%	15.0	0.0064	722.0	0.0952	0.008	867.093	0.114
26.0	VLCC	2,000,000	MDO	0.52	3,600	56%	23.2	0.0064	722.0	0.0952	0.010	1,090.691	0.144
26.0	Panamax	350,000	MDO	0.52	3,600	56%	11.0	0.0064	722.0	0.0952	0.005	520.360	0.069
45.0	Suezmax	1,000,000	MDO	0.52	3,600	56%	15.3	0.0064	722.0	0.0952	0.011	1,252.684	0.165
						TOTAL		**0**	**2,888**	**0**	**0.0330**	**3,730.83**	**0.4919**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	MDO	0.52	102.17	28.06	15.0	50,000	236,841	0.0559	6,596.0	0.8390	0.02	2,827.00	0.36
26.0	VLCC	2,000,000	MDO	0.52	80.38	28.06	23.2	90,000	378,553	0.0559	6,596.0	0.8390	0.04	4,518.51	0.57
26.0	Panamax	350,000	MDO	0.52	59.91	28.06	11.0	35,000	42,453	0.0559	6,596.0	0.8390	0.00	506.73	0.06
45.0	Suezmax	1,000,000	MDO	0.52	82.85	28.06	15.3	70,000	351,612	0.0559	6,596.0	0.8390	0.04	4,196.93	0.53
						TOTAL			**1,009,458**	**0**	**26,384**	**3**	**0.1021**	**12,049.17**	**1.5326**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	HFO	2.70	3,600	28%	1.0	0.0064	722.0	0.0952	0.0003	28.9031	0.0038
26.0	VLCC	2,000,000	HFO	2.70	3,600	28%	1.0	0.0064	722.0	0.0952	0.0002	23.6527	0.0031
26.0	Panamax	350,000	HFO	2.70	3,600	28%	1.0	0.0064	722.0	0.0952	0.0002	23.6527	0.0031
45.0	Suezmax	1,000,000	HFO	2.70	3,600	28%	1.0	0.0064	722.0	0.0952	0.0004	40.9374	0.0054
						TOTAL		**0**	**2,888**	**0**	**0.0010**	**117.1459**	**0.0154**

Table H.2.RPA.Un.GHG.2010-5. 2010 Reduced Project Alternative Summary of Average Daily Unmitigated Vessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0486	5534.23	0.7302
Cruising	Aux Generator	0.0062	704.51	0.0929
Maneuvering	Main Engines	0.0005	57.91	0.0077
Maneuvering	Aux Generator	0.0034	386.74	0.0511
Boiler Warm-up	Boiler	0.0085	1008.21	0.1282
Berth Operations	Boiler	0.1092	12889.35	1.6395
Berth Operations	Aux Generator	0.0366	4140.42	0.5459
Propulsion	TOTAL	0.0588	6683.39	0.8819
Non-Propulsion	TOTAL	0.1544	18037.97	2.3137
Total Emissions		**0.2132**	**24,721.36**	**3.20**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	1.33E-04	15.16	2.00E-03
Cruising	Aux Generator	1.70E-05	1.93	2.55E-04
Maneuvering	Main Engines	1.40E-06	0.16	2.10E-05
Maneuvering	Aux Generator	9.34E-06	1.06	1.40E-04
Boiler Warm-up	Boiler	2.34E-05	2.76	3.51E-04
Berth Operations	Boiler	2.99E-04	35.31	4.49E-03
Berth Operations	Aux Generator	1.00E-04	11.34	1.50E-03
Propulsion	TOTAL	1.61E-04	18.31	2.42E-03
Non-Propulsion	TOTAL	4.23E-04	49.42	6.34E-03
Total Emissions		**5.84E-04**	**67.73**	**8.76E-03**

Table H.2.RPA.Un.GHG.2010-6. 2010 Reduced Project Alternative Tug Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	4,800	0.50	2400	8.2	26.0	0.00636	645.0	0.0890	0.0005	50.3100	0.0069
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	26.0	0.00636	645.0	0.0890	0.0005	50.3100	0.0069
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	32.0	0.00636	645.0	0.0890	0.0006	61.9200	0.0085
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	32.0	0.00636	645.0	0.0890	0.0006	61.9200	0.0085
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	26.0	0.00636	645.0	0.0890	0.0005	50.3100	0.0069
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	26.0	0.00636	645.0	0.0890	0.0005	50.3100	0.0069
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	4,800	0.50	2400	8.2	45.0	0.00636	645.0	0.0890	0.0009	87.0750	0.0120
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	45.0	0.00636	645.0	0.0890	0.0009	87.0750	0.0120
								TOTAL				**0.0049**	**499.23**	**0.0689**

Table H.2.RPA.Un.GHG.2010-7. 2010 Reduced Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	300	1.00	300	1.0	26.0	0.0068	690.0	0.0952	0.00007	6.72750	0.00093
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	26.0	0.0068	690.0	0.0952	0.00007	6.72750	0.00093
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	32.0	0.0068	690.0	0.0952	0.00008	8.28000	0.00114
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	32.0	0.0068	690.0	0.0952	0.00008	8.28000	0.00114
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	26.0	0.0068	690.0	0.0952	0.00007	6.72750	0.00093
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	26.0	0.0068	690.0	0.0952	0.00007	6.72750	0.00093
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	300	1.00	300	1.0	45.0	0.0068	690.0	0.0952	0.00011	11.64375	0.00161
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	45.0	0.0068	690.0	0.0952	0.00011	11.64375	0.00161
								TOTAL				**0.0007**	**66.76**	**0.0092**

Table H.2.RPA.Un.GHG.2010-8. 2010 Reduced Project Alternative Summary of Tug Average Daily Unmitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0049	499.23	0.0689
Tug Assist	Aux Generator	0.0007	66.76	0.0092
	TOTAL	**0.0056**	**565.99**	**0.0781**

Table H.2.RPA.Un.GHG.2015-1. 2015 Reduced Project Alternative Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	15.54	1.42	16.9	0.777	25,400	27,957	95	46.0	0.0055	620.00	0.0818	0.0088	996.68	0.1315
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	54	46.0	0.0055	620.00	0.0818	0.0050	567.30	0.0748
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	4	46.0	0.0055	620.00	0.0818	0.0004	43.20	0.0057
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	0	46.0	0.0060	682.00	0.0902	0.0000	5.57	0.0007
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	2	46.0	0.0060	682.00	0.0902	0.0002	25.80	0.0034
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	3	46.0	0.0055	620.00	0.0818	0.0003	34.93	0.0046
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	54	46.0	0.0055	620.00	0.0818	0.0050	567.30	0.0748
		Cruising - VSR to CW	22	15.54	1.42	16.9	0.777	25,400	27,957	95	46.0	0.0055	620.00	0.0818	0.0088	996.68	0.1315
AFRAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	16.1	0.761	12,477	14,859	51	24.0	0.0055	620.00	0.0818	0.0024	276.38	0.0365
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	16	24.0	0.0055	620.00	0.0818	0.0008	88.08	0.0116
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	2	24.0	0.0055	620.00	0.0818	0.0001	12.81	0.0017
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	0	24.0	0.0060	682.00	0.0902	0.0000	1.65	0.0002
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	1	24.0	0.0060	682.00	0.0902	0.0001	7.65	0.0010
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	2	24.0	0.0055	620.00	0.0818	0.0001	9.54	0.0013
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	18	24.0	0.0055	620.00	0.0818	0.0009	100.10	0.0132
		Cruising - VSR to CW	24.5	14.7	1.67	16.1	0.761	12,477	15,828	54	24.0	0.0055	620.00	0.0818	0.0026	294.41	0.0388
PANAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	15.8	0.805	10,300	12,979	44	10	0.0055	620.00	0.0818	0.0009	100.58	0.0133
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	14	10	0.0055	620.00	0.0818	0.0003	32.06	0.0042
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	2	10	0.0055	620.00	0.0818	0.0000	4.66	0.0006
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	0	10	0.0060	682.00	0.0902	0.0000	0.60	0.0001
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	1	10	0.0060	682.00	0.0902	0.0000	2.78	0.0004
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	2	10	0.0055	620.00	0.0818	0.0000	3.47	0.0005
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	16	10	0.0055	620.00	0.0818	0.0003	36.43	0.0048
		Cruising - VSR to CW	24.5	14.7	1.67	15.8	0.805	10,300	13,825	47	10	0.0055	620.00	0.0818	0.0009	107.14	0.0141
SUEZMAX	North In	Cruising - CW to VSR	22	15.54	1.42	17	0.764	16,000	17,302	59	52	0.0055	620.00	0.0818	0.0061	697.27	0.0920
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	34	52	0.0055	620.00	0.0818	0.0035	396.88	0.0524
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	3	52	0.0055	620.00	0.0818	0.0003	30.23	0.0040
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	0	52	0.0060	682.00	0.0902	0.0000	3.90	0.0005
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	1	52	0.0060	682.00	0.0902	0.0002	18.05	0.0024
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	2	52	0.0055	620.00	0.0818	0.0002	24.44	0.0032
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	34	52	0.0055	620.00	0.0818	0.0035	396.88	0.0524
		Cruising - VSR to CW	22	15.54	1.42	17	0.764	16,000	17,302	59	52	0.0055	620.00	0.0818	0.0061	697.27	0.0920
														TOTAL	**0.0578**	**6580.73**	**0.8683**

Table H.2.RPA.Un.GHG.2015-2. 2015 Reduced Project Alternative Auxiliary Generator Average Daily Unmitigated GHG Emissions.

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	3.84	3,600	0.278	3,840	13	46.0	0.0055	620.00	0.0818	0.0012	136.90	0.0181
		Maneuvering	2.00	3,600	0.278	2,002	7	46.0	0.0060	682.00	0.0902	0.0007	78.49	0.0104
	North Out	Maneuvering	1.50	3,600	0.278	1,501	5	46.0	0.0060	682.00	0.0902	0.0005	58.87	0.0078
		Cruising	3.71	3,600	0.278	3,712	13	46.0	0.0055	620.00	0.0818	0.0012	132.32	0.0175
AFRAMAX	South In	Cruising	3.15	3,600	0.278	3,155	11	24.0	0.0055	620.00	0.0818	0.0005	58.69	0.0077
		Maneuvering	2.00	3,600	0.278	2,002	7	24.0	0.0060	682.00	0.0902	0.0004	40.95	0.0054
	South Out	Maneuvering	1.50	3,600	0.278	1,501	5	24.0	0.0060	682.00	0.0902	0.0003	30.71	0.0041
		Cruising	3.21	3,600	0.278	3,211	11	24.0	0.0055	620.00	0.0818	0.0005	59.72	0.0079
PANAMAX	South In	Cruising	3.15	3,600	0.28	3,178	11	10	0.0055	620.00	0.0818	0.0002	24.63	0.0032
		Maneuvering	2.00	3,600	0.28	2,016	7	10	0.0060	682.00	0.0902	0.0002	17.19	0.0023
	South Out	Maneuvering	1.5	3,600	0.28	1,512	5	10	0.0060	682.00	0.0902	0.0001	12.89	0.0017
		Cruising	3.21	3,600	0.28	3,234	11	10	0.0055	620.00	0.0818	0.0002	25.06	0.0033
SUEZMAX	North In	Cruising	3.84	3,600	0.28	3,868	13	52	0.0055	620.00	0.0818	0.0014	155.87	0.0206
		Maneuvering	2.00	3,600	0.28	2,016	7	52	0.0060	682.00	0.0902	0.0008	89.37	0.0118
	North Out	Maneuvering	1.5	3,600	0.28	1,512	5	52	0.0060	682.00	0.0902	0.0006	67.03	0.0089
		Cruising	3.71	3,600	0.28	3,738	13	52	0.0055	620.00	0.0818	0.0013	150.65	0.0199
								TOTAL				**0.0100**	**1139.35**	**0.1504**

Table H.2.RPA.Un.GHG.2015-3. 2015 Reduced Project Alternative Boiler Warm-Up Average Daily Unmitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	HFO	2.70	107.96	30%	3	50,000	15,525	0.0559	6,596.00	0.8390	0.0016	185.31	0.0236
46.0	VLCC	HFO	2.70	84.93	30%	3	90,000	42,137	0.0559	6,596.00	0.8390	0.0043	502.96	0.0640
10.0	Panamax	HFO	2.70	63.30	30%	3	35,000	2,655	0.0559	6,596.00	0.8390	0.0003	31.69	0.0040
52.0	Suezmax	HFO	2.70	87.54	30%	3	70,000	38,187	0.0559	6,596.00	0.8390	0.0039	455.81	0.0580
										TOTAL		**0.0100**	**1,175.77**	**0.1496**

Table H.2.RPA.Un.GHG.2015-4. 2015 Reduced Project Alternative Berth Operations Average Daily Unmitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	HFO	2.70	3,600	28%	2.5	8.5	150	0.0064	722.0	0.0952	0.0005	54.19	0.0071
46.0	VLCC	2,000,000	HFO	2.70	3,600	28%	2.5	8.5	150	0.0064	722.0	0.0952	0.0009	103.87	0.0137
10.0	Panamax	350,000	HFO	2.70	3,600	28%	2.5	8.6	150	0.0064	722.0	0.0952	0.0002	22.74	0.0030
52.0	Suezmax	1,000,000	HFO	2.70	3,600	28%	2.5	8.6	150	0.0064	722.0	0.0952	0.0010	118.26	0.0156
						TOTAL							**0.0026**	**299.07**	**0.0394**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	HFO	2.70	107.96	30%	2.5	50,000	43,126	0.0559	6,596.0	0.8390	0.0013	154.43	0.0196
46.0	VLCC	2,000,000	HFO	2.70	84.93	30%	2.5	90,000	117,047	0.0559	6,596.0	0.8390	0.0036	419.13	0.0533
10.0	Panamax	350,000	HFO	2.70	59.91	30%	2.5	35,000	6,980	0.0559	6,596.0	0.8390	0.0002	25.00	0.0032
52.0	Suezmax	1,000,000	HFO	2.70	82.85	30%	2.5	70,000	100,391	0.0559	6,596.0	0.8390	0.0030	359.49	0.0457
						TOTAL							**0.0081**	**958.04**	**0.1219**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	MDO	0.52	3,600	56%	15.0	102.4	140	0.0064	722.0	0.0952	0.0057	650.32	0.0857
46.0	VLCC	2,000,000	MDO	0.52	3,600	56%	23.2	158.4	140	0.0064	722.0	0.0952	0.0171	1927.84	0.2542
10.0	Panamax	350,000	MDO	0.52	3,600	56%	11.0	75.7	140	0.0064	722.0	0.0952	0.0018	200.14	0.0264
52.0	Suezmax	1,000,000	MDO	0.52	3,600	56%	15.3	105.2	140	0.0064	722.0	0.0952	0.0128	1447.55	0.1909
						TOTAL							**0.0374**	**4225.84**	**0.5572**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	MDO	0.52	102.17	28.06	15.0	50,000	177,631	0.0559	6,596.0	0.8390	0.0180	2120.25	0.2697
46.0	VLCC	2,000,000	MDO	0.52	80.38	28.06	23.2	90,000	669,107	0.0559	6,596.0	0.8390	0.0677	7986.64	1.0159
10.0	Panamax	350,000	MDO	0.52	59.91	28.06	11.0	35,000	16,328	0.0559	6,596.0	0.8390	0.0017	194.89	0.0248
52.0	Suezmax	1,000,000	MDO	0.52	82.85	28.06	15.3	70,000	406,307	0.0559	6,596.0	0.8390	0.0411	4849.79	0.6169
						TOTAL							**0.1284**	**15151.58**	**1.9273**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0002	21.68	0.0029
46.0	VLCC	2,000,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0004	41.55	0.0055
10.0	Panamax	350,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0001	9.10	0.0012
52.0	Suezmax	1,000,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0004	47.31	0.0062
						TOTAL							**0.0011**	**119.63**	**0.0158**

Table H.2.RPA.Un.GHG.2015-5. 2015 Reduced Project Alternative Summary of Average Daily Unmitigated Vessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0573	6514.74	0.8595
Cruising	Aux Generator	0.0065	743.85	0.0981
Maneuvering	Main Engines	0.0006	65.9923	0.0087
Maneuvering	Aux Generator	0.0035	395.5020	0.0523
Boiler Warm-up	Boiler	0.0100	1175.77	0.1496
Berth Operations	Boiler	0.1365	16109.62	2.0491
Berth Operations	Aux Generator	0.0411	4644.54	0.6124
Propulsion	TOTAL	0.0679	7720.08	1.0187
Non-Propulsion	TOTAL	0.1876	21929.93	2.8111
Total Emissions		**0.2555**	**29650.0078**	**3.8298**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	1.57E-04	17.8	2.35E-03
Cruising	Aux Generator	1.79E-05	2.0	2.69E-04
Maneuvering	Main Engines	1.59E-06	0.2	2.39E-05
Maneuvering	Aux Generator	9.55E-06	1.1	1.43E-04
Boiler Warm-up	Boiler	2.73E-05	3.2	4.10E-04
Berth Operations	Boiler	3.74E-04	44.1	5.61E-03
Berth Operations	Aux Generator	1.13E-04	12.7	1.68E-03
Propulsion	TOTAL	1.86E-04	21.2	2.79E-03
Non-Propulsion	TOTAL	5.14E-04	60.1	7.70E-03
Total Emissions		**7.00E-04**	**8.12E+01**	**1.05E-02**

Table H.2.RPA.Un.GHG.2015-6. 2015 Reduced Project Alternative Tug Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	4,800	0.50	2400	8.2	46.0	0.00636	645.0	0.0890	0.0009	89.0100	0.0123
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	46.0	0.00636	645.0	0.0890	0.0009	89.0100	0.0123
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	24.0	0.00636	645.0	0.0890	0.0005	46.4400	0.0064
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	24.0	0.00636	645.0	0.0890	0.0005	46.4400	0.0064
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	10.0	0.00636	645.0	0.0890	0.0002	19.3500	0.0027
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	10.0	0.00636	645.0	0.0890	0.0002	19.3500	0.0027
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	4,800	0.50	2400	8.2	52.0	0.00636	645.0	0.0890	0.0010	100.6200	0.0139
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	52.0	0.00636	645.0	0.0890	0.0010	100.6200	0.0139
								TOTAL				**0.0050**	**510.8400**	**0.0705**

Table H.2.RPA.Un.GHG.2015-7. 2015 Reduced Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	300	1.00	300	1.0	46.0	0.0068	690.0	0.0952	0.00012	11.90	0.00164
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	46.0	0.0068	690.0	0.0952	0.00012	11.90	0.00164
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	24.0	0.0068	690.0	0.0952	0.00006	6.21	0.00086
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	24.0	0.0068	690.0	0.0952	0.00006	6.21	0.00086
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	10.0	0.0068	690.0	0.0952	0.00003	2.59	0.00036
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	10.0	0.0068	690.0	0.0952	0.00003	2.59	0.00036
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	300	1.00	300	1.0	52.0	0.0068	690.0	0.0952	0.00013	13.46	0.00186
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	52.0	0.0068	690.0	0.0952	0.00013	13.46	0.00186
								TOTAL				**0.00067**	**68.31**	**0.00942**

Table H.2.RPA.Un.GHG.2015-8. 2015 Reduced Project Alternative Summary of Tug Average Daily Unmitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0050	510.84	0.0705
Tug Assist	Aux Generator	0.00067	68.31	0.00942
	TOTAL	**0.0057**	**579.15**	**0.0799**

Table H.2.RPA.Un.GHG.2025-1. 2025 Reduced Project Alternative Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	15.54	1.42	16.9	0.777	25,400	27,957	95	46	0.0055	620.00	0.0818	0.0088	996.68	0.1315
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	54	46	0.0055	620.00	0.0818	0.0050	567.30	0.0748
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	4	46	0.0055	620.00	0.0818	0.0004	43.20	0.0057
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	0	46	0.0060	682.00	0.0902	0.0000	5.57	0.0007
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	2	46	0.0060	682.00	0.0902	0.0002	25.80	0.0034
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	3	46	0.0055	620.00	0.0818	0.0003	34.93	0.0046
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	54	46	0.0055	620.00	0.0818	0.0050	567.30	0.0748
		Cruising - VSR to CW	22	15.54	1.42	16.9	0.777	25,400	27,957	95	46	0.0055	620.00	0.0818	0.0088	996.68	0.1315
AFRAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	16.1	0.761	12,477	14,859	51	24	0.0055	620.00	0.0818	0.0024	276.38	0.0365
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	16	24	0.0055	620.00	0.0818	0.0008	88.08	0.0116
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	2	24	0.0055	620.00	0.0818	0.0001	12.81	0.0017
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	0	24	0.0060	682.00	0.0902	0.0000	1.65	0.0002
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	1	24	0.0060	682.00	0.0902	0.0001	7.65	0.0010
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	2	24	0.0055	620.00	0.0818	0.0001	9.54	0.0013
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	18	24	0.0055	620.00	0.0818	0.0009	100.10	0.0132
		Cruising - VSR to CW	24.5	14.7	1.67	16.1	0.761	12,477	15,828	54	24	0.0055	620.00	0.0818	0.0026	294.41	0.0388
PANAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	15.8	0.805	10,300	12,979	44	10	0.0055	620.00	0.0818	0.0009	100.58	0.0133
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	14	10	0.0055	620.00	0.0818	0.0003	32.06	0.0042
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	2	10	0.0055	620.00	0.0818	0.0000	4.66	0.0006
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	0	10	0.0060	682.00	0.0902	0.0000	0.60	0.0001
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	1	10	0.0060	682.00	0.0902	0.0000	2.78	0.0004
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	2	10	0.0055	620.00	0.0818	0.0000	3.47	0.0005
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	16	10	0.0055	620.00	0.0818	0.0003	36.43	0.0048
		Cruising - VSR to CW	24.5	14.7	1.67	15.8	0.805	10,300	13,825	47	10	0.0055	620.00	0.0818	0.0009	107.14	0.0141
SUEZMAX	North In	Cruising - CW to VSR	22	15.54	1.42	17	0.764	16,000	17,302	59	52	0.0055	620.00	0.0818	0.0061	697.27	0.0920
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	34	52	0.0055	620.00	0.0818	0.0035	396.88	0.0524
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	3	52	0.0055	620.00	0.0818	0.0003	30.23	0.0040
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	0	52	0.0060	682.00	0.0902	0.0000	3.90	0.0005
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	1	52	0.0060	682.00	0.0902	0.0002	18.05	0.0024
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	2	52	0.0055	620.00	0.0818	0.0002	24.44	0.0032
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	34	52	0.0055	620.00	0.0818	0.0035	396.88	0.0524
		Cruising - VSR to CW	22	15.54	1.42	17	0.764	16,000	17,302	59	52	0.0055	620.00	0.0818	0.0061	697.27	0.0920
														TOTAL	**0.0578**	**6580.73**	**0.8683**

Table H.2.RPA.Un.GHG.2025-2. 2025 Reduced Project Alternative Auxiliary Generator Average Daily Unmitigated GHG Emissions.

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	3.84	3,600	0.278	3,840	13	46.0	0.0055	620.00	0.0818	0.0012	136.90	0.0181
		Maneuvering	2.00	3,600	0.278	2,002	7	46.0	0.0060	682.00	0.0902	0.0007	78.49	0.0104
	North Out	Maneuvering	1.50	3,600	0.278	1,501	5	46.0	0.0060	682.00	0.0902	0.0005	58.87	0.0078
		Cruising	3.71	3,600	0.278	3,712	13	46.0	0.0055	620.00	0.0818	0.0012	132.32	0.0175
AFRAMAX	South In	Cruising	3.15	3,600	0.278	3,155	11	24.0	0.0055	620.00	0.0818	0.0005	58.69	0.0077
		Maneuvering	2.00	3,600	0.278	2,002	7	24.0	0.0060	682.00	0.0902	0.0004	40.95	0.0054
	South Out	Maneuvering	1.50	3,600	0.278	1,501	5	24.0	0.0060	682.00	0.0902	0.0003	30.71	0.0041
		Cruising	3.21	3,600	0.278	3,211	11	24.0	0.0055	620.00	0.0818	0.0005	59.72	0.0079
PANAMAX	South In	Cruising	3.15	3,600	0.28	3,178	11	10	0.0055	620.00	0.0818	0.0002	24.63	0.0032
		Maneuvering	2.00	3,600	0.28	2,016	7	10	0.0060	682.00	0.0902	0.0002	17.19	0.0023
	South Out	Maneuvering	1.5	3,600	0.28	1,512	5	10	0.0060	682.00	0.0902	0.0001	12.89	0.0017
		Cruising	3.21	3,600	0.28	3,234	11	10	0.0055	620.00	0.0818	0.0002	25.06	0.0033
SUEZMAX	North In	Cruising	3.84	3,600	0.28	3,868	13	52	0.0055	620.00	0.0818	0.0014	155.87	0.0206
		Maneuvering	2.00	3,600	0.28	2,016	7	52	0.0060	682.00	0.0902	0.0008	89.37	0.0118
	North Out	Maneuvering	1.5	3,600	0.28	1,512	5	52	0.0060	682.00	0.0902	0.0006	67.03	0.0089
		Cruising	3.71	3,600	0.28	3,738	13	52	0.0055	620.00	0.0818	0.0013	150.65	0.0199
								TOTAL				**0.0100**	**1139.35**	**0.1504**

Table H.2.RPA.Un.GHG.2025-3. 2025 Reduced Project Alternative Boiler Warm-Up Average Daily Unmitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	2.70	107.96	30%	3	50,000	51,751	0.0559	6,596.00	0.8390	0.0052	617.71	0.0786
46.0	VLCC	2.70	84.93	30%	3	90,000	140,457	0.0559	6,596.00	0.8390	0.0142	1,676.53	0.2133
10.0	Panamax	2.70	63.30	30%	3	35,000	8,850	0.0559	6,596.00	0.8390	0.0009	105.64	0.0134
52.0	Suezmax	2.70	87.54	30%	3	70,000	127,289	0.0559	6,596.00	0.8390	0.0129	1,519.35	0.1933
									TOTAL		**0.0332**	**3,919.23**	**0.4985**

Table H.2.RPA.Un.GHG.2025-4. 2025 Reduced Project Alternative Berth Operations Average Daily Unmitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	HFO	2.70	3,600	28%	2.5	8.5	150	0.0064	722.0	0.0952	0.0005	54.19	0.0071
46.0	VLCC	2,000,000	HFO	2.70	3,600	28%	2.5	8.5	150	0.0064	722.0	0.0952	0.0009	103.87	0.0137
10.0	Panamax	350,000	HFO	2.70	3,600	28%	2.5	8.6	150	0.0064	722.0	0.0952	0.0002	22.74	0.0030
52.0	Suezmax	1,000,000	HFO	2.70	3,600	28%	2.5	8.6	150	0.0064	722.0	0.0952	0.0010	118.26	0.0156
						TOTAL							**0.0026**	**299.07**	**0.0394**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	HFO	2.70	107.96	30%	2.5	50,000	43,126	0.0559	6,596.0	0.8390	0.0013	154.43	0.0196
46.0	VLCC	2,000,000	HFO	2.70	84.93	30%	2.5	90,000	117,047	0.0559	6,596.0	0.8390	0.0036	419.13	0.0533
10.0	Panamax	350,000	HFO	2.70	59.91	30%	2.5	35,000	6,980	0.0559	6,596.0	0.8390	0.0002	25.00	0.0032
52.0	Suezmax	1,000,000	HFO	2.70	82.85	30%	2.5	70,000	100,391	0.0559	6,596.0	0.8390	0.0030	359.49	0.0457
						TOTAL							**0.0081**	**958.04**	**0.1219**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	MDO	0.52	3,600	56%	15.0	102.4	140	0.0064	722.0	0.0952	0.0057	650.32	0.0857
46.0	VLCC	2,000,000	MDO	0.52	3,600	56%	23.2	158.4	140	0.0064	722.0	0.0952	0.0171	1927.84	0.2542
10.0	Panamax	350,000	MDO	0.52	3,600	56%	11.0	75.7	140	0.0064	722.0	0.0952	0.0018	200.14	0.0264
52.0	Suezmax	1,000,000	MDO	0.52	3,600	56%	15.3	105.2	140	0.0064	722.0	0.0952	0.0128	1447.55	0.1909
						TOTAL							**0.0374**	**4225.84**	**0.5572**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	MDO	0.52	102.17	28.06	15.0	50,000	177,631	0.0559	6,596.0	0.8390	0.0180	2120.25	0.2697
46.0	VLCC	2,000,000	MDO	0.52	80.38	28.06	23.2	90,000	669,107	0.0559	6,596.0	0.8390	0.0677	7986.64	1.0159
10.0	Panamax	350,000	MDO	0.52	59.91	28.06	11.0	35,000	16,328	0.0559	6,596.0	0.8390	0.0017	194.89	0.0248
52.0	Suezmax	1,000,000	MDO	0.52	82.85	28.06	15.3	70,000	406,307	0.0559	6,596.0	0.8390	0.0411	4849.79	0.6169
							TOTAL						**0.1284**	**15151.58**	**1.9273**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0002	21.68	0.0029
46.0	VLCC	2,000,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0004	41.55	0.0055
10.0	Panamax	350,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0001	9.10	0.0012
52.0	Suezmax	1,000,000	HFO	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0004	47.31	0.0062
						TOTAL							**0.0011**	**119.63**	**0.0158**

Table H.2.RPA.Un.GHG.2025-5. 2025 Reduced Project Alternative Summary of Average Daily Unmitigated Vessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0573	6514.74	0.8595
Cruising	Aux Generator	0.0065	743.85	0.0981
Maneuvering	Main Engines	0.0006	65.99	0.0087
Maneuvering	Aux Generator	0.0035	395.50	0.0523
Boiler Warm-up	Boiler	0.0332	3919.23	0.4985
Berth Operations	Boiler	0.1365	16109.62	2.0491
Berth Operations	Aux Generator	0.0411	4644.54	0.6124
Propulsion	TOTAL	0.0679	7720.08	1.0187
Non-Propulsion	TOTAL	0.2108	24673.39	3.1600
Total Emissions		**0.2787**	**32393.47**	**4.1787**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	1.57E-04	17.85	2.35E-03
Cruising	Aux Generator	1.79E-05	2.04	2.69E-04
Maneuvering	Main Engines	1.59E-06	0.18	2.39E-05
Maneuvering	Aux Generator	9.55E-06	1.08	1.43E-04
Boiler Warm-up	Boiler	9.10E-05	10.74	1.37E-03
Berth Operations	Boiler	3.74E-04	44.14	5.61E-03
Berth Operations	Aux Generator	1.13E-04	12.72	1.68E-03
Propulsion	TOTAL	1.86E-04	21.15	2.79E-03
Non-Propulsion	TOTAL	5.78E-04	67.60	8.66E-03
Total Emissions		**7.64E-04**	**88.75**	**1.14E-02**

Table H.2.RPA.Un.GHG.2025-6. 2025 Reduced Project Alternative Tug Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	4,800	0.50	2400	8.2	46.0	0.00636	645.0	0.0890	0.0009	89.0100	0.0123
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	46.0	0.00636	645.0	0.0890	0.0009	89.0100	0.0123
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	24.0	0.00636	645.0	0.0890	0.0005	46.4400	0.0064
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	24.0	0.00636	645.0	0.0890	0.0005	46.4400	0.0064
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	10.0	0.00636	645.0	0.0890	0.0002	19.3500	0.0027
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	10.0	0.00636	645.0	0.0890	0.0002	19.3500	0.0027
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	4,800	0.50	2400	8.2	52.0	0.00636	645.0	0.0890	0.0010	100.6200	0.0139
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	52.0	0.00636	645.0	0.0890	0.0010	100.6200	0.0139
								TOTAL				**0.0050**	**510.8400**	**0.0705**

Table H.2.RPA.Un.GHG.2025-7. 2025 Reduced Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	300	1.00	300	1.0	46.0	0.0068	690.0	0.0952	0.00012	11.90	0.00164
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	46.0	0.0068	690.0	0.0952	0.00012	11.90	0.00164
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	24.0	0.0068	690.0	0.0952	0.00006	6.21	0.00086
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	24.0	0.0068	690.0	0.0952	0.00006	6.21	0.00086
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	10.0	0.0068	690.0	0.0952	0.00003	2.59	0.00036
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	10.0	0.0068	690.0	0.0952	0.00003	2.59	0.00036
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	300	1.00	300	1.0	52.0	0.0068	690.0	0.0952	0.00013	13.46	0.00186
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	52.0	0.0068	690.0	0.0952	0.00013	13.46	0.00186
								TOTAL				**0.00067**	**68.31**	**0.00942**

Table H.2.RPA.Un.GHG.2025-8. 2025 Reduced Project Alternative Summary of Tug Average Daily Unmitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0050	510.84	0.0705
Tug Assist	Aux Generator	0.00067	68.31	0.00942
	TOTAL	**0.0057**	**579.15**	**0.0799**

Table H.2.RPA.Un.GHG.2025-12. 2025 Reduced Project Alternative Main Engines Average Daily Unmitigated GHG Emissions (BP).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	Dist at 0.2	27	0.0058	588.00	0.0811	0.0019	196.51	0.0271
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	Dist at 0.2	27	0.0058	588.00	0.0811	0.0009	93.98	0.0130
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	Dist at 0.2	27	0.0058	588.00	0.0811	0.0001	13.66	0.0019
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	Dist at 0.2	27	0.0064	647.00	0.0895	0.0000	1.76	0.0002
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	Dist at 0.2	27	0.0064	647.00	0.0895	0.0001	8.16	0.0011
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	Dist at 0.2	27	0.0058	588.00	0.0811	0.0001	10.18	0.0014
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	Dist at 0.2	27	0.0058	588.00	0.0811	0.0011	106.80	0.0147
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	Dist at 0.2	27	0.0058	588.00	0.0811	0.0021	209.32	0.0289
											TOTAL				**0.0063**	**640.37**	**0.0883**

Table H.2.RPA.Un.GHG.2025-13. 2025 Reduced Project Alternative Auxiliary Generator Average Daily Unmitigated GHG Emissions

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising	3.50	3,600	0.28	3,533	Dist at 0.2	27	0.0068	690.00	0.0952	0.0008	82.2701	0.0114
		Maneuvering	2.00	3,600	0.28	2,016	Dist at 0.2	27	0.0068	690.00	0.0952	0.0005	46.9476	0.0065
	South Out	Maneuvering	1.5	3,600	0.28	1,512	Dist at 0.2	27	0.0068	690.00	0.0952	0.0003	35.2107	0.0049
		Cruising	3.50	3,600	0.28	3,528	Dist at 0.2	27	0.0068	690.00	0.0952	0.0008	82.1583	0.0113
								TOTAL				**0.0024**	**246.59**	**0.0340**

Table H.2.RPA.Un.GHG.2025-14. 2025 Reduced Project Alternative Boiler Warm-Up Average Daily Unmitigated GHG Emissions (BP).

Shipcalls (vessels/yr)	Vessel Size	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
27.0	Aframax	Dist at 0.2	0.20	102.17	30%	3	50,000	16,530	0.0627	6,360.00	0.8770	0.00188	190.24139	0.02623
							TOTAL					**0.00188**	**190.24**	**0.0262**

Table H.2.RPA.Un.GHG.2025-15. 2025 Reduced Project Alternative Berth Operations Average Daily Unmitigated GHG Emissions (BP).

Auxiliary Generator Pre-Pumpin

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
27.0	Aframax	400,000	Dist at 0.2	0.20	3,600	28%	2.5	0.0068	690.0	0.0952	0.00058	58.68	0.0081

AMP Reduction 0%

TOTAL **0.00058** **58.68** **0.0081**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
27.0	Aframax	400,000	Dist at 0.2	0.20	102.17	30%	2.5	50,000	45,915	0.0627	6,360.0	0.8770	0.00156	158.53	0.02186

TOTAL **0.00156** **158.53** **0.0219**

Auxiliary Generator Pumpin

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
27.0	Aframax	400,000	Dist at 0.2	0.20	3,600	56%	15.0	0.0068	690.0	0.0952	0.0069	704.2140	0.0972

AMP Reduction 0%

TOTAL **0.0069** **704.21** **0.0972**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
27.0	Aframax	400,000	Dist at 0.2	0.20	102.17	28.06	15.0	50,000	199,831	0.0627	6,360.00	0.8770	0.0227	2,299.89	0.3171

TOTAL **0.0227** **2,299.89** **0.3171**

Auxiliary Generator Post-Pumpin

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
27.0	Aframax	400,000	Dist at 0.2	0.20	3,600	28%	1.0	0.0068	690.0	0.0952	0.00023	23.47380	0.00324

AMP Reduction 0%

TOTAL **0.00023** **23.47** **0.0032**

Table H.2.RPA.Un.GHG.2025-16. 2025 Reduced Project Alternative Summary of Average Daily Unmitigated Vessel GHG Emissions (BP).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0062	630.44	0.0870
Cruising	Aux Generator	0.0016	164.43	0.0227
Maneuvering	Main Engines	0.0001	9.92	0.0014
Maneuvering	Aux Generator	0.0008	82.16	0.0113
Boiler Warm-up	Boiler	0.0019	190.24	0.0262
Berth Operations	Boiler	0.0242	2458.43	0.3390
Berth Operations	Aux Generator	0.0077	786.37	0.1085
Propulsion	TOTAL	0.0087	886.95	0.1223
Non-Propulsion	TOTAL	0.0339	3435.04	0.4737
Total Emissions		**0.0426**	**4321.99**	**0.5961**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	1.70E-05	1.73	2.38E-04
Cruising	Aux Generator	4.44E-06	0.45	6.22E-05
Maneuvering	Main Engines	2.69E-07	0.03	3.76E-06
Maneuvering	Aux Generator	2.22E-06	0.23	3.11E-05
Boiler Warm-up	Boiler	5.14E-06	0.52	7.19E-05
Berth Operations	Boiler	6.64E-05	6.74	9.29E-04
Berth Operations	Aux Generator	2.12E-05	2.15	2.97E-04
Propulsion	TOTAL	2.40E-05	2.43	3.35E-04
Non-Propulsion	TOTAL	9.28E-05	9.41	1.30E-03
Total Emissions		**1.17E-04**	**11.84**	**1.63E-03**

Table H.2.RPA.Un.GHG.2025-17. 2025 Reduced Project Alternative Tug Main Engines Average Daily Unmitigated GHG Emissions (BP).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	MGO	2400	8.2	27.0	0.00636	645.0	0.0890	0.0005	52.2450	0.0072
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	MGO	2400	8.2	27.0	0.00636	645.0	0.0890	0.0005	52.2450	0.0072
									TOTAL				**0.0010**	**104.4900**	**0.0144**

Table H.2.RPA.Un.GHG.2025-18. 2025 Reduced Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions (BP).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	MGO	300	1.0	27.0	0.0068	690.0	0.0952	0.00007	6.98625	0.00096
	Maneuvering - Berth to Pilo	1.00	2	300	1.00	MGO	300	1.0	27.0	0.0068	690.0	0.0952	0.00007	6.98625	0.00096
									TOTAL				**0.00014**	**13.97**	**0.00193**

Table H.2.RPA.Un.GHG.2025-19. 2025 Reduced Project Alternative Summary of Tug Average Daily Unmitigated GHG Emissions (BP).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0010	104.4900	0.0144
Tug Assist	Aux Generatoı	0.00014	13.97250	0.00193
	TOTAL	**0.0012**	**118.46**	**0.0163**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	2.82E-06	2.86E-01	3.95E-05
Tug Assist	Aux Generatoı	3.77E-07	3.83E-02	5.28E-06
	TOTAL	**3.20E-06**	**3.25E-01**	**4.48E-05**

Table H.2.RPA.Un.GHG.2025-23. 2025 Reduced Project Alternative BP Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0087	886.95	0.1223	892.23
Tanker Hoteling	0.0077	786.37	0.1085	791.05
Offloading Emissions	0.0242	2,458.43	0.3390	2473.06
Transiting Operations	0.0019	190.24	0.0262	191.37
Tug Assistance	0.0012	118.46	0.0163	119.17
Tanks	- - -	- - -	- - -	---
Vapor Destruction Units	0.0165	8,698.11	0.9723	8723.64
Valves, Flanges, Pumps	- - -	- - -	- - -	---
TOTAL	**0.0603**	**13,138.56**	**1.5847**	**13190.52**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	2.40E-05	2.43E+00	3.35E-04	2.44
Tanker Hoteling	2.12E-05	2.15E+00	2.97E-04	2.17
Offloading Emissions	6.64E-05	6.74E+00	9.29E-04	6.78
Transiting Operations	5.14E-06	5.21E-01	7.19E-05	0.52
Tug Assistance	3.20E-06	3.25E-01	4.48E-05	0.33
Tanks	- - -	- - -	- - -	---
Vapor Destruction Units	4.52E-05	2.38E+01	2.66E-03	23.90
Valves, Flanges, Pumps	- - -	- - -	- - -	---
TOTAL	**1.65E-04**	**3.60E+01**	**4.34E-03**	**36.14**

Table H.2.RPA.Un.GHG.2025-24. 2025 Reduced Project Alternative Main Engines Average Daily Unmitigated GHG Emissions (Tesoro).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	68	0.0058	588.00	0.0811	0.0049	494.90	0.0683
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	68	0.0058	588.00	0.0811	0.0023	236.69	0.0326
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	68	0.0058	588.00	0.0811	0.0003	34.41	0.0047
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	68	0.0064	647.00	0.0895	0.0000	4.44	0.0006
	0%	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	68	0.0064	647.00	0.0895	0.0002	20.55	0.0028
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	68	0.0058	588.00	0.0811	0.0003	25.63	0.0035
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	68	0.0058	588.00	0.0811	0.0027	268.97	0.0371
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	68	0.0058	588.00	0.0811	0.0052	527.18	0.0727
										TOTAL	**0**	**4,822**	**1**	**0.0159**	**1,612.77**	**0.2225**

Table H.2.RPA.Un.GHG.2025-25. 2025 Reduced Project Alternative Auxiliary Generator Average Daily Unmitigated GHG Emissions (Tesoro).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising	3.50	3,600	0.28	3,533	68	0.0068	690.00	0.0952	0.0020	207.1987	0.0286
		Maneuvering	2.00	3,600	0.28	2,016	68	0.0068	690.00	0.0952	0.0012	118.2384	0.0163
	South Out	Maneuvering	1.5	3,600	0.28	1,512	68	0.0068	690.00	0.0952	0.0009	88.6788	0.0122
		Cruising	3.50	3,600	0.28	3,528	68	0.0068	690.00	0.0952	0.0020	206.9172	0.0285
							TOTAL	**0**	**2,760**	**0**	**0.0061**	**621.03**	**0.0857**

Table H.2.RPA.Un.GHG.2025-26. 2025 Reduced Project Alternative Boiler Warm-Up Average Daily Unmitigated GHG Emissions (Tesor

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
68.0	Aframax	0.20	102.17	30%	3	50,000	41,630	0.0627	6,360.00	0.8770	0.00472	479.12645	0.06607
						TOTAL		**0**	**6,360**	**1**	**0.00472**	**479.13**	**0.0661**

Table H.2.RPA.Un.GHG.2025-27. 2025 Reduced Project Alternative Berth Operations Average Daily Unmitigated GHG Emissions (Tesoro).

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
68.0	Aframax	400,000	0.20	3,600	28%	2.5	0.0068	690.00	0.0952	0.00146	147.80	0.0204
AMP Reduction		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.00146**	**147.80**	**0.0204**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
68.0	Aframax	400,000	0.20	102.17	30%	2.5	50,000	115638.48	0.0627	6,360.0	0.8770	0.00394	399.27	0.05506
AMP Reduction		0%												
					TOTAL				**0.0627**	**6,360.00**	**0.8770**	**0.00394**	**399.27**	**0.0551**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
68.0	Aframax	400,000	0.20	3,600	56%	15.0	0.0068	690.00	0.0952	0.0175	1,773.5760	0.2447
AMP Reduction		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.0175**	**1,773.58**	**0.2447**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
68.0	Aframax	400,000	0.20	102.17	28.06	15.0	50,000	503276.96	0.0627	6,360.00	0.8770	0.0571	5,792.32	0.7987
AMP Reduction		0%												
						TOTAL			**0**	**6,360**	**1**	**0.0571**	**5,792.32**	**0.7987**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
68.0	Aframax	400,000	0.20	3,600	28%	1.0	0.0068	690.00	0.0952	0.00058	59.11920	0.00816
AMP Reduction		0%										
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.00058**	**59.12**	**0.0082**

Table H.2.RPA.Un.GHG.2025-28. 2025 Reduced Project Alternative Summary of Average Daily Unmitigated Vessel GHG Emissions (Tesoro).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0157	1587.7804	0.2190
Cruising	Aux Generator	0.0041	414.1159	0.0571
Maneuvering	Main Engines	0.0002	24.9919	0.0035
Maneuvering	Aux Generator	0.0020	206.9172	0.0285
Boiler Warm-up	Boiler	0.0047	479.1265	0.0661
Berth Operations	Boiler	0.0000	6191.5890	0.8538
Berth Operations	Aux Generator	0.0195	1980.4932	0.2733
Propulsion	TOTAL	0.0220	2233.81	0.3081
Non-Propulsion	TOTAL	0.0242	8651.21	1.1931
Total Emissions		**0.0463**	**10885.01**	**1.5012**

Mode	Equipment	N_2O Emissions (tons/day	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	4.29E-05	4.35E+00	6.00E-04
Cruising	Aux Generator	1.12E-05	1.13E+00	1.57E-04
Berth Operations	Boiler	0.0000	6.85E-02	9.47E-06
Maneuvering	Aux Generator	5.59E-06	5.67E-01	7.82E-05
Boiler Warm-up	Boiler	1.29E-05	1.31E+00	1.81E-04
Berth Operations	Boiler	0.00E+00	1.70E+01	2.34E-03
Berth Operations	Aux Generator	5.35E-05	5.43E+00	7.49E-04
Propulsion	TOTAL	5.97E-05	6.12E+00	8.44E-04
Non-Propulsion	TOTAL	6.64E-05	2.37E+01	3.27E-03
Total Emissions		**0.0001**	**29.82**	**0.0041**

Table H.2.RPA.Un.GHG.2025-29. 2025 Reduced Project Alternative Tug Main Engines Average Daily Unmitigated GHG Emissions (Tesoro).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N2O Emission Factor (g/kWh)	CO2 Emission Factor (g/kWh)	CH4 Emission Factor (g/kWh)	N2O Emissions (tons/yr)	CO2 Emissions (tons/yr)	CH4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	MGO	2400	8.2	68.0	0.00636	645.0	0.0890	0.0013	131.5800	0.0182
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	MGO	2400	8.2	68.0	0.00636	645.0	0.0890	0.0013	131.5800	0.0182
									TOTAL				**0.0026**	**263.1600**	**0.0363**

Table H.2.RPA.Un.GHG.2025-30. 2025 Reduced Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions (Tesoro).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N2O Emission Factor (g/kWh)	CO2 Emission Factor (g/kWh)	CH4 Emission Factor (g/kWh)	N2O Emissions (tons/yr)	CO2 Emissions (tons/yr)	CH4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	MGO	300	1.0	68.0	0.0068	690.0	0.0952	0.00017	17.59500	0.00243
	Maneuvering - Berth to Pilo	1.00	2	300	1.00	MGO	300	1.0	68.0	0.0068	690.0	0.0952	0.00017	17.59500	0.00243
									TOTAL				**0.00035**	**35.19**	**0.00486**

Table H.2.RPA.Un.GHG.2025-31. 2025 Reduced Project Alternative Summary of Tug Average Daily Unmitigated GHG Emissions (Tesoro).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0026	263.1600	0.0363
Tug Assist	Aux Generator	0.00035	35.19000	0.00486
	TOTAL	**0.0029**	**298.35**	**0.0412**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	7.11E-06	7.21E-01	9.95E-05
Tug Assist	Aux Generator	9.50E-07	9.64E-02	1.33E-05
	TOTAL	**8.06E-06**	**8.17E-01**	**1.13E-04**

Table H.2.RPA.Un.GHG.2025-35. 2025 Reduced Project Alternative Tesoro Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0220	2,233.81	0.3081	2247.11
Tanker Hoteling	0.0195	1,980.49	0.2733	1992.28
Offloading Emissions	0.0000	6,191.59	0.8538	6209.52
Transiting Operations	0.0047	479.13	0.0661	481.98
Tug Assistance	0.0029	298.35	0.0412	300.13
Tanks	- - -	- - -	- - -	---
Vapor Destruction Units	0.0174	9,192.54	1.0276	9219.51
Valves, Flanges, Pumps	- - -	- - -	- - -	---
TOTAL	**0.0666**	**20,375.90**	**2.5700**	**20450.53**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	6.04E-05	6.12	8.44E-04	6.16
Tanker Hoteling	5.35E-05	5.43	7.49E-04	5.46
Offloading Emissions	0.00E+00	16.96	2.34E-03	17.01
Transiting Operations	1.29E-05	1.31	1.81E-04	1.32
Tug Assistance	8.06E-06	0.82	1.13E-04	0.82
Tanks	- - -	- - -	- - -	---
Vapor Destruction Units	4.77E-05	25.19	2.82E-03	25.26
Valves, Flanges, Pumps	- - -	- - -	- - -	---
TOTAL	**1.83E-04**	**55.82**	**7.04E-03**	**56.03**

Table H.2.RPA.Un.GHG.2025-36. 2025 Reduced Project Alternative Main Engines Average Daily Unmitigated GHG Emissions (Exxon Mobil).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	South In	Cruising - CW to VSR	23	12	1.92	15.8	0.438	10,300	8,649	30	114	0.0058	588.00	0.0811	0.0071	724.68	0.1000
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	14	114	0.0058	588.00	0.0811	0.0034	346.59	0.0478
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	2	114	0.0058	588.00	0.0811	0.0005	50.39	0.0070
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	0	114	0.0064	647.00	0.0895	0.0001	6.50	0.0009
PANAMAX	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	1	114	0.0064	647.00	0.0895	0.0003	30.10	0.0042
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	2	114	0.0058	588.00	0.0811	0.0004	37.53	0.0052
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	16	114	0.0058	588.00	0.0811	0.0039	393.85	0.0543
		Cruising - VSR to CW	24.5	12	2.04	15.8	0.438	10,300	9,213	31	114	0.0058	588.00	0.0811	0.0076	771.95	0.1065
														TOTAL	**0.0233**	**2361.58**	**0.3257**

Table H.2.RPA.Un.GHG.2025-37. 2025 Reduced Project Alternative Auxiliary Generator Average Daily Unmitigated GHG Emissions (Exxon Mobil).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	South In	Cruising	3.50	3,600	0.28	3,528	12	114	0.0068	690.00	0.0952	0.0034	346.89	0.0479
		Maneuvering	2.00	3,600	0.28	2,016	7	114	0.0068	690.00	0.0952	0.0020	198.22	0.0273
PANAMAX	South Out	Maneuvering	1.5	3,600	0.28	1,512	5	114	0.0068	690.00	0.0952	0.0015	148.67	0.0205
		Cruising	3.58	3,600	0.28	3,609	12	114	0.0068	690.00	0.0952	0.0035	354.82	0.0490
								TOTAL				**0.0103**	**1048.60**	**0.1447**

Table H.2.RPA.Un.GHG.2025-38. 2025 Reduced Project Alternative Boiler Warm-Up Average Daily Unmitigated GHG Emissions (Exxon Mobil).

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
114.0	Panamax	0.20	59.91	30%	3	35,000	28,647	0.0627	6,360.00	0.8770	0.00325	329.70	0.0455
									TOTAL		**0.00325**	**329.70**	**0.0455**

Table H.2.RPA.Un.GHG.2025-39. 2025 Reduced Project Alternative Berth Operations Average Daily Unmitigated GHG Emissions (Exxon Mobil).

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
114.0	Panamax	300,000	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0024	247.78	0.0342
AMP Reduction		70%												
					TOTAL							**0.0007**	**74.3337**	**0.0103**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
114.0	Panamax	300,000	0.20	59.91	30%	2.5	35,000	79,574	0.0627	6,360.0	0.8770	0.0027	274.75	0.0379
					TOTAL							**0.0027**	**274.75**	**0.0379**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
114.0	Panamax	300,000	0.20	3,600	56%	11.0	75.7	140	0.0068	690.0	0.0952	0.0215	2180.46	0.3008
AMP Reduction		70%												
					TOTAL							**0.0064**	**654.1366**	**0.0903**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
114.0	Panamax	300,000	0.20	59.91	28.06	11.0	35,000	186,138	0.0627	6,360.0	0.8770	0.0211	2142.30	0.2954
					TOTAL							**0.0211**	**2142.30**	**0.2954**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
114.0	Panamax	300,000	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0010	99.11	0.0137
AMP Reduction		70%												
					TOTAL							**0.0003**	**29.7335**	**0.0041**

Table H.2.RPA.Un.GHG.2025-40. 2025 Reduced Project Alternative Summary of Average Daily Unmitigated Vessel GHG Emissions (Exxon Mobil).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	2.29E-02	2324.98	0.321
Cruising	Aux Generator	6.92E-03	701.71	0.097
Maneuvering	Main Engines	3.61E-04	36.60	0.005
Maneuvering	Aux Generator	3.42E-03	346.89	0.048
Boiler Warm-up	Boiler	3.25E-03	329.70	0.045
Berth Operations	Boiler	2.38E-02	2417.05	0.333
Berth Operations	Aux Generator	7.47E-03	758.20	0.105
Propulsion	TOTAL	3.36E-02	3410.18	0.470
Non-Propulsion	TOTAL	0.03	3504.96	0.483
Total		**6.82E-02**	**6915.13**	**0.954**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	6.28E-05	6.4	8.79E-04
Cruising	Aux Generator	1.89E-05	1.9	2.65E-04
Maneuvering	Main Engines	9.90E-07	0.1	1.39E-05
Maneuvering	Aux Generator	9.37E-06	1.0	1.31E-04
Boiler Warm-up	Boiler	8.91E-06	0.9	1.25E-04
Berth Operations	Boiler	6.53E-05	6.6	9.13E-04
Berth Operations	Aux Generator	2.05E-05	2.1	2.87E-04
Propulsion	TOTAL	9.21E-05	9.3	1.29E-03
Non-Propulsion	TOTAL	9.47E-05	9.6	1.32E-03
Total		**1.87E-04**	**1.89E+01**	**2.61E-03**

Table H.2.RPA.Un.GHG.2025-41. 2025 Reduced Project Alternative Tug Main Engines Average Daily Unmitigated GHG Emissions (Exxon Mobil).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	MGO	2400	8.2	114.0	0.00636	645.0	0.0890	0.0022	220.59	0.0304
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	MGO	2400	8.2	114.0	0.00636	645.0	0.0890	0.0022	220.59	0.0304
									TOTAL				**0.0044**	**441.18**	**0.0609**

Table H.2.RPA.Un.GHG.2025-42. 2025 Reduced Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions (Exxon Mobil).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	MGO	300	1.0	114.0	0.0068	690.0	0.0952	0.00029	29.49750	0.0041
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	MGO	300	1.0	114.0	0.0068	690.0	0.0952	0.00029	29.49750	0.0041
									TOTAL				**0.00058**	**59.00**	**0.0081**

Table H.2.RPA.Un.GHG.2025-43. 2025 Reduced Project Alternative Summary of Tug Average Daily Unmitigated GHG Emissions (Exxon Mobil).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0044	441.18	0.0609
Tug Assist	Aux Generator	0.00058	59.00	0.0081
	TOTAL	**0.0049**	**500.18**	**0.0690**

Table H.2.RPA.Un.GHG.2025-47. 2025 Reduced Project Alternative Exxon Mobil Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0336	3,410.18	0.4704	3430.48
Tanker Hoteling	0.0075	758.20	0.1046	762.72
Offloading Emissions	0.0238	2,417.05	0.3333	2431.44
Transiting Operations	0.0033	329.70	0.0455	331.66
Tug Assistance	0.0049	500.18	0.0690	503.15
Tanks	- - -	- - -	- - -	---
Vapor Destruction Units	0.0172	9,088.53	1.0160	9115.20
Valves, Flanges, Pumps	- - -	- - -	- - -	---
TOTAL	**0.0903**	**16,503.84**	**2.0388**	**16574.65**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	9.21E-05	9.34	1.29E-03	9.40
Tanker Hoteling	2.05E-05	2.08	2.87E-04	2.09
Offloading Emissions	6.53E-05	6.62	9.13E-04	6.66
Transiting Operations	8.91E-06	0.90	1.25E-04	0.91
Tug Assistance	1.35E-05	1.37	1.89E-04	1.38
Tanks	- - -	- - -	- - -	---
Vapor Destruction Units	4.72E-05	24.90	2.78E-03	24.97
Valves, Flanges, Pumps	- - -	- - -	- - -	---
TOTAL	**2.47E-04**	**45.22**	**5.59E-03**	**45.41**

Table H.2.RPA.Un.GHG.2040-1. 2040 Reduced Project Alternative Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	15.54	1.42	16.9	0.777	25,400	27,957	95	46.0	0.0055	620.00	0.0818	0.0088	996.68	0.1315
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	54	46.0	0.0055	620.00	0.0818	0.0050	567.30	0.0748
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	4	46.0	0.0055	620.00	0.0818	0.0004	43.20	0.0057
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	0	46.0	0.0060	682.00	0.0902	0.0000	5.57	0.0007
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	2	46.0	0.0060	682.00	0.0902	0.0002	25.80	0.0034
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	3	46.0	0.0055	620.00	0.0818	0.0003	34.93	0.0046
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	54	46.0	0.0055	620.00	0.0818	0.0050	567.30	0.0748
		Cruising - VSR to CW	22	15.54	1.42	16.9	0.777	25,400	27,957	95	46.0	0.0055	620.00	0.0818	0.0088	996.68	0.1315
AFRAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	16.1	0.761	12,477	14,859	51	24.0	0.0055	620.00	0.0818	0.0024	276.38	0.0365
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	16	24.0	0.0055	620.00	0.0818	0.0008	88.08	0.0116
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	2	24.0	0.0055	620.00	0.0818	0.0001	12.81	0.0017
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	0	24.0	0.0060	682.00	0.0902	0.0000	1.65	0.0002
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	1	24.0	0.0060	682.00	0.0902	0.0001	7.65	0.0010
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	2	24.0	0.0055	620.00	0.0818	0.0001	9.54	0.0013
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	18	24.0	0.0055	620.00	0.0818	0.0009	100.10	0.0132
		Cruising - VSR to CW	24.5	14.7	1.67	16.1	0.761	12,477	15,828	54	24.0	0.0055	620.00	0.0818	0.0026	294.41	0.0388
PANAMAX	South In	Cruising - CW to VSR	23	14.7	1.56	15.8	0.805	10,300	12,979	44	10	0.0055	620.00	0.0818	0.0009	100.58	0.0133
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	14	10	0.0055	620.00	0.0818	0.0003	32.06	0.0042
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	2	10	0.0055	620.00	0.0818	0.0000	4.66	0.0006
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	0	10	0.0060	682.00	0.0902	0.0000	0.60	0.0001
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	1	10	0.0060	682.00	0.0902	0.0000	2.78	0.0004
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	2	10	0.0055	620.00	0.0818	0.0000	3.47	0.0005
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	16	10	0.0055	620.00	0.0818	0.0003	36.43	0.0048
		Cruising - VSR to CW	24.5	14.7	1.67	15.8	0.805	10,300	13,825	47	10	0.0055	620.00	0.0818	0.0009	107.14	0.0141
SUEZMAX	North In	Cruising - CW to VSR	22	15.54	1.42	17	0.764	16,000	17,302	59	52	0.0055	620.00	0.0818	0.0061	697.27	0.0920
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	34	52	0.0055	620.00	0.0818	0.0035	396.88	0.0524
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	3	52	0.0055	620.00	0.0818	0.0003	30.23	0.0040
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	0	52	0.0060	682.00	0.0902	0.0000	3.90	0.0005
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	1	52	0.0060	682.00	0.0902	0.0002	18.05	0.0024
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	2	52	0.0055	620.00	0.0818	0.0002	24.44	0.0032
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	34	52	0.0055	620.00	0.0818	0.0035	396.88	0.0524
		Cruising - VSR to CW	22	15.54	1.42	17	0.764	16,000	17,302	59	52	0.0055	620.00	0.0818	0.0061	697.27	0.0920
														TOTAL	**0.0578**	**6580.73**	**0.8683**

Table H.2.RPA.Un.GHG.2040-2. 2040 Reduced Project Alternative Auxiliary Generator Average Daily Unmitigated GHG Emissions

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	3.84	3,600	0.278	3,840	13	46.0	0.0055	620.00	0.0818	0.0012	136.90	0.0181
		Maneuvering	2.00	3,600	0.278	2,002	7	46.0	0.0060	682.00	0.0902	0.0007	78.49	0.0104
	North Out	Maneuvering	1.50	3,600	0.278	1,501	5	46.0	0.0060	682.00	0.0902	0.0005	58.87	0.0078
		Cruising	3.71	3,600	0.278	3,712	13	46.0	0.0055	620.00	0.0818	0.0012	132.32	0.0175
AFRAMAX	South In	Cruising	3.15	3,600	0.278	3,155	11	24.0	0.0055	620.00	0.0818	0.0005	58.69	0.0077
		Maneuvering	2.00	3,600	0.278	2,002	7	24.0	0.0060	682.00	0.0902	0.0004	40.95	0.0054
	South Out	Maneuvering	1.50	3,600	0.278	1,501	5	24.0	0.0060	682.00	0.0902	0.0003	30.71	0.0041
		Cruising	3.21	3,600	0.278	3,211	11	24.0	0.0055	620.00	0.0818	0.0005	59.72	0.0079
PANAMAX	South In	Cruising	3.15	3,600	0.28	3,178	11	10	0.0055	620.00	0.0818	0.0002	24.63	0.0032
		Maneuvering	2.00	3,600	0.28	2,016	7	10	0.0060	682.00	0.0902	0.0002	17.19	0.0023
	South Out	Maneuvering	1.5	3,600	0.28	1,512	5	10	0.0060	682.00	0.0902	0.0001	12.89	0.0017
		Cruising	3.21	3,600	0.28	3,234	11	10	0.0055	620.00	0.0818	0.0002	25.06	0.0033
SUEZMAX	North In	Cruising	3.84	3,600	0.28	3,868	13	52	0.0055	620.00	0.0818	0.0014	155.87	0.0206
		Maneuvering	2.00	3,600	0.28	2,016	7	52	0.0060	682.00	0.0902	0.0008	89.37	0.0118
	North Out	Maneuvering	1.5	3,600	0.28	1,512	5	52	0.0060	682.00	0.0902	0.0006	67.03	0.0089
		Cruising	3.71	3,600	0.28	3,738	13	52	0.0055	620.00	0.0818	0.0013	150.65	0.0199
								TOTAL				**0.0100**	**1139.35**	**0.1504**

Table H.2.RPA.Un.GHG.2040-3. 2040 Reduced Project Alternative Boiler Warm-Up Average Daily Unmitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	2.70	107.96	30%	3	50,000	15,525	0.0559	6,596.00	0.8390	0.0016	185.31	0.0236
46.0	VLCC	2.70	84.93	30%	3	90,000	42,137	0.0559	6,596.00	0.8390	0.0043	502.96	0.0640
10.0	Panamax	2.70	63.30	30%	3	35,000	2,655	0.0559	6,596.00	0.8390	0.0003	31.69	0.0040
52.0	Suezmax	2.70	87.54	30%	3	70,000	38,187	0.0559	6,596.00	0.8390	0.0039	455.81	0.0580
									TOTAL		**0.0100**	**1,175.77**	**0.1496**

Table H.2.RPA.Un.GHG.2040-4. 2040 Reduced Project Alternative Berth Operations Average Daily Unmitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	2.70	3,600	28%	2.5	8.5	150	0.0064	722.0	0.0952	0.0005	54.19	0.0071
46.0	VLCC	2,000,000	2.70	3,600	28%	2.5	8.5	150	0.0064	722.0	0.0952	0.0009	103.87	0.0137
10.0	Panamax	350,000	2.70	3,600	28%	2.5	8.6	150	0.0064	722.0	0.0952	0.0002	22.74	0.0030
52.0	Suezmax	1,000,000	2.70	3,600	28%	2.5	8.6	150	0.0064	722.0	0.0952	0.0010	118.26	0.0156
					TOTAL							**0.0026**	**299.07**	**0.0394**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	2.70	107.96	30%	2.5	50,000	43,126	0.0559	6,596.0	0.8390	0.0013	154.43	0.0196
46.0	VLCC	2,000,000	2.70	84.93	30%	2.5	90,000	117,047	0.0559	6,596.0	0.8390	0.0036	419.13	0.0533
10.0	Panamax	350,000	2.70	59.91	30%	2.5	35,000	6,980	0.0559	6,596.0	0.8390	0.0002	25.00	0.0032
52.0	Suezmax	1,000,000	2.70	82.85	30%	2.5	70,000	100,391	0.0559	6,596.0	0.8390	0.0030	359.49	0.0457
					TOTAL							**0.0081**	**958.04**	**0.1219**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	0.52	3,600	56%	15.0	102.4	140	0.0064	722.0	0.0952	0.0057	650.32	0.0857
46.0	VLCC	2,000,000	0.52	3,600	56%	23.2	158.4	140	0.0064	722.0	0.0952	0.0171	1927.84	0.2542
10.0	Panamax	350,000	0.52	3,600	56%	11.0	75.7	140	0.0064	722.0	0.0952	0.0018	200.14	0.0264
52.0	Suezmax	1,000,000	0.52	3,600	56%	15.3	105.2	140	0.0064	722.0	0.0952	0.0128	1447.55	0.1909
					TOTAL							**0.0374**	**4225.84**	**0.5572**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	0.52	102.17	28.06	15.0	50,000	177,631	0.0559	6,596.0	0.8390	0.0180	2120.25	0.2697
46.0	VLCC	2,000,000	0.52	80.38	28.06	23.2	90,000	669,107	0.0559	6,596.0	0.8390	0.0677	7986.64	1.0159
10.0	Panamax	350,000	0.52	59.91	28.06	11.0	35,000	16,328	0.0559	6,596.0	0.8390	0.0017	194.89	0.0248
52.0	Suezmax	1,000,000	0.52	82.85	28.06	15.3	70,000	406,307	0.0559	6,596.0	0.8390	0.0411	4849.79	0.6169
					TOTAL							**0.1284**	**15151.58**	**1.9273**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0002	21.68	0.0029
46.0	VLCC	2,000,000	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0004	41.55	0.0055
10.0	Panamax	350,000	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0001	9.10	0.0012
52.0	Suezmax	1,000,000	2.70	3,600	28%	1.0	3.4	150	0.0064	722.0	0.0952	0.0004	47.31	0.0062
					TOTAL							**0.0011**	**119.63**	**0.0158**

Table H.2.RPA.Un.GHG.2040-5. 2040 Reduced Project Alternative Summary of Average Daily Unmitigated Vessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0573	6514.74	0.8595
Cruising	Aux Generator	0.0065	743.85	0.0981
Maneuvering	Main Engines	0.0006	65.99	0.0087
Maneuvering	Aux Generator	0.0035	395.50	0.0523
Boiler Warm-up	Boiler	0.0100	1175.77	0.1496
Berth Operations	Boiler	0.1365	16109.62	2.0491
Berth Operations	Aux Generator	0.0411	4644.54	0.6124
Propulsion	**TOTAL**	**0.0679**	**7720.08**	**1.0187**
Non-Propulsion	**TOTAL**	**0.1876**	**21929.93**	**2.8111**
Total Emissions		**0.26**	**29650.01**	**3.83**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	1.57E-04	17.85	2.35E-03
Cruising	Aux Generator	1.79E-05	2.04	2.69E-04
Maneuvering	Main Engines	1.59E-06	0.18	2.39E-05
Maneuvering	Aux Generator	9.55E-06	1.08	1.43E-04
Boiler Warm-up	Boiler	2.73E-05	3.22	4.10E-04
Berth Operations	Boiler	3.74E-04	44.14	5.61E-03
Berth Operations	Aux Generator	1.13E-04	12.72	1.68E-03
Propulsion	**TOTAL**	**1.86E-04**	**21.15**	**2.79E-03**
Non-Propulsion	**TOTAL**	**5.14E-04**	**60.08**	**7.70E-03**
Total Emissions		**7.00E-04**	**81.23**	**1.05E-02**

Table H.2.RPA.Un.GHG.2040-6. 2040 Reduced Project Alternative Tug Main Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	4,800	0.50	MGO	2400	8.2	46.0	0.00636	645.0	0.0890	0.0009	89.0100	0.0123
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	MGO	2400	8.2	46.0	0.00636	645.0	0.0890	0.0009	89.0100	0.0123
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	MGO	2400	8.2	24.0	0.00636	645.0	0.0890	0.0005	46.4400	0.0064
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	MGO	2400	8.2	24.0	0.00636	645.0	0.0890	0.0005	46.4400	0.0064
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	MGO	2400	8.2	10.0	0.00636	645.0	0.0890	0.0002	19.3500	0.0027
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	MGO	2400	8.2	10.0	0.00636	645.0	0.0890	0.0002	19.3500	0.0027
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	4,800	0.50	MGO	2400	8.2	52.0	0.00636	645.0	0.0890	0.0010	100.6200	0.0139
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	MGO	2400	8.2	52.0	0.00636	645.0	0.0890	0.0010	100.6200	0.0139
									TOTAL				**0.0050**	**510.8400**	**0.0705**

Table H.2.RPA.Un.GHG.2040-7. 2040 Reduced Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	Maneuvering - Pilot to Berth	1.00	4	300	1.00	MGO	300	1.0	46.0	0.0068	690.0	0.0952	0.00012	11.90	0.00164
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	MGO	300	1.0	46.0	0.0068	690.0	0.0952	0.00012	11.90	0.00164
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	MGO	300	1.0	24.0	0.0068	690.0	0.0952	0.00006	6.21	0.00086
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	MGO	300	1.0	24.0	0.0068	690.0	0.0952	0.00006	6.21	0.00086
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	MGO	300	1.0	10.0	0.0068	690.0	0.0952	0.00003	2.59	0.00036
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	MGO	300	1.0	10.0	0.0068	690.0	0.0952	0.00003	2.59	0.00036
SUEZMAX	Maneuvering - Pilot to Berth	1.00	3	300	1.00	MGO	300	1.0	52.0	0.0068	690.0	0.0952	0.00013	13.46	0.00186
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	MGO	300	1.0	52.0	0.0068	690.0	0.0952	0.00013	13.46	0.00186
									TOTAL				**0.00067**	**68.31**	**0.00942**

PM = PM_{10}

Table H.2.RPA.Un.GHG.2040-8. 2040 Reduced Project Alternative Summary of Tug Average Daily Unmitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0050	510.84	0.0705
Tug Assist	Aux Generator	0.00067	68.31	0.00942
	TOTAL	**0.0057**	**579.15**	**0.0799**

PM = PM_{10}

Table H.2.RPA.Un.GHG.2040-12. 2040 Reduced Project Alternative Main Engines Average Daily Unmitigated GHG Emissions (BP).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	31	0.0058	588.00	0.0811	0.0022	225.62	0.0311
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	31	0.0058	588.00	0.0811	0.0011	107.90	0.0149
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	31	0.0058	588.00	0.0811	0.0002	15.69	0.0022
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	31	0.0064	647.00	0.0895	0.0000	2.02	0.0003
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	31	0.0064	647.00	0.0895	0.0001	9.37	0.0013
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	31	0.0058	588.00	0.0811	0.0001	11.68	0.0016
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	31	0.0058	588.00	0.0811	0.0012	122.62	0.0169
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	31	0.0058	588.00	0.0811	0.0024	240.33	0.0331
										TOTAL				**0.0073**	**735.23**	**0.1014**

Table H.2.RPA.Un.GHG.2040-13. 2040 Reduced Project Alternative Auxiliary Generator Average Daily Unmitigated GHG Emissions (BP).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising	3.50	3,600	0.28	3,533	31	0.0068	690.00	0.0952	0.0009	94.4582	0.0130
		Maneuvering	2.00	3,600	0.28	2,016	31	0.0068	690.00	0.0952	0.0005	53.9028	0.0074
	South Out	Maneuvering	1.5	3,600	0.28	1,512	31	0.0068	690.00	0.0952	0.0004	40.4271	0.0056
		Cruising	3.50	3,600	0.28	3,528	31	0.0068	690.00	0.0952	0.0009	94.3299	0.0130
							TOTAL				**0.0028**	**283.12**	**0.0391**

Table H.2.RPA.Un.GHG.2040-14. 2040 Reduced Project Alternative Boiler Warm-Up Average Daily Unmitigated GHG Emissions (BP).

Shipcalls (vessels/yr)	Vessel Size	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N2O Emission Factor (lb/ton)	CO2 Emission Factor (lb/ton)	CH4 Emission Factor (lb/ton)	N2O Emissions (tons/yr)	CO2 Emissions (tons/yr)	CH4 Emissions (tons/yr)
31.0	Aframax	Dist at 0.2	0.20	102.17	30%	3	50,000	18,978	0.0627	6,360.00	0.8770	0.00215	218.42530	0.03012
							TOTAL					**0.00215**	**218.43**	**0.0301**

Table H.2.RPA.Un.GHG.2040-15. 2040 Reduced Project Alternative Berth Operations Average Daily Unmitigated GHG Emissions (BP).

Auxiliary Generator Pre-Pumpin

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
31.0	Aframax	400,000	Dist at 0.2	0.20	3,600	28%	2.5	0.0068	690.0	0.0952	0.00066	67.38	0.0093
						TOTAL					**0.00066**	**67.38**	**0.0093**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
31.0	Aframax	400,000	Dist at 0.2	0.20	102.17	30%	2.5	50,000	52,718	0.0627	6,360.0	0.8770	0.00179	182.02	0.02510
						TOTAL							**0.00179**	**182.02**	**0.0251**

Auxiliary Generator Pumpin

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
31.0	Aframax	400,000	Dist at 0.2	0.20	3,600	56%	15.0	0.0068	690.0	0.0952	0.0080	808.5420	0.1116
						TOTAL					**0.0080**	**808.54**	**0.1116**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
31.0	Aframax	400,000	Dist at 0.2	0.20	102.17	28.06	15.0	50,000	229,435	0.0627	6,360.00	0.8770	0.0260	2,640.62	0.3641
						TOTAL							**0.0260**	**2,640.62**	**0.3641**

Auxiliary Generator Post-Pumpin

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
31.0	Aframax	400,000	Dist at 0.2	0.20	3,600	28%	1.0	0.0068	690.0	0.0952	0.00027	26.95140	0.00372
						TOTAL					**0.00027**	**26.95**	**0.0037**

Table H.2.RPA.Un.GHG.2040-16. 2040 Reduced Project Alternative Summary of Average Daily Unmitigated Vessel GHG Emissions (BP).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	7.14E-03	723.84	9.98E-02
Cruising	Aux Generator	1.86E-03	188.79	2.60E-02
Maneuvering	Main Engines	1.13E-04	11.39	1.58E-03
Maneuvering	Aux Generator	9.30E-04	94.33	1.30E-02
Boiler Warm-up	Boiler	2.15E-03	218.43	3.01E-02
Berth Operations	Boiler	2.78E-02	2822.64	3.89E-01
Berth Operations	Aux Generator	8.90E-03	902.87	1.25E-01
Propulsion	TOTAL	1.00E-02	1018.35	1.40E-01
Non-Propulsion	TOTAL	3.89E-02	3943.93	5.44E-01
Total Emissions		**4.89E-02**	**4962.29**	**6.84E-01**

Mode	Equipment	N_2O Emissions (tons/day	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	1.96E-05	1.98	2.74E-04
Cruising	Aux Generator	5.10E-06	0.52	7.14E-05
Maneuvering	Main Engines	3.08E-07	0.03	4.32E-06
Maneuvering	Aux Generator	2.55E-06	0.26	3.57E-05
Boiler Warm-up	Boiler	5.90E-06	0.60	8.25E-05
Berth Operations	Boiler	7.62E-05	7.73	1.07E-03
Berth Operations	Aux Generator	2.44E-05	2.47	3.41E-04
Propulsion	TOTAL	2.75E-05	2.79	3.85E-04
Non-Propulsion	TOTAL	1.07E-04	10.81	1.49E-03
Total Emissions		**1.34E-04**	**13.60**	**1.88E-03**

Table H.2.RPA.Un.GHG.2040-17. 2040 Reduced Project Alternative Tug Main Engines Average Daily Unmitigated GHG Emissions (BP).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	MGO	2400	8.2	31.0	0.00636	645.0	0.0890	0.0006	59.9850	0.0083
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	MGO	2400	8.2	31.0	0.00636	645.0	0.0890	0.0006	59.9850	0.0083
									TOTAL				**0.0012**	**119.9700**	**0.0166**

Table H.2.RPA.Un.GHG.2040-18. 2040 Reduced Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions (BP).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	MGO	300	1.0	31.0	0.0068	690.0	0.0952	0.00008	8.02125	0.00111
	Maneuvering - Berth to Pilo	1.00	2	300	1.00	MGO	300	1.0	31.0	0.0068	690.0	0.0952	0.00008	8.02125	0.00111
									TOTAL				**0.00016**	**16.04**	**0.00221**

Table H.2.RPA.Un.GHG.2040-19. 2040 Reduced Project Alternative Summary of Tug Average Daily Unmitigated GHG Emissions (BP).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0012	119.9700	0.0166
Tug Assist	Aux Generatoı	0.00016	16.04250	0.00221
	TOTAL	**0.0013**	**136.01**	**0.0188**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	3.24E-06	3.29E-01	4.54E-05
Tug Assist	Aux Generatoı	4.33E-07	4.40E-02	6.06E-06
	TOTAL	**3.67E-06**	**3.73E-01**	**5.14E-05**

Table H.2.RPA.Un.GHG.2040-23. 2040 Reduced Project Alternative BP Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0100	1,018.35	0.1405	1024.42
Tanker Hoteling	0.0089	902.87	0.1246	908.25
Offloading Emissions	0.0278	2,822.64	0.3892	2839.44
Transiting Operations	0.0022	218.43	0.0301	219.73
Tug Assistance	0.0013	136.01	0.0188	136.82
Tanks	- - -	- - -	- - -	---
Vapor Destruction Units	0.0166	8,746.35	0.9777	8772.02
Valves, Flanges, Pumps	- - -	- - -	- - -	---
TOTAL	**0.0668**	**13,844.65**	**1.6809**	**13900.66**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	2.75E-05	2.79	3.85E-04	2.81
Tanker Hoteling	2.44E-05	2.47	3.41E-04	2.49
Offloading Emissions	7.62E-05	7.73	1.07E-03	7.78
Transiting Operations	5.90E-06	0.60	8.25E-05	0.60
Tug Assistance	3.67E-06	0.37	5.14E-05	0.37
Tanks	- - -	- - -	- - -	---
Vapor Destruction Units	4.54E-05	23.96	2.68E-03	24.03
Valves, Flanges, Pumps	- - -	- - -	- - -	---
TOTAL	**1.83E-04**	**37.93**	**4.61E-03**	**38.08**

Table H.2.RPA.Un.GHG.2040-24. 2040 Reduced Project Alternative Main Engines Average Daily Unmitigated GHG Emissions (Tesoro).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	78	0.0058	588.00	0.0811	0.0056	567.68	0.0783
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	78	0.0058	588.00	0.0811	0.0027	271.50	0.0374
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	78	0.0058	588.00	0.0811	0.0004	39.47	0.0054
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	78	0.0064	647.00	0.0895	0.0001	5.09	0.0007
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	78	0.0064	647.00	0.0895	0.0002	23.57	0.0033
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	78	0.0058	588.00	0.0811	0.0003	29.40	0.0041
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	78	0.0058	588.00	0.0811	0.0030	308.52	0.0426
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	78	0.0058	588.00	0.0811	0.0060	604.70	0.0834
										TOTAL	**0**	**4,822**	**1**	**0.0182**	**1,849.94**	**0.2552**

Table H.2.RPA.Un.GHG.2040-25. 2040 Reduced Project Alternative Auxiliary Generator Average Daily Unmitigated GHG Emissions (Tesoro).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	South In	Cruising	3.50	3,600	0.28	3,533	78	0.0068	690.00	0.0952	0.0023	237.6691	0.0328
		Maneuvering	2.00	3,600	0.28	2,016	78	0.0068	690.00	0.0952	0.0013	135.6264	0.0187
	South Out	Maneuvering	1.5	3,600	0.28	1,512	78	0.0068	690.00	0.0952	0.0010	101.7198	0.0140
		Cruising	3.50	3,600	0.28	3,528	78	0.0068	690.00	0.0952	0.0023	237.3462	0.0327
							TOTAL	**0**	**2,760**	**0**	**0.0070**	**712.36**	**0.0983**

Table H.2.RPA.Un.GHG.2040-26. 2040 Reduced Project Alternative Boiler Warm-Up Average Daily Unmitigated GHG Emissions (Tesoro).

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
78.0	Aframax	0.20	102.17	30%	3	50,000	47,752	0.0627	6,360.00	0.8770	0.00542	549.58623	0.07578
						TOTAL		**0**	**6,360**	**1**	**0.00542**	**549.59**	**0.0758**

Table H.2.RPA.Un.GHG.2040-27. 2040 Reduced Project Alternative Berth Operations Average Daily Unmitigated GHG Emissions (Tesoro).

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
78.0	Aframax	400,000	0.20	3,600	28%	2.5	0.0068	690.00	0.0952	0.00167	169.53	0.0234
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.00167**	**169.53**	**0.0234**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N2O Emissions (tons/yr)	CO2 Emissions (tons/yr)	CH4 Emissions (tons/yr)
78.0	Aframax	400,000	0.20	102.17	30%	2.5	50,000	132644.14	0.0627	6,360.0	0.8770	0.00452	457.99	0.06315
					TOTAL				**0.0627**	**6,360.00**	**0.8770**	**0.00452**	**457.99**	**0.0632**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N2O Emission Factor (g/kWh)	CO2 Emission Factor (g/kWh)	CH4 Emission Factor (g/kWh)	N2O Emissions (tons/yr)	CO2 Emissions (tons/yr)	CH4 Emissions (tons/yr)
78.0	Aframax	400,000	0.20	3,600	56%	15.0	0.0068	690.00	0.0952	0.0200	2,034.3960	0.2807
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.0200**	**2,034.40**	**0.2807**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N2O Emissions (tons/yr)	CO2 Emissions (tons/yr)	CH4 Emissions (tons/yr)
78.0	Aframax	400,000	0.20	102.17	28.06	15.0	50,000	577288.28	0.0627	6,360.00	0.8770	0.0655	6,644.13	0.9162
					TOTAL				**0**	**6,360**	**1**	**0.0655**	**6,644.13**	**0.9162**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	N2O Emission Factor (g/kWh)	CO2 Emission Factor (g/kWh)	CH4 Emission Factor (g/kWh)	N2O Emissions (tons/yr)	CO2 Emissions (tons/yr)	CH4 Emissions (tons/yr)
78.0	Aframax	400,000	0.20	3,600	28%	1.0	0.0068	690.00	0.0952	0.00067	67.81320	0.00936
					TOTAL		**0.0068**	**690.00**	**0.0952**	**0.00067**	**67.81**	**0.0094**

Table H.2.RPA.Un.GHG.2040-28. 2040 Reduced Project Alternative Summary of Average Daily Unmitigated Vessel GHG Emissions (Tesoro).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0180	1821.28	0.2512
Cruising	Aux Generator	0.0047	475.02	0.0655
Maneuvering	Main Engines	0.0003	28.67	0.0040
Maneuvering	Aux Generator	0.0023	237.35	0.0327
Boiler Warm-up	Boiler	0.0054	549.59	0.0758
Berth Operations	Boiler	0.0700	7102.12	0.9793
Berth Operations	Aux Generator	0.0224	2271.74	0.3134
Propulsion	TOTAL	0.0253	2562.31	0.3535
Non-Propulsion	TOTAL	0.0978	9923.45	1.3686
Total Emissions		**0.1231**	**12485.75**	**1.7220**

Mode	Equipment	N_2O Emissions (tons/day	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	4.92E-05	4.99E+00	6.88E-04
Cruising	Aux Generator	1.28E-05	1.30E+00	1.80E-04
Maneuvering	Main Engines	7.76E-07	7.85E-02	1.09E-05
Maneuvering	Aux Generator	6.41E-06	6.50E-01	8.97E-05
Boiler Warm-up	Boiler	1.48E-05	1.51E+00	2.08E-04
Berth Operations	Boiler	1.92E-04	1.95E+01	2.68E-03
Berth Operations	Aux Generator	6.13E-05	6.22E+00	8.59E-04
Propulsion	TOTAL	6.92E-05	7.02E+00	9.68E-04
Non-Propulsion	TOTAL	2.68E-04	2.72E+01	3.75E-03
Total Emissions		**0.0003**	**34.21**	**0.0047**

Table H.2.RPA.Un.GHG.2040-29. 2040 Reduced Project Alternative Tug Main Engines Average Daily Unmitigated GHG Emissions (Tesoro).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	2400	8.2	78.0	0.00636	645.0	0.0890	0.0015	150.9300	0.0208
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	2400	8.2	78.0	0.00636	645.0	0.0890	0.0015	150.9300	0.0208
								TOTAL				**0.0030**	**301.8600**	**0.0417**

Table H.2.RPA.Un.GHG.2040-30. 2040 Reduced Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions (Tesoro).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
AFRAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	300	1.0	78.0	0.0068	690.0	0.0952	0.00020	20.18250	0.00278
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	300	1.0	78.0	0.0068	690.0	0.0952	0.00020	20.18250	0.00278
								TOTAL				**0.00040**	**40.37**	**0.00557**

Table H.2.RPA.Un.GHG.2040-31. 2040 Reduced Project Alternative Summary of Tug Average Daily Unmitigated GHG Emissions (Tesoro).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0030	301.8600	0.0417
Tug Assist	Aux Generator	0.00040	40.36500	0.00557
	TOTAL	**0.0034**	**342.23**	**0.0472**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	8.15E-06	8.27E-01	1.14E-04
Tug Assist	Aux Generator	1.09E-06	1.11E-01	1.53E-05
	TOTAL	**9.24E-06**	**9.38E-01**	**1.29E-04**

Table H.2.RPA.Un.GHG.2040-35. 2040 Reduced Project Alternative Tesoro Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CH_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0253	2,562.31	0.3535	2577.56
Tanker Hoteling	0.0224	2,271.74	0.3134	2285.26
Offloading Emissions	0.0700	7,102.12	0.9793	7144.39
Transiting Operations	0.0054	549.59	0.0758	552.86
Tug Assistance	0.0034	342.23	0.0472	344.26
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.0176	9,313.13	1.0411	9340.46
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.1441**	**22,141.10**	**2.8103**	**22244.79**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/day)
Tanker Cruising and Manuevering	6.92E-05	7.02	9.68E-04	7.06
Tanker Hoteling	6.13E-05	6.22	8.59E-04	6.26
Offloading Emissions	1.92E-04	19.46	2.68E-03	19.57
Transiting Operations	1.48E-05	1.51	2.08E-04	1.51
Tug Assistance	9.24E-06	0.94	1.29E-04	0.94
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	4.83E-05	25.52	2.85E-03	25.59
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**3.95E-04**	**60.66**	**7.70E-03**	**60.94**

Table H.2.RPA.Un.GHG.2040-36. 2040 Reduced Project Alternative Main Engines Average Daily Unmitigated GHG Emissions (Exxon Mobil).

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	South In	Cruising - CW to VSR	23	12	1.92	15.8	0.438	10,300	8,649	30	131	0.0058	588.00	0.0811	0.0082	832.75	0.1149
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	14	131	0.0058	588.00	0.0811	0.0039	398.27	0.0549
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	2	131	0.0058	588.00	0.0811	0.0006	57.91	0.0080
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	0	131	0.0064	647.00	0.0895	0.0001	7.47	0.0010
PANAMAX	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	1	131	0.0064	647.00	0.0895	0.0003	34.58	0.0048
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	2	131	0.0058	588.00	0.0811	0.0004	43.12	0.0059
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	16	131	0.0058	588.00	0.0811	0.0045	452.58	0.0624
		Cruising - VSR to CW	24.5	12	2.04	15.8	0.438	10,300	9,213	31	131	0.0058	588.00	0.0811	0.0087	887.06	0.1223
														TOTAL	**0.0268**	**2713.74**	**0.3743**

Table H.2.RPA.Un.GHG.2040-37. 2040 Reduced Project Alternative Auxiliary Generator Average Daily Unmitigated GHG Emissions (Exxon Mobil).

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	South In	Cruising	3.50	3,600	0.28	3,528	12	131	0.0068	690.00	0.0952	0.0039	398.62	0.0550
		Maneuvering	2.00	3,600	0.28	2,016	7	131	0.0068	690.00	0.0952	0.0022	227.78	0.0314
PANAMAX	South Out	Maneuvering	1.5	3,600	0.28	1,512	5	131	0.0068	690.00	0.0952	0.0017	170.84	0.0236
		Cruising	3.58	3,600	0.28	3,609	12	131	0.0068	690.00	0.0952	0.0040	407.73	0.0563
								TOTAL				**0.0119**	**1204.97**	**0.1663**

Table H.2.RPA.Un.GHG.2040-38. 2040 Reduced Project Alternative Boiler Warm-Up Average Daily Unmitigated GHG Emissions (Exxon Mobil).

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
131.0	Panamax	0.20	59.91	30%	3	35,000	32,919	0.0627	6,360.00	0.8770	0.00374	378.87	0.0522
									TOTAL		**0.00374**	**378.87**	**0.0522**

Table H.2.RPA.Un.GHG.2040-39. 2040 Reduced Project Alternative Berth Operations Average Daily Unmitigated GHG Emissions (Exxon Mobil).

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
131.0	Panamax	300,000	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0028	284.73	0.0393
AMP Reduction		70%												
					TOTAL							**0.0008**	**85.4186**	**0.0118**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
131.0	Panamax	300,000	0.20	59.91	30%	2.5	35,000	91,441	0.0627	6,360.0	0.8770	0.0031	315.72	0.0435
					TOTAL							**0.0031**	**315.72**	**0.0435**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
131.0	Panamax	300,000	0.20	3,600	56%	11.0	75.7	140	0.0068	690.0	0.0952	0.0247	2505.61	0.3457
AMP Reduction		70%												
					TOTAL							**0.0074**	**751.6832**	**0.1037**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
131.0	Panamax	300,000	0.20	59.91	28.06	11.0	35,000	213,895	0.0627	6,360.0	0.8770	0.0243	2461.77	0.3395
					TOTAL							**0.0243**	**2461.77**	**0.3395**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
131.0	Panamax	300,000	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0011	113.89	0.0157
AMP Reduction		70%												
					TOTAL							**0.0003**	**34.1674**	**0.0047**

Table H.2.RPA.Un.GHG.2040-40. 2040 Reduced Project Alternative Summary of Average Daily Unmitigated Vessel GHG Emissions (Exxon Mobil).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	2.64E-02	2671.69	3.68E-01
Cruising	Aux Generator	7.95E-03	806.35	1.11E-01
Maneuvering	Main Engines	4.15E-04	42.05	5.82E-03
Maneuvering	Aux Generator	3.93E-03	398.62	5.50E-02
Boiler Warm-up	Boiler	3.74E-03	378.87	5.22E-02
Berth Operations	Boiler	2.74E-02	2777.49	3.83E-01
Berth Operations	Aux Generator	8.59E-03	871.27	1.20E-01
Propulsion	TOTAL	3.86E-02	3918.71	5.41E-01
Non-Propulsion	TOTAL	0.04	4027.62	0.56
Total Emissions		**7.83E-02**	**7946.34**	**1.10E+00**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	7.22E-05	7.32	1.01E-03
Cruising	Aux Generator	2.18E-05	2.21	3.05E-04
Maneuvering	Main Engines	1.14E-06	0.12	1.59E-05
Maneuvering	Aux Generator	1.08E-05	1.09	1.51E-04
Boiler Warm-up	Boiler	1.02E-05	1.04	1.43E-04
Berth Operations	Boiler	7.50E-05	7.61	1.05E-03
Berth Operations	Aux Generator	2.35E-05	2.39	3.29E-04
Propulsion	TOTAL	1.06E-04	10.74	1.48E-03
Non-Propulsion	TOTAL	1.09E-04	11.03	1.52E-03
Total Emissions		**2.15E-04**	**21.77**	**3.00E-03**

Table H.2.RPA.Un.GHG.2040-41. 2040 Reduced Project Alternative Tug Main Engines Average Daily Unmitigated GHG Emissions (Exxon Mobil).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	4,800	0.50	MGO	2400	8.2	131.0	0.00636	645.0	0.0890	0.0025	253.49	0.0350
	Maneuvering - Berth to Pilot	1.00	2	4,800	0.50	MGO	2400	8.2	131.0	0.00636	645.0	0.0890	0.0025	253.49	0.0350
									TOTAL				**0.0050**	**506.97**	**0.0700**

Table H.2.RPA.Un.GHG.2040-42. 2040 Reduced Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions (Exxon Mobil).

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Energy (kWh)	Energy (MMBtu)	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
PANAMAX	Maneuvering - Pilot to Berth	1.00	2	300	1.00	MGO	300	1.0	131.0	0.0068	690.0	0.0952	0.00033	33.89625	0.0047
	Maneuvering - Berth to Pilot	1.00	2	300	1.00	MGO	300	1.0	131.0	0.0068	690.0	0.0952	0.00033	33.89625	0.0047
									TOTAL				**0.00067**	**67.79**	**0.0094**

Table H.2.RPA.Un.GHG.2040-43. 2040 Reduced Project Alternative Summary of Tug Average Daily Unmitigated GHG Emissions (Exxon Mobil).

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0050	506.97	0.0700
Tug Assist	Aux Generator	0.00067	67.79	0.0094
	TOTAL	**0.0057**	**574.76**	**0.0793**

Table H.2.RPA.Un.GHG.2040-47. 2040 Reduced Project Alternative Exxon Mobil Berth Summary.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	0.0386	3,918.71	0.5406	3942.05
Tanker Hoteling	0.0086	871.27	0.1202	876.46
Offloading Emissions	0.0274	2,777.49	0.3830	2794.02
Transiting Operations	0.0037	378.87	0.0522	381.12
Tug Assistance	0.0057	574.76	0.0793	578.18
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	0.0174	9,195.30	1.0279	9222.29
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**0.1014**	**17,716.40**	**2.2032**	**17794.12**

Operation	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)	CO_2e Emissions (tons/yr)
Tanker Cruising and Manuevering	1.06E-04	1.07E+01	1.48E-03	10.80
Tanker Hoteling	2.35E-05	2.39E+00	3.29E-04	2.40
Offloading Emissions	7.50E-05	7.61E+00	1.05E-03	7.65
Transiting Operations	1.02E-05	1.04E+00	1.43E-04	1.04
Tug Assistance	1.55E-05	1.57E+00	2.17E-04	1.58
Tanks	- - -	- - -	- - -	- - -
Vapor Destruction Units	4.77E-05	2.52E+01	2.82E-03	25.27
Valves, Flanges, Pumps	- - -	- - -	- - -	- - -
TOTAL	**2.78E-04**	**4.85E+01**	**6.04E-03**	**48.75**

Table H.2.RPA.Un.GHG.Bar.2010-1. 2010 Reduced Project Alternative Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	North In	Volpak to Berth 408	5	3	1.67	3	0.50	4,800	4,000.00	MGO	6.0	0.00636	645.0	0.0890	0.0002	21.3106	0.0029
Barge	North Out	Volpak to Berth 408	5	3	1.67	3.0	0.50	4,800	4,000.00	MGO	6.0	0.00636	645.0	0.0890	0.0002	21.3106	0.0029
														TOTAL	**0.0004**	**42.62**	**0.0059**

Table H.2.RPA.Un.GHG.Bar.2010-2. 2010 Reduced Project Alternative Tug Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	4,800	0.50	MGO	6.0	0.00636	645.0	0.0890	0.0001	12.79	0.0018
	Maneuvering - Berth to Pilot	1.00	1	4,800	0.50	MGO	6.0	0.00636	645.0	0.0890	0.0001	12.79	0.0018
										TOTAL	**0.0003**	**25.57**	**0.0035**

Table H.2.RPA.Un.GHG.Bar.2010-3. 2010 Reduced Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	300	1.00	MGO	6.0	0.00636	645.0	0.0890	0.00002	1.60	0.0002
	Maneuvering - Berth to Pilot	1.00	1	300	1.00	MGO	6.0	0.00636	645.0	0.0890	0.00002	1.60	0.0002
										TOTAL	**0.00003**	**3.20**	**0.0004**

Table H.2.RPA.Un.GHG.Bar.2010-4. 2010 Reduced Project Alternative Summary of Tug Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0003	25.57	0.0035
Tug Assist	Aux Generator	0.00003	3.20	0.0004
	TOTAL	**0.0003**	**28.77**	**0.0040**

Table H.2.RPA.Un.GHG.Bar.2010-5. 2010 Reduced Project Alternative Summary of Average Daily Unmitigated Vessel GHG Emissions from Barge Fuel Deliveries for OGV.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Barge	0.0004	42.62	0.0059	43
Tug Assistance	0.0003	28.77	0.0040	29
TOTAL	**0.0007**	**71.39**	**0.0099**	**72**

Table H.2.RPA.Un.GHG.Bar.2015-1. 2015 Reduced Project Alternative Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	North In	Volpak to Berth 408	5	3	1.67	3	0.50	4,800	4,000.00	MGO	8.0	0.00636	645.0	0.0890	0.0003	28.4141	0.0039
Barge	North Out	Volpak to Berth 408	5	3	1.67	3.0	0.50	4,800	4,000.00	MGO	8.0	0.00636	645.0	0.0890	0.0003	28.4141	0.0039
														TOTAL	**0.0006**	**56.83**	**0.0078**

Table H.2.RPA.Un.GHG.Bar.2015-2. 2015 Reduced Project Alternative Tug Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	4,800	0.50	MGO	8.0	0.00636	645.0	0.0890	0.0002	17.05	0.0024
	Maneuvering - Berth to Pilot	1.00	1	4,800	0.50	MGO	8.0	0.00636	645.0	0.0890	0.0002	17.05	0.0024
										TOTAL	**0.0003**	**34.10**	**0.0047**

Table H.2.RPA.Un.GHG.Bar.2015-3. 2015 Reduced Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	300	1.00	MGO	8.0	0.00636	645.0	0.0890	0.00002	2.13	0.0003
	Maneuvering - Berth to Pilot	1.00	1	300	1.00	MGO	8.0	0.00636	645.0	0.0890	0.00002	2.13	0.0003
										TOTAL	**0.00004**	**4.26**	**0.0006**

Table H.2.RPA.Un.GHG.Bar.2015-4. 2015 Reduced Project Alternative Summary of Tug Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0003	34.10	0.0047
Tug Assist	Aux Generator	0.00004	4.26	0.0006
	TOTAL	**0.0004**	**38.36**	**0.0053**

Table H.2.RPA.Un.GHG.Bar.2015-5. 2015 Reduced Project Alternative Summary of Average Daily Unmitigated Vessel GHG Emissions from Barge Fuel Deliveries for OGV.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Barge	0.0006	56.83	0.0078	57
Tug Assistance	0.0004	38.36	0.0053	39
TOTAL	**0.0009**	**95.19**	**0.0131**	**96**

Table H.2.RPA.Un.GHG.Bar.2025-1. 2025 Reduced Project Alternative Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	North In	Volpak to Berth 408	5	3	1.67	3	0.50	4,800	4,000.00	MGO	8.0	0.00636	645.0	0.0890	0.0003	28.4141	0.0039
Barge	North Out	Volpak to Berth 408	5	3	1.67	3.0	0.50	4,800	4,000.00	MGO	8.0	0.00636	645.0	0.0890	0.0003	28.4141	0.0039
														TOTAL	**0.0006**	**56.83**	**0.0078**

Table H.2.RPA.Un.GHG.Bar.2025-2. 2025 Reduced Project Alternative Tug Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	4,800	0.50	MGO	8.0	0.00636	645.0	0.0890	0.0002	17.05	0.0024
	Maneuvering - Berth to Pilot	1.00	1	4,800	0.50	MGO	8.0	0.00636	645.0	0.0890	0.0002	17.05	0.0024
										TOTAL	**0.0003**	**34.10**	**0.0047**

Table H.2.RPA.Un.GHG.Bar.2025-3. 2025 Reduced Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	300	1.00	MGO	8.0	0.00636	645.0	0.0890	0.00002	2.13	0.0003
	Maneuvering - Berth to Pilot	1.00	1	300	1.00	MGO	8.0	0.00636	645.0	0.0890	0.00002	2.13	0.0003
										TOTAL	**0.00004**	**4.26**	**0.0006**

Table H.2.RPA.Un.GHG.Bar.2025-4. 2025 Reduced Project Alternative Summary of Tug Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0003	34.10	0.0047
Tug Assist	Aux Generator	0.00004	4.26	0.0006
	TOTAL	**0.0004**	**38.36**	**0.0053**

Table H.2.RPA.Un.GHG.Bar.2025-5. 2025 Reduced Project Alternative Summary of Average Daily Unmitigated Vessel GHG Emissions from Barge Fuel Deliveries for OGV.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Barge	0.0006	56.83	0.0078	57
Tug Assistance	0.0004	38.36	0.0053	39
TOTAL	**0.0009**	**95.19**	**0.0131**	**96**

Table H.2.RPA.Un.GHG.Bar.2040-1. 2040 Reduced Project Alternative Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	North In	Volpak to Berth 408	5	3	1.67	3	0.50	4,800	4,000.00	MGO	8.0	0.00636	645.0	0.0890	0.0003	28.4141	0.0039
Barge	North Out	Volpak to Berth 408	5	3	1.67	3.0	0.50	4,800	4,000.00	MGO	8.0	0.00636	645.0	0.0890	0.0003	28.4141	0.0039
														TOTAL	**0.0006**	**56.83**	**0.0078**

Table H.2.RPA.Un.GHG.Bar.2040-2. 2040 Reduced Project Alternative Tug Main Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	4,800	0.50	MGO	8.0	0.00636	645.0	0.0890	0.0002	17.05	0.0024
	Maneuvering - Berth to Pilot	1.00	1	4,800	0.50	MGO	8.0	0.00636	645.0	0.0890	0.0002	17.05	0.0024
										TOTAL	**0.0003**	**34.10**	**0.0047**

Table H.2.RPA.Un.GHG.Bar.2040-3. 2040 Reduced Project Alternative Tug Auxiliary Generator Engines Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for O

Ship	Mode	Activity (hours)	No. of Tugs	Average Power (kW)	Load Factor	Fuel Type	Shipcalls (vessels/ yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Barge	Maneuvering - Pilot to Berth	1.00	1	300	1.00	MGO	8.0	0.00636	645.0	0.0890	0.00002	2.13	0.0003
	Maneuvering - Berth to Pilot	1.00	1	300	1.00	MGO	8.0	0.00636	645.0	0.0890	0.00002	2.13	0.0003
										TOTAL	**0.00004**	**4.26**	**0.0006**

Table H.2.RPA.Un.GHG.Bar.2040-4. 2040 Reduced Project Alternative Summary of Tug Average Daily Unmitigated GHG Emissions from Barge Fuel Deliveries for OGV.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Tug Assist	Main Engines	0.0003	34.10	0.0047
Tug Assist	Aux Generator	0.00004	4.26	0.0006
	TOTAL	**0.0004**	**38.36**	**0.0053**

Table H.2.RPA.Un.GHG.Bar.2040-5. 2040 Reduced Project Alternative Summary of Average Daily Unmitigated Vessel GHG Emissions from Barge Fuel Deliveries for OGV.

Operation	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)	CO_2e Emissions (tons/yr)
Barge	0.0006	56.83	0.0078	57
Tug Assistance	0.0004	38.36	0.0053	39
TOTAL	**0.0009**	**95.19**	**0.0131**	**96**

Table H.2.RPA.Mit.GHG.2010-1. 2010 Reduced Project Alternative Main Engines Average Daily Mitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	12	1.83	16.9	0.358	25,400	16,671	26.0	0.0058	588.00	0.0811	0.0031	318.58	0.0439
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	26.0	0.0058	588.00	0.0811	0.0030	304.10	0.0419
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	26.0	0.0058	588.00	0.0811	0.0002	23.16	0.0032
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	26.0	0.00639	647.00	0.0895	0.0000	2.99	0.0004
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0064**	**648.83**	**0.0895**
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	26.0	0.00639	647.00	0.0895	0.0001	13.83	0.0019
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	26.0	0.0058	588.00	0.0811	0.0002	18.72	0.0026
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	26.0	0.0058	588.00	0.0811	0.0030	304.10	0.0419
		Cruising - VSR to CW	22	12	1.83	16.9	0.358	25,400	16,671	26.0	0.0058	588.00	0.0811	0.0031	318.58	0.0439
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0065**	**655.24**	**0.0904**
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	32.0	0.0058	588.00	0.0811	0.0023	232.90	0.0321
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	32.0	0.0058	588.00	0.0811	0.0011	111.38	0.0154
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	32.0	0.0058	588.00	0.0811	0.0002	16.19	0.0022
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	32.0	0.00639	647.00	0.0895	0.0000	2.09	0.0003
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0036**	**362.56**	**0.0500**
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	32.0	0.00639	647.00	0.0895	0.0001	9.67	0.0013
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	32.0	0.0058	588.00	0.0811	0.0001	12.06	0.0017
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	32.0	0.0058	588.00	0.0811	0.0012	126.57	0.0175
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	32.0	0.0058	588.00	0.0811	0.0024	248.08	0.0342
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0039**	**396.39**	**0.0547**
PANAMAX	South In	Cruising - CW to VSR	23	12	1.92	15.8	0.438	10,300	8,649	26	0.0058	588.00	0.0811	0.0016	165.28	0.0228
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	26	0.0058	588.00	0.0811	0.0008	79.05	0.0109
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	26	0.0058	588.00	0.0811	0.0001	11.49	0.0016
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	26	0.00639	647.00	0.0895	0.0000	1.48	0.0002
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0025**	**257.30**	**0.0355**
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	26	0.00639	647.00	0.0895	0.0001	6.86	0.0009
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	26	0.0058	588.00	0.0811	0.0001	8.56	0.0012
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	26	0.0058	588.00	0.0811	0.0009	89.83	0.0124
		Cruising - VSR to CW	24.5	12	2.04	15.8	0.438	10,300	9,213	26	0.0058	588.00	0.0811	0.0017	176.06	0.0243
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0028**	**281.31**	**0.0388**
SUEZMAX	North In	Cruising - CW to VSR	22	12	1.83	17	0.352	16,000	10,317	45	0.0058	588.00	0.0811	0.0034	341.24	0.0471
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	45	0.0058	588.00	0.0811	0.0032	325.73	0.0449
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	45	0.0058	588.00	0.0811	0.0002	24.81	0.0034
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	45	0.00639	647.00	0.0895	0.0000	3.20	0.0004
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0069**	**694.97**	**0.0959**
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	45	0.00639	647.00	0.0895	0.0001	14.82	0.0020
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	45	0.0058	588.00	0.0811	0.0002	20.06	0.0028
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	45	0.0058	588.00	0.0811	0.0032	325.73	0.0449
		Cruising - VSR to CW	22	12	1.83	17	0.352	16,000	10,317	45	0.0058	588.00	0.0811	0.0034	341.24	0.0471
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0069**	**701.84**	**0.0968**
										GRAND TOTAL	**0.1903**	**19288.00**	**2.6624**	**0.0394**	**3998.43**	**0.5515**

Table H.2.RPA.Mit.GHG.2010-2. 2010 Reduced Project Alternative Auxiliary Generator Average Daily Mitigated GHG Emissions.

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	4.25	3,600	0.280	4,289	26.0	0.0068	690.00	0.0952	0.0009	96.18	0.0133
		Maneuvering	2.00	3,600	0.280	2,016	26.0	0.0068	690.00	0.0952	0.0004	45.21	0.0062
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0014**	**141.39**	**0.0195**
	North Out	Maneuvering	1.50	3,600	0.280	1,512	26.0	0.0068	690.00	0.0952	0.0003	33.91	0.0047
		Cruising	4.13	3,600	0.280	4,159	26.0	0.0068	690.00	0.0952	0.0009	93.27	0.0129
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0013**	**127.18**	**0.0175**
AFRAMAX	South In	Cruising	3.50	3,600	0.280	3,533	32.0	0.0068	690.00	0.0952	0.0010	97.51	0.0135
		Maneuvering	2.00	3,600	0.280	2,016	32.0	0.0068	690.00	0.0952	0.0005	55.64	0.0077
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0015**	**153.15**	**0.0211**
	South Out	Maneuvering	1.50	3,600	0.278	1,501	32.0	0.0068	690.00	0.0952	0.0004	41.43	0.0057
		Cruising	3.58	3,600	0.278	3,586	32.0	0.0068	690.00	0.0952	0.0010	98.98	0.0137
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0014**	**140.41**	**0.0194**
PANAMAX	South In	Cruising	3.50	3,600	0.28	3,533	26	0.0068	690.00	0.0952	0.0008	79.22	0.0109
		Maneuvering	2.00	3,600	0.28	2,016	26	0.0068	690.00	0.0952	0.0004	45.21	0.0062
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0012**	**124.43**	**0.0172**
	South Out	Maneuvering	1.5	3,600	0.28	1,512	26	0.0068	690.00	0.0952	0.0003	33.91	0.0047
		Cruising	3.58	3,600	0.28	3,612	26	0.0068	690.00	0.0952	0.0008	81.00	0.0112
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0011**	**114.91**	**0.0159**
SUEZMAX	North In	Cruising	4.25	3,600	0.28	4,289	45	0.0068	690.00	0.0952	0.0016	166.46	0.0230
		Maneuvering	2.00	3,600	0.28	2,016	45	0.0068	690.00	0.0952	0.0008	78.25	0.0108
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0024**	**244.71**	**0.0338**
	North Out	Maneuvering	1.5	3,600	0.28	1,512	45	0.0068	690.00	0.0952	0.0006	58.68	0.0081
		Cruising	4.13	3,600	0.28	4,159	45	0.0068	690.00	0.0952	0.0016	161.43	0.0223
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0022**	**220.11**	**0.0304**
							GRAND TOTAL	**0.1088**	**11040.00**	**1.5232**	**0.0125**	**1266.28**	**0.1747**

Table H.2.RPA.Mit.GHG.2010-3. 2010 Reduced Project Alternative Summary of Average Daily MitigatedVessel GHG Emi

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0389	3943.49	0.5439
Cruising	Aux Generator	0.0086	874.04	0.1206
Maneuvering	Main Engines	0.0005	54.9418	0.0076
Maneuvering	Aux Generator	0.0039	392.24	0.0541
Maneuvering	**TOTAL**	**0.0044**	**447.18**	**0.0617**
Propulsion	**TOTAL**	**0.0519**	**5264.71**	**0.7262**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	1.07E-04	10.80	1.49E-03
Cruising	Aux Generator	2.36E-05	2.39	3.30E-04
Maneuvering	Main Engines	1.49E-06	0.15	2.08E-05
Maneuvering	Aux Generator	1.06E-05	1.07	1.48E-04
Maneuvering	**TOTAL**	**1.21E-05**	**1.23**	**1.69E-04**
Propulsion	**TOTAL**	**1.42E-04**	**14.42**	**1.99E-03**

Table H.2.RPA.Mit.GHG.2010-4. 2010 Reduced Project Alternative Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	MDO	0.52	102.17	30%	3	50,000	19,591	0.0627	6360.00	0.8770	0.0022	225.48	0.0311
26.0	VLCC	MDO	0.52	80.38	30%	3	90,000	22,541	0.0627	6360.00	0.8770	0.0026	259.42	0.0358
26.0	Panamax	MDO	0.52	59.91	30%	3	35,000	6,533	0.0627	6360.00	0.8770	0.0007	75.19	0.0104
45.0	Suezmax	MDO	0.52	82.85	30%	3	70,000	31,276	0.0627	6360.00	0.8770	0.0035	359.96	0.0496
							TOTAL		**0**	**25,440**	**4**	**0.0091**	**920.06**	**0.1269**

Table H.2.RPA.Mit.GHG.2010-5. 2010 Reduced Project Alternative Summary of Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Boiler Warm-up	Boiler	0.0091	920.06	0.1269

Table H.2.RPA.Mit.GHG.2010-6. 2010 Reduced Project Alternative Berth Operations Average Daily Mitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	Dist at 0.2%S	0.20	3,600	28%	2.5	8.6	140.0	0.0068	690.0	0.0952	0.0007	69.5520	0.0096
26.0	VLCC	2,000,000	Dist at 0.2%S	0.20	3,600	28%	2.5	8.6	140.0	0.0068	690.0	0.0952	0.0006	56.5110	0.0078
26.0	Panamax	350,000	Dist at 0.2%S	0.20	3,600	28%	2.5	8.6	140.0	0.0068	690.0	0.0952	0.0006	56.5110	0.0078
45.0	Suezmax	1,000,000	Dist at 0.2%S	0.20	3,600	28%	2.5	8.6	140.0	0.0068	690.0	0.0952	0.0010	97.8075	0.0135
												TOTAL	**0.0028**	**280.3815**	**0.0387**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	Dist at 0.2%S	0.20	102.17	30%	2.5	50,000	54,420.2	0.0627	6,360.00	0.8770	0.0019	187.9001	0.0259
26.0	VLCC	2,000,000	Dist at 0.2%S	0.20	80.38	30%	2.5	90,000	62,612.9	0.0627	6,360.00	0.8770	0.0021	216.1874	0.0298
26.0	Panamax	350,000	Dist at 0.2%S	0.20	59.91	30%	2.5	35,000	18,148.5	0.0627	6,360.00	0.8770	0.0006	62.6624	0.0086
45.0	Suezmax	1,000,000	Dist at 0.2%S	0.20	82.85	30%	2.5	70,000	86,876.7	0.0627	6,360.00	0.8770	0.0030	299.9644	0.0414
												TOTAL	**0.0076**	**766.7143**	**0.1057**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	Dist at 0.2%S	0.20	3,600	56%	15.0	102.4	140.0	0.0068	690.0	0.0952	0.0082	828.6624	0.1143
26.0	VLCC	2,000,000	Dist at 0.2%S	0.20	3,600	56%	23.2	158.4	140.0	0.0068	690.0	0.0952	0.0103	1,041.3524	0.1437
26.0	Panamax	350,000	Dist at 0.2%S	0.20	3,600	56%	11.0	75.7	140.0	0.0068	690.0	0.0952	0.0049	497.2968	0.0686
45.0	Suezmax	1,000,000	Dist at 0.2%S	0.20	3,600	56%	15.3	105.2	140.0	0.0068	690.0	0.0952	0.0118	1,197.1638	0.1652
												TOTAL	**0.0351**	**3,564.4754**	**0.4918**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	Dist at 0.2%S	0.20	102.17	28.06	15.0	50,000	236,841.0	0.0627	6,360.00	0.8770	0.0269	2,725.8514	0.3759
26.0	VLCC	2,000,000	Dist at 0.2%S	0.20	80.38	28.06	23.2	90,000	378,190.7	0.0627	6,360.00	0.8770	0.0429	4,352.6741	0.6002
26.0	Panamax	350,000	Dist at 0.2%S	0.20	59.91	28.06	11.0	35,000	42,452.5	0.0627	6,360.00	0.8770	0.0048	488.5948	0.0674
45.0	Suezmax	1,000,000	Dist at 0.2%S	0.20	82.85	28.06	15.3	70,000	351,611.7	0.0627	6,360.00	0.8770	0.0399	4,046.7709	0.5580
												TOTAL	**0.1145**	**11,613.8912**	**1.6015**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
32.0	Aframax	700,000	Dist at 0.2%S	0.20	3,600	28%	1.0	3.4	140.0	0.0068	690.0	0.0952	0.0003	27.6221	0.0038
26.0	VLCC	2,000,000	Dist at 0.2%S	0.20	3,600	28%	1.0	3.4	140.0	0.0068	690.0	0.0952	0.0002	22.4429	0.0031
26.0	Panamax	350,000	Dist at 0.2%S	0.20	3,600	28%	1.0	3.4	140.0	0.0068	690.0	0.0952	0.0002	22.6044	0.0031
45.0	Suezmax	1,000,000	Dist at 0.2%S	0.20	3,600	28%	1.0	3.4	140.0	0.0068	690.0	0.0952	0.0004	39.1230	0.0054
												TOTAL	**0.0011**	**111.7924**	**0.0154**

Table H.2.RPA.Mit.GHG.2010-7. 2010 Reduced Project Alternative Summary of Berth Operations Average Daily Mitigated GHG Emissions.

Year 2010 (No AMP)

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Berth Operations	Boiler	0.1221	12380.61	1.7072
Berth Operations	Aux Generator	0.0390	3956.65	0.5459

Table H.2.RPA.Mit.GHG.2015-1. 2015 Reduced Project Alternative Main Engines Average Daily Mitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	12	1.83	16.9	0.358	25,400	16,671	46.0	0.0058	588.00	0.0811	0.0056	563.64	0.0777
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	46.0	0.0058	588.00	0.0811	0.0053	538.02	0.0742
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	46.0	0.0058	588.00	0.0811	0.0004	40.97	0.0057
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	46.0	0.00639	647.00	0.0895	0.0001	5.29	0.0007
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0113**	**1147.93**	**0.1583**
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	46.0	0.00639	647.00	0.0895	0.0002	24.47	0.0034
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	46.0	0.0058	588.00	0.0811	0.0003	33.13	0.0046
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	46.0	0.0058	588.00	0.0811	0.0053	538.02	0.0742
		Cruising - VSR to CW	22	12	1.83	16.9	0.358	25,400	16,671	46.0	0.0058	588.00	0.0811	0.0056	563.64	0.0777
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0114**	**1159.26**	**0.1599**
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	24.0	0.0058	588.00	0.0811	0.0017	174.67	0.0241
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	24.0	0.0058	588.00	0.0811	0.0008	83.54	0.0115
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	24.0	0.0058	588.00	0.0811	0.0001	12.15	0.0017
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	24.0	0.00639	647.00	0.0895	0.0000	1.57	0.0002
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0027**	**271.92**	**0.0375**
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	24.0	0.00639	647.00	0.0895	0.0001	7.25	0.0010
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	24.0	0.0058	588.00	0.0811	0.0001	9.04	0.0012
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	24.0	0.0058	588.00	0.0811	0.0009	94.93	0.0131
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	24.0	0.0058	588.00	0.0811	0.0018	186.06	0.0257
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0029**	**297.29**	**0.0410**
PANAMAX	South In	Cruising - CW to VSR	23	12	1.92	15.8	0.438	10,300	8,649	10	0.0058	588.00	0.0811	0.0006	63.57	0.0088
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	10	0.0058	588.00	0.0811	0.0003	30.40	0.0042
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	10	0.0058	588.00	0.0811	0.0000	4.42	0.0006
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	10	0.00639	647.00	0.0895	0.0000	0.57	0.0001
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0010**	**98.96**	**0.0136**
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	10	0.00639	647.00	0.0895	0.0000	2.64	0.0004
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	10	0.0058	588.00	0.0811	0.0000	3.29	0.0005
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	10	0.0058	588.00	0.0811	0.0003	34.55	0.0048
		Cruising - VSR to CW	24.5	12	2.04	15.8	0.438	10,300	9,213	10	0.0058	588.00	0.0811	0.0007	67.71	0.0093
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0011**	**108.19**	**0.0149**
SUEZMAX	North In	Cruising - CW to VSR	22	12	1.83	17	0.352	16,000	10,317	52	0.0058	588.00	0.0811	0.0039	394.32	0.0544
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	52	0.0058	588.00	0.0811	0.0037	376.40	0.0519
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	52	0.0058	588.00	0.0811	0.0003	28.67	0.0040
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	52	0.00639	647.00	0.0895	0.0000	3.70	0.0005
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0079**	**803.08**	**0.1108**
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	52	0.00639	647.00	0.0895	0.0002	17.12	0.0024
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	52	0.0058	588.00	0.0811	0.0002	23.18	0.0032
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	52	0.0058	588.00	0.0811	0.0037	376.40	0.0519
		Cruising - VSR to CW	22	12	1.83	17	0.352	16,000	10,317	52	0.0058	588.00	0.0811	0.0039	394.32	0.0544
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0080**	**811.01**	**0.1119**
										GRAND TOTAL	**0.1903**	**19288.00**	**2.6624**	**0.0463**	**4697.65**	**0.6480**

Table H.2.RPA.Mit.GHG.2015-2. 2015 Reduced Project Alternative Auxiliary Generator Average Daily Mitigated GHG Emissions

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	4.25	3,600	0.280	4,289	46.0	0.0068	690.00	0.0952	0.0017	170.16	0.0235
		Maneuvering	2.00	3,600	0.280	2,016	46.0	0.0068	690.00	0.0952	0.0008	79.98	0.0110
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0025**	**250.14**	**0.0345**
	North Out	Maneuvering	1.50	3,600	0.280	1,512	46.0	0.0068	690.00	0.0952	0.0006	59.99	0.0083
		Cruising	4.13	3,600	0.280	4,159	46.0	0.0068	690.00	0.0952	0.0016	165.02	0.0228
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0022**	**225.00**	**0.0310**
AFRAMAX	South In	Cruising	3.50	3,600	0.280	3,533	24.0	0.0068	690.00	0.0952	0.0007	73.13	0.0101
		Maneuvering	2.00	3,600	0.280	2,016	24.0	0.0068	690.00	0.0952	0.0004	41.73	0.0058
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0011**	**114.86**	**0.0158**
	South Out	Maneuvering	1.50	3,600	0.278	1,501	24.0	0.0068	690.00	0.0952	0.0003	31.07	0.0043
		Cruising	3.58	3,600	0.278	3,586	24.0	0.0068	690.00	0.0952	0.0007	74.23	0.0102
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0010**	**105.31**	**0.0145**
PANAMAX	South In	Cruising	3.50	3,600	0.28	3,533	10	0.0068	690.00	0.0952	0.0003	30.47	0.0042
		Maneuvering	2.00	3,600	0.28	2,016	10	0.0068	690.00	0.0952	0.0002	17.39	0.0024
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0005**	**47.86**	**0.0066**
	South Out	Maneuvering	1.5	3,600	0.28	1,512	10	0.0068	690.00	0.0952	0.0001	13.04	0.0018
		Cruising	3.58	3,600	0.28	3,612	10	0.0068	690.00	0.0952	0.0003	31.15	0.0043
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0004**	**44.19**	**0.0061**
SUEZMAX	North In	Cruising	4.25	3,600	0.28	4,289	52	0.0068	690.00	0.0952	0.0019	192.35	0.0265
		Maneuvering	2.00	3,600	0.28	2,016	52	0.0068	690.00	0.0952	0.0009	90.42	0.0125
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0028**	**282.77**	**0.0390**
	North Out	Maneuvering	1.5	3,600	0.28	1,512	52	0.0068	690.00	0.0952	0.0007	67.81	0.0094
		Cruising	4.13	3,600	0.28	4,159	52	0.0068	690.00	0.0952	0.0018	186.54	0.0257
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0025**	**254.35**	**0.0351**
							GRAND TOTAL	**0.1088**	**11040.00**	**1.5232**	**0.0131**	**1324.49**	**0.1827**

Table H.2.RPA.Mit.GHG.2015-3. 2015 Reduced Project Alternative Summary of Average Daily MitigatedVessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0457	4,635	0.6393
Cruising	Aux Generator	0.0091	923	0.1274
Maneuvering	Main Engines	0.0006	63	0.0087
Maneuvering	Aux Generator	0.0040	401	0.0554
Maneuvering	**TOTAL**	**0.0046**	**464**	**0.0640**
Propulsion	**TOTAL**	**0.0594**	**6,022**	**0.8307**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	0.0001	13	0.0018
Cruising	Aux Generator	0.0000	3	0.0003
Maneuvering	Main Engines	0.0000	0	0.0000
Maneuvering	Aux Generator	0.0000	1	0.0002
Maneuvering	**TOTAL**	**0.0000**	**1**	**0.0002**
Propulsion	**TOTAL**	**0.0002**	**16**	**0.0023**

Table H.2.RPA.Mit.GHG.2015-4. 2015 Reduced Project Alternative Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	0.20	102.17	30%	3	50,000	14,693	0.0627	6,360.00	0.8770	0.0017	169.11	0.0233
46.0	VLCC	0.20	80.38	30%	3	90,000	39,880	0.0627	6,360.00	0.8770	0.0045	458.98	0.0633
10	Panamax	0.20	59.91	30%	3	35,000	2,094	0.0627	6,360.00	0.8770	0.0002	24.10	0.0033
52	Suezmax	0.20	82.85	30%	3	70,000	30,117	0.0627	6,360.00	0.8770	0.0034	346.63	0.0478
						TOTAL		**0.2508**	**25,440.00**	**3.5080**	**0.0098**	**998.82**	**0.1377**

Table H.2.RPA.Mit.GHG.2015-5. 2015 Reduced Project Alternative Summary of Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Boiler Warm-up	Boiler	0.0098	998.82	0.1377

Table H.2.RPA.Mit.GHG.2015-6. 2015 Reduced Project Alternative Berth Operations Average Daily Mitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	3,600	28%	2.5	8.5	150	0.0068	690.0	0.0952	0.0005	51.79	0.0071
46.0	VLCC	2,000,000	Dist at 0.2	0.20	3,600	28%	2.5	8.5	150	0.0068	690.0	0.0952	0.0010	99.27	0.0137
10.0	Panamax	350,000	Dist at 0.2	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0002	21.74	0.0030
52.0	Suezmax	1,000,000	Dist at 0.2	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0011	113.02	0.0156
						TOTAL							**0.0028**	**285.82**	**0.0394**

Auxiliary Generator Usage per Ship Visit

Shipcalls (vessels/yr)	Vessel Type	Auxiliary kW per Vessel	Load Factor	Hours/visit	kW-Hrs/Visit	AMP Reduction	AMPed kW-Hr per year
24.0	Aframax	3,600	28%	2.5	9,000	0.15	183,600
46.0	VLCC	3,600	28%	2.5	9,000	0.15	351,900
10.0	Panamax	3,600	28%	2.5	9,000	0.15	76,500
52.0	Suezmax	3,600	28%	2.5	9,000	0.15	397,800
						TOTAL AMPed kW-Hr per year	**1,009,800**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	102.17	30%	2.5	50,000	40,815	0.0627	6,360.0	0.8770	0.0014	140.93	0.0194
46.0	VLCC	2,000,000	Dist at 0.2	0.20	80.38	30%	2.5	90,000	110,777	0.0627	6,360.0	0.8770	0.0038	382.49	0.0527
10.0	Panamax	350,000	Dist at 0.2	0.20	59.91	30%	2.5	35,000	6,980	0.0627	6,360.0	0.8770	0.0002	24.10	0.0033
52.0	Suezmax	1,000,000	Dist at 0.2	0.20	82.85	30%	2.5	70,000	100,391	0.0627	6,360.0	0.8770	0.0034	346.63	0.0478
						TOTAL							**0.0088**	**894.14**	**0.1233**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	3,600	56%	15.0	102.4	140	0.0068	690.0	0.0952	0.0061	621.50	0.0857
46.0	VLCC	2,000,000	Dist at 0.2	0.20	3,600	56%	23.2	158.4	140	0.0068	690.0	0.0952	0.0182	1842.39	0.2542
10.0	Panamax	350,000	Dist at 0.2	0.20	3,600	56%	11.0	75.7	140	0.0068	690.0	0.0952	0.0019	191.27	0.0264
52.0	Suezmax	1,000,000	Dist at 0.2	0.20	3,600	56%	15.3	105.2	140	0.0068	690.0	0.0952	0.0136	1383.39	0.1909
						TOTAL							**0.0398**	**4038.55**	**0.5572**

Auxiliary Generator Usage per Ship Visit

Shipcalls (vessels/yr)	Vessel Type	Auxiliary kW per Vessel	Load Factor	Hours/visit	kW-Hrs/Visit	AMP Reduction	AMPed kW-Hr per year
24.0	Aframax	3,600	56%	15.0	54,000	0.15	1,101,600
46.0	VLCC	3,600	56%	23.2	83,520	0.15	3,265,632
10.0	Panamax	3,600	56%	11.0	39,600	0.15	336,600
52.0	Suezmax	3,600	56%	15.3	55,080	0.15	2,434,536
						TOTAL AMPed kW-Hr per year	**7,138,368**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	102.17	28.06	15.0	50,000	177,631	0.0627	6,360.0	0.8770	0.0202	2044.39	0.2819
46.0	VLCC	2,000,000	Dist at 0.2	0.20	80.38	28.06	23.2	90,000	669,107	0.0627	6,360.0	0.8770	0.0759	7700.89	1.0619
10.0	Panamax	350,000	Dist at 0.2	0.20	59.91	28.06	11.0	35,000	16,328	0.0627	6,360.0	0.8770	0.0019	187.92	0.0259
52.0	Suezmax	1,000,000	Dist at 0.2	0.20	82.85	28.06	15.3	70,000	406,307	0.0627	6,360.0	0.8770	0.0461	4676.27	0.6448
						TOTAL							**0.1440**	**14609.46**	**2.0145**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0002	20.72	0.0029
46.0	VLCC	2,000,000	Dist at 0.2	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0004	39.71	0.0055
10.0	Panamax	350,000	Dist at 0.2	2.70	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0001	8.69	0.0012
52.0	Suezmax	1,000,000	Dist at 0.2	2.70	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0004	45.21	0.0062
						TOTAL							**0.0011**	**114.33**	**0.0158**

Auxiliary Generator Usage per Ship Visit

Shipcalls (vessels/yr)	Vessel Type	Auxiliary kW per Vessel	Load Factor	Hours/visit	kW-Hrs/Visit	AMP Reduction	AMPed kW-Hr per year
24.0	Aframax	3,600	28%	1.0	3,600	0.15	73,440
46.0	VLCC	3,600	28%	1.0	3,600	0.15	140,760
10.0	Panamax	3,600	28%	1.0	3,600	0.15	30,600
52.0	Suezmax	3,600	28%	1.0	3,600	0.15	159,120
						TOTAL AMPed kW-Hr per year	**403,920**
						Total AMPed kW-Hr per year	**8,552,088**

GHG Emissions from AMPed Electricity

	CO_2	CH_4	N_2O
	Emission Factors		
Lb/MW-Hrs	804.54	0.0037	0.01
Project Year	*Pounds Per Year*		
2010	**6,880,497**	**32**	**57**

Table H.2.RPA.Mit.GHG.2015-7. 2015 Reduced Project Alternative Summary of Berth Operations Average Daily Mitigated GHG Emissions.

No AMP

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Berth Operations	Boiler	0.1528	15503.60	2.1378
Berth Operations	Aux Generator	0.0437	4438.6882	0.6124

Mitigated Emissions with AMP - Year 2015

AMP Reduction 15%

Berth Operations	Boiler	0.1528	15503.60	2.1378
Berth Operations	Aux Generator	0.0372	3772.88	0.5205

Table H.2.RPA.Mit.GHG.2025-1. 2025 Reduced Project Alternative Main Engines Average Daily Mitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	12	1.83	16.9	0.358	25,400	16,671	46.0	0.0058	588.00	0.0811	0.0056	563.64	0.0777
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	46.0	0.0058	588.00	0.0811	0.0053	538.02	0.0742
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	46.0	0.0058	588.00	0.0811	0.0004	40.97	0.0057
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	46.0	0.00639	647.00	0.0895	0.0001	5.29	0.0007
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0113**	**1147.93**	**0.1583**
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	46.0	0.00639	647.00	0.0895	0.0002	24.47	0.0034
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	46.0	0.0058	588.00	0.0811	0.0003	33.13	0.0046
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	46.0	0.0058	588.00	0.0811	0.0053	538.02	0.0742
		Cruising - VSR to CW	22	12	1.83	16.9	0.358	25,400	16,671	46.0	0.0058	588.00	0.0811	0.0056	563.64	0.0777
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0114**	**1159.26**	**0.1599**
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	24.0	0.0058	588.00	0.0811	0.0017	174.67	0.0241
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	24.0	0.0058	588.00	0.0811	0.0008	83.54	0.0115
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	24.0	0.0058	588.00	0.0811	0.0001	12.15	0.0017
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	24.0	0.00639	647.00	0.0895	0.0000	1.57	0.0002
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0027**	**271.92**	**0.0375**
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	24.0	0.00639	647.00	0.0895	0.0001	7.25	0.0010
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	24.0	0.0058	588.00	0.0811	0.0001	9.04	0.0012
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	24.0	0.0058	588.00	0.0811	0.0009	94.93	0.0131
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	24.0	0.0058	588.00	0.0811	0.0018	186.06	0.0257
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0029**	**297.29**	**0.0410**
PANAMAX	South In	Cruising - CW to VSR	23	12	1.92	15.8	0.438	10,300	8,649	10	0.0058	588.00	0.0811	0.0006	63.57	0.0088
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	10	0.0058	588.00	0.0811	0.0003	30.40	0.0042
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	10	0.0058	588.00	0.0811	0.0000	4.42	0.0006
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	10	0.00639	647.00	0.0895	0.0000	0.57	0.0001
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0010**	**98.96**	**0.0136**
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	10	0.00639	647.00	0.0895	0.0000	2.64	0.0004
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	10	0.0058	588.00	0.0811	0.0000	3.29	0.0005
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	10	0.0058	588.00	0.0811	0.0003	34.55	0.0048
		Cruising - VSR to CW	24.5	12	2.04	15.8	0.438	10,300	9,213	10	0.0058	588.00	0.0811	0.0007	67.71	0.0093
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0011**	**108.19**	**0.0149**
SUEZMAX	North In	Cruising - CW to VSR	22	12	1.83	17	0.352	16,000	10,317	52	0.0058	588.00	0.0811	0.0039	394.32	0.0544
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	52	0.0058	588.00	0.0811	0.0037	376.40	0.0519
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	52	0.0058	588.00	0.0811	0.0003	28.67	0.0040
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	52	0.00639	647.00	0.0895	0.0000	3.70	0.0005
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0079**	**803.08**	**0.1108**
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	52	0.00639	647.00	0.0895	0.0002	17.12	0.0024
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	52	0.0058	588.00	0.0811	0.0002	23.18	0.0032
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	52	0.0058	588.00	0.0811	0.0037	376.40	0.0519
		Cruising - VSR to CW	22	12	1.83	17	0.352	16,000	10,317	52	0.0058	588.00	0.0811	0.0039	394.32	0.0544
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0080**	**811.01**	**0.1119**
										GRAND TOTAL	**0.1903**	**19288.00**	**2.6624**	**0.0463**	**4697.65**	**0.6480**

Table H.2.RPA.Mit.GHG.2025-2. 2025 Reduced Project Alternative Auxiliary Generator Average Daily Mitigated GHG Emissions

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	4.25	3,600	0.280	4,289	46.0	0.0068	690.00	0.0952	0.0017	170.16	0.0235
		Maneuvering	2.00	3,600	0.280	2,016	46.0	0.0068	690.00	0.0952	0.0008	79.98	0.0110
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0025**	**250.14**	**0.0345**
	North Out	Maneuvering	1.50	3,600	0.280	1,512	46.0	0.0068	690.00	0.0952	0.0006	59.99	0.0083
		Cruising	4.13	3,600	0.280	4,159	46.0	0.0068	690.00	0.0952	0.0016	165.02	0.0228
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0022**	**225.00**	**0.0310**
AFRAMAX	South In	Cruising	3.50	3,600	0.280	3,533	24.0	0.0068	690.00	0.0952	0.0007	73.13	0.0101
		Maneuvering	2.00	3,600	0.280	2,016	24.0	0.0068	690.00	0.0952	0.0004	41.73	0.0058
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0011**	**114.86**	**0.0158**
	South Out	Maneuvering	1.50	3,600	0.278	1,501	24.0	0.0068	690.00	0.0952	0.0003	31.07	0.0043
		Cruising	3.58	3,600	0.278	3,586	24.0	0.0068	690.00	0.0952	0.0007	74.23	0.0102
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0010**	**105.31**	**0.0145**
PANAMAX	South In	Cruising	3.50	3,600	0.28	3,533	10	0.0068	690.00	0.0952	0.0003	30.47	0.0042
		Maneuvering	2.00	3,600	0.28	2,016	10	0.0068	690.00	0.0952	0.0002	17.39	0.0024
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0005**	**47.86**	**0.0066**
	South Out	Maneuvering	1.5	3,600	0.28	1,512	10	0.0068	690.00	0.0952	0.0001	13.04	0.0018
		Cruising	3.58	3,600	0.28	3,612	10	0.0068	690.00	0.0952	0.0003	31.15	0.0043
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0004**	**44.19**	**0.0061**
SUEZMAX	North In	Cruising	4.25	3,600	0.28	4,289	52	0.0068	690.00	0.0952	0.0019	192.35	0.0265
		Maneuvering	2.00	3,600	0.28	2,016	52	0.0068	690.00	0.0952	0.0009	90.42	0.0125
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0028**	**282.77**	**0.0390**
	North Out	Maneuvering	1.5	3,600	0.28	1,512	52	0.0068	690.00	0.0952	0.0007	67.81	0.0094
		Cruising	4.13	3,600	0.28	4,159	52	0.0068	690.00	0.0952	0.0018	186.54	0.0257
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0025**	**254.35**	**0.0351**
							GRAND TOTAL	**0.1088**	**11040.00**	**1.5232**	**0.0131**	**1324.49**	**0.1827**

Table H.2.RPA.Mit.GHG.2025-3. 2025 Reduced Project Alternative Summary of Average Daily MitigatedVessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0457	4635.05	0.6393
Cruising	Aux Generator	0.0091	923.05	0.1274
Maneuvering	Main Engines	0.0006	62.61	0.0087
Maneuvering	Aux Generator	0.0040	401.44	0.0554
Maneuvering	**TOTAL**	**0.0046**	**464.04**	**0.0640**
Propulsion	**TOTAL**	**0.0594**	**6,022.15**	**0.8307**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	1.25E-04	12.70	1.75E-03
Cruising	Aux Generator	2.49E-05	2.53	3.49E-04
Maneuvering	Main Engines	1.69E-06	0.17	2.37E-05
Maneuvering	Aux Generator	1.08E-05	1.10	1.52E-04
Maneuvering	**TOTAL**	**1.25E-05**	**1.27**	**1.75E-04**
Propulsion	**TOTAL**	**1.63E-04**	**16.50**	**2.28E-03**

Table H.2.RPA.Mit.GHG.2025-4. 2025 Reduced Project Alternative Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	0.20	102.17	30%	3	50,000	14,693	0.0068	690.00	0.0952	0.0002	18.35	0.0025
46.0	VLCC	0.20	80.38	30%	3	90,000	39,880	0.0068	690.00	0.0952	0.0005	49.80	0.0069
10	Panamax	0.20	59.91	30%	3	35,000	2,094	0.0068	690.00	0.0952	0.0000	2.61	0.0004
52	Suezmax	0.20	82.85	30%	3	70,000	30,117	0.0068	690.00	0.0952	0.0004	37.61	0.0052
						TOTAL		**0.0272**	**2,760.00**	**0.3808**	**0.0011**	**108.36**	**0.0150**

Table H.2.RPA.Mit.GHG.2025-5. 2025 Reduced Project Alternative Summary of Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Boiler Warm-up	Boiler	0.0011	108.36	0.0150

Table H.2.RPA.Mit.GHG.2025-6. 2025 Reduced Project Alternative Berth Operations Average Daily Mitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	0.20	3,600	28%	2.5	8.5	150	0.0068	690.0	0.0952	0.0005	51.79	0.0071
46.0	VLCC	2,000,000	0.20	3,600	28%	2.5	8.5	150	0.0068	690.0	0.0952	0.0010	99.27	0.0137
10.0	Panamax	350,000	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0002	21.74	0.0030
52.0	Suezmax	1,000,000	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0011	113.02	0.0156
					TOTAL							**0.0028**	**285.82**	**0.0394**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	0.20	102.17	30%	2.5	50,000	40,815	0.0627	6,360.0	0.8770	0.0014	140.93	0.0194
46.0	VLCC	2,000,000	0.20	80.38	30%	2.5	90,000	110,777	0.0627	6,360.0	0.8770	0.0038	382.49	0.0527
10.0	Panamax	350,000	0.20	59.91	30%	2.5	35,000	6,980	0.0627	6,360.0	0.8770	0.0002	24.10	0.0033
52.0	Suezmax	1,000,000	0.20	82.85	30%	2.5	70,000	100,391	0.0627	6,360.0	0.8770	0.0034	346.63	0.0478
					TOTAL							**0.0088**	**894.14**	**0.1233**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	0.20	3,600	56%	15.0	102.4	140	0.0068	690.0	0.0952	0.0061	621.50	0.0857
46.0	VLCC	2,000,000	0.20	3,600	56%	23.2	158.4	140	0.0068	690.0	0.0952	0.0182	1842.39	0.2542
10.0	Panamax	350,000	0.20	3,600	56%	11.0	75.7	140	0.0068	690.0	0.0952	0.0019	191.27	0.0264
52.0	Suezmax	1,000,000	0.20	3,600	56%	15.3	105.2	140	0.0068	690.0	0.0952	0.0136	1383.39	0.1909
					TOTAL							**0.0398**	**4038.55**	**0.5572**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	0.20	102.17	28.06	15.0	50,000	177,631	0.0627	6,360.0	0.8770	0.0202	2044.39	0.2819
46.0	VLCC	2,000,000	0.20	80.38	28.06	23.2	90,000	669,107	0.0627	6,360.0	0.8770	0.0759	7700.89	1.0619
10.0	Panamax	350,000	0.20	59.91	28.06	11.0	35,000	16,328	0.0627	6,360.0	0.8770	0.0019	187.92	0.0259
52.0	Suezmax	1,000,000	0.20	82.85	28.06	15.3	70,000	406,307	0.0627	6,360.0	0.8770	0.0461	4676.27	0.6448
						TOTAL						**0.1440**	**14609.46**	**2.0145**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0002	20.72	0.0029
46.0	VLCC	2,000,000	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0004	39.71	0.0055
10.0	Panamax	350,000	2.70	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0001	8.69	0.0012
52.0	Suezmax	1,000,000	2.70	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0004	45.21	0.0062
					TOTAL							**0.0011**	**114.33**	**0.0158**

Table H.2.RPA.Mit.GHG.2025-7. 2025 Reduced Project Alternative Summary of Berth Operations Average Daily Mitigated GHG Emissions.

No AMP

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Berth Operations	Boiler	0.1528	15503.60	2.1378
Berth Operations	Aux Generator	0.0437	4438.6882	0.6124

Mitigated Emissions with AMP - Year 2025

AMP Reduction 40%

Berth Operations	Boiler	0.1528	15503.60	2.1378
Berth Operations	Aux Generator	0.0262	2663.21	0.3674

Table H.2.RPA.Mit.GHG.2040-1. 2040 Reduced Project Alternative Main Engines Average Daily Mitigated GHG Emissions.

Ship	Direction	Mode	Distance (nautical miles)	Ship speed (knots)	Activity (hours)	Maximum Speed (knots)	Load Factor	MCR (kW)	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising - CW to VSR	22	12	1.83	16.9	0.358	25,400	16,671	46.0	0.0058	588.00	0.0811	0.0056	563.64	0.0777
		Cruising - VSR to PZ	21	12	1.75	16.9	0.358	25,400	15,913	46.0	0.0058	588.00	0.0811	0.0053	538.02	0.0742
		Cruising - PZ to Pilot	4.7	7	0.67	16.9	0.071	25,400	1,212	46.0	0.0058	588.00	0.0811	0.0004	40.97	0.0057
		Maneuvering - Pilot to Berth		3	1.00	16.9	0.006	25,400	142	46.0	0.00639	647.00	0.0895	0.0001	5.29	0.0007
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0113**	**1147.93**	**0.1583**
	North Out	Maneuvering - Berth to Pilot		5	1.00	16.9	0.026	25,400	658	46.0	0.00639	647.00	0.0895	0.0002	24.47	0.0034
		Cruising - Pilot to PZ	3.8	7	0.54	16.9	0.071	25,400	980	46.0	0.0058	588.00	0.0811	0.0003	33.13	0.0046
		Cruising - PZ to VSR	21	12	1.75	16.9	0.358	25,400	15,913	46.0	0.0058	588.00	0.0811	0.0053	538.02	0.0742
		Cruising - VSR to CW	22	12	1.83	16.9	0.358	25,400	16,671	46.0	0.0058	588.00	0.0811	0.0056	563.64	0.0777
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0114**	**1159.26**	**0.1599**
AFRAMAX	South In	Cruising - CW to VSR	23	12	1.92	16.1	0.414	12,477	9,902	24.0	0.0058	588.00	0.0811	0.0017	174.67	0.0241
		Cruising - VSR to PZ	11	12	0.92	16.1	0.414	12,477	4,736	24.0	0.0058	588.00	0.0811	0.0008	83.54	0.0115
		Cruising - PZ to Pilot	4.7	7	0.67	16.1	0.082	12,477	689	24.0	0.0058	588.00	0.0811	0.0001	12.15	0.0017
		Maneuvering - Pilot to Berth		3	1.00	16.1	0.006	12,477	81	24.0	0.00639	647.00	0.0895	0.0000	1.57	0.0002
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0027**	**271.92**	**0.0375**
	South Out	Maneuvering - Berth to Pilot		5	1.00	16.1	0.030	12,477	374	24.0	0.00639	647.00	0.0895	0.0001	7.25	0.0010
		Cruising - Pilot to PZ	3.5	7	0.50	16.1	0.082	12,477	513	24.0	0.0058	588.00	0.0811	0.0001	9.04	0.0012
		Cruising - PZ to VSR	12.5	12	1.04	16.1	0.414	12,477	5,382	24.0	0.0058	588.00	0.0811	0.0009	94.93	0.0131
		Cruising - VSR to CW	24.5	12	2.04	16.1	0.414	12,477	10,548	24.0	0.0058	588.00	0.0811	0.0018	186.06	0.0257
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0029**	**297.29**	**0.0410**
PANAMAX	South In	Cruising - CW to VSR	23	12	1.92	15.8	0.438	10,300	8,649	10	0.0058	588.00	0.0811	0.0006	63.57	0.0088
		Cruising - VSR to PZ	11	12	0.92	15.8	0.438	10,300	4,136	10	0.0058	588.00	0.0811	0.0003	30.40	0.0042
		Cruising - PZ to Pilot	4.7	7	0.67	15.8	0.087	10,300	601	10	0.0058	588.00	0.0811	0.0000	4.42	0.0006
		Maneuvering - Pilot to Berth		3	1.00	15.8	0.007	10,300	71	10	0.00639	647.00	0.0895	0.0000	0.57	0.0001
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0010**	**98.96**	**0.0136**
	South Out	Maneuvering - Berth to Pilot		5	1.00	15.8	0.032	10,300	326	10	0.00639	647.00	0.0895	0.0000	2.64	0.0004
		Cruising - Pilot to PZ	3.5	7	0.50	15.8	0.087	10,300	448	10	0.0058	588.00	0.0811	0.0000	3.29	0.0005
		Cruising - PZ to VSR	12.5	12	1.04	15.8	0.438	10,300	4,700	10	0.0058	588.00	0.0811	0.0003	34.55	0.0048
		Cruising - VSR to CW	24.5	12	2.04	15.8	0.438	10,300	9,213	10	0.0058	588.00	0.0811	0.0007	67.71	0.0093
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0011**	**108.19**	**0.0149**
SUEZMAX	North In	Cruising - CW to VSR	22	12	1.83	17	0.352	16,000	10,317	52	0.0058	588.00	0.0811	0.0039	394.32	0.0544
		Cruising - VSR to PZ	21	12	1.75	17	0.352	16,000	9,848	52	0.0058	588.00	0.0811	0.0037	376.40	0.0519
		Cruising - PZ to Pilot	4.7	7	0.67	17	0.070	16,000	750	52	0.0058	588.00	0.0811	0.0003	28.67	0.0040
		Maneuvering - Pilot to Berth		3	1.00	17	0.005	16,000	88	52	0.00639	647.00	0.0895	0.0000	3.70	0.0005
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0079**	**803.08**	**0.1108**
	North Out	Maneuvering - Berth to Pilot		5	1.00	17	0.025	16,000	407	52	0.00639	647.00	0.0895	0.0002	17.12	0.0024
		Cruising - Pilot to PZ	3.8	7	0.54	17	0.070	16,000	606	52	0.0058	588.00	0.0811	0.0002	23.18	0.0032
		Cruising - PZ to VSR	21	12	1.75	17	0.352	16,000	9,848	52	0.0058	588.00	0.0811	0.0037	376.40	0.0519
		Cruising - VSR to CW	22	12	1.83	17	0.352	16,000	10,317	52	0.0058	588.00	0.0811	0.0039	394.32	0.0544
										TOTAL	**0.0238**	**2411.00**	**0.3328**	**0.0080**	**811.01**	**0.1119**
										GRAND TOTAL	**0.1903**	**19288.00**	**2.6624**	**0.0463**	**4697.65**	**0.6480**

Table H.2.RPA.Mit.GHG.2040-2. 2040 Reduced Project Alternative Auxiliary Generator Average Daily Mitigated GHG Emissions

Ship	Direction	Mode	Activity (hours)	MCR (kW)	Load Factor	Energy (kW-hr)	Annual Shipcalls (vessels/yr)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
VLCC	North In	Cruising	4.25	3,600	0.280	4,289	46.0	0.0068	690.00	0.0952	0.0017	170.16	0.0235
		Maneuvering	2.00	3,600	0.280	2,016	46.0	0.0068	690.00	0.0952	0.0008	79.98	0.0110
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0025**	**250.14**	**0.0345**
	North Out	Maneuvering	1.50	3,600	0.280	1,512	46.0	0.0068	690.00	0.0952	0.0006	59.99	0.0083
		Cruising	4.13	3,600	0.280	4,159	46.0	0.0068	690.00	0.0952	0.0016	165.02	0.0228
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0022**	**225.00**	**0.0310**
AFRAMAX	South In	Cruising	3.50	3,600	0.280	3,533	24.0	0.0068	690.00	0.0952	0.0007	73.13	0.0101
		Maneuvering	2.00	3,600	0.280	2,016	24.0	0.0068	690.00	0.0952	0.0004	41.73	0.0058
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0011**	**114.86**	**0.0158**
	South Out	Maneuvering	1.50	3,600	0.278	1,501	24.0	0.0068	690.00	0.0952	0.0003	31.07	0.0043
		Cruising	3.58	3,600	0.278	3,586	24.0	0.0068	690.00	0.0952	0.0007	74.23	0.0102
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0010**	**105.31**	**0.0145**
PANAMAX	South In	Cruising	3.50	3,600	0.28	3,533	10	0.0068	690.00	0.0952	0.0003	30.47	0.0042
		Maneuvering	2.00	3,600	0.28	2,016	10	0.0068	690.00	0.0952	0.0002	17.39	0.0024
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0005**	**47.86**	**0.0066**
	South Out	Maneuvering	1.5	3,600	0.28	1,512	10	0.0068	690.00	0.0952	0.0001	13.04	0.0018
		Cruising	3.58	3,600	0.28	3,612	10	0.0068	690.00	0.0952	0.0003	31.15	0.0043
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0004**	**44.19**	**0.0061**
SUEZMAX	North In	Cruising	4.25	3,600	0.28	4,289	52	0.0068	690.00	0.0952	0.0019	192.35	0.0265
		Maneuvering	2.00	3,600	0.28	2,016	52	0.0068	690.00	0.0952	0.0009	90.42	0.0125
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0028**	**282.77**	**0.0390**
	North Out	Maneuvering	1.5	3,600	0.28	1,512	52	0.0068	690.00	0.0952	0.0007	67.81	0.0094
		Cruising	4.13	3,600	0.28	4,159	52	0.0068	690.00	0.0952	0.0018	186.54	0.0257
							TOTAL	**0.0136**	**1380.00**	**0.1904**	**0.0025**	**254.35**	**0.0351**
							GRAND TOTAL	**0.1088**	**11040.00**	**1.5232**	**0.0131**	**1324.49**	**0.1827**

Table H.2.RPA.Mit.GHG.2040-3. 2040 Reduced Project Alternative Summary of Average Daily MitigatedVessel GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Cruising	Main Engines	0.0457	4635.05	0.6393
Cruising	Aux Generator	0.0091	923.05	0.1274
Maneuvering	Main Engines	0.0006	62.61	0.0087
Maneuvering	Aux Generator	0.0040	401.44	0.0554
Maneuvering	**TOTAL**	**0.0046**	**464.04**	**0.0640**
Propulsion	**TOTAL**	**0.0594**	**6022.15**	**0.8307**

Mode	Equipment	N_2O Emissions (tons/day)	CO_2 Emissions (tons/day)	CH_4 Emissions (tons/day)
Cruising	Main Engines	1.25E-04	12.70	1.75E-03
Cruising	Aux Generator	2.49E-05	2.53	3.49E-04
Maneuvering	Main Engines	1.69E-06	0.17	2.37E-05
Maneuvering	Aux Generator	1.08E-05	1.10	1.52E-04
Maneuvering	**TOTAL**	**1.25E-05**	**1.27**	**1.75E-04**
Propulsion	**TOTAL**	**1.63E-04**	**16.50**	**2.28E-03**

Table H.2.RPA.Mit.GHG.2040-4. 2040 Reduced Project Alternative Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Shipcalls (vessels/yr)	Vessel Size	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	0.20	102.17	30%	3	50,000	14,693	0.0068	690.00	0.0952	0.0002	18.35	0.0025
46.0	VLCC	0.20	80.38	30%	3	90,000	39,880	0.0068	690.00	0.0952	0.0005	49.80	0.0069
10	Panamax	0.20	59.91	30%	3	35,000	2,094	0.0068	690.00	0.0952	0.0000	2.61	0.0004
52	Suezmax	0.20	82.85	30%	3	70,000	30,117	0.0068	690.00	0.0952	0.0004	37.61	0.0052
						TOTAL		**0.0272**	**2,760.00**	**0.3808**	**0.0011**	**108.36**	**0.0150**

Table H.2.RPA.Mit.GHG.2040-5. 2040 Reduced Project Alternative Summary of Boiler Warm-Up Average Daily Mitigated GHG Emissions.

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Boiler Warm-up	Boiler	0.0011	108.36	0.0150

Table H.2.RPA.Mit.GHG.2040-6. 2040 Reduced Project Alternative Berth Operations Average Daily Mitigated GHG Emissions.

Auxiliary Generator Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	3,600	28%	2.5	8.5	150	0.0068	690.0	0.0952	0.0005	51.79	0.0071
46.0	VLCC	2,000,000	Dist at 0.2	0.20	3,600	28%	2.5	8.5	150	0.0068	690.0	0.0952	0.0010	99.27	0.0137
10.0	Panamax	350,000	Dist at 0.2	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0002	21.74	0.0030
52	Suezmax	1,000,000	Dist at 0.2	0.20	3,600	28%	2.5	8.6	150	0.0068	690.0	0.0952	0.0011	113.02	0.0156
						TOTAL							**0.0028**	**285.82**	**0.0394**

Boiler Pre-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Load Factor	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	102.17	30%	2.5	50,000	40,815	0.0627	6,360.0	0.8770	0.0014	140.93	0.0194
46.0	VLCC	2,000,000	Dist at 0.2	0.20	80.38	30%	2.5	90,000	110,777	0.0627	6,360.0	0.8770	0.0038	382.49	0.0527
10.0	Panamax	350,000	Dist at 0.2	0.20	59.91	30%	2.5	35,000	6,980	0.0627	6,360.0	0.8770	0.0002	24.10	0.0033
52.0	Suezmax	1,000,000	Dist at 0.2	0.20	82.85	30%	2.5	70,000	100,391	0.0627	6,360.0	0.8770	0.0034	346.63	0.0478
						TOTAL							**0.0088**	**894.14**	**0.1233**

Auxiliary Generator Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	3,600	56%	15.0	102.4	140	0.0068	690.0	0.0952	0.0061	621.50	0.0857
46.0	VLCC	2,000,000	Dist at 0.2	0.20	3,600	56%	23.2	158.4	140	0.0068	690.0	0.0952	0.0182	1842.39	0.2542
10.0	Panamax	350,000	Dist at 0.2	0.20	3,600	56%	11.0	75.7	140	0.0068	690.0	0.0952	0.0019	191.27	0.0264
52.0	Suezmax	1,000,000	Dist at 0.2	0.20	3,600	56%	15.3	105.2	140	0.0068	690.0	0.0952	0.0136	1383.39	0.1909
						TOTAL							**0.0398**	**4038.55**	**0.5572**

Boiler Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	Fuel Consumption (lb/1000 bbl offloaded)	Inerting Fuel Consumption Savings (lb/1000 bbl offloaded)	Activity Time (hr)	Pumping Rate (bbl/hr)	Fuel Consumption (gal/yr)	N_2O Emission Factor (lb/ton)	CO_2 Emission Factor (lb/ton)	CH_4 Emission Factor (lb/ton)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	102.17	28.06	15.0	50,000	177,631	0.0627	6,360.0	0.8770	0.0202	2044.39	0.2819
46.0	VLCC	2,000,000	Dist at 0.2	0.20	80.38	28.06	23.2	90,000	669,107	0.0627	6,360.0	0.8770	0.0759	7700.89	1.0619
10.0	Panamax	350,000	Dist at 0.2	0.20	59.91	28.06	11.0	35,000	16,328	0.0627	6,360.0	0.8770	0.0019	187.92	0.0259
52.0	Suezmax	1,000,000	Dist at 0.2	0.20	82.85	28.06	15.3	70,000	406,307	0.0627	6,360.0	0.8770	0.0461	4676.27	0.6448
							TOTAL						**0.1440**	**14609.46**	**2.0145**

Auxiliary Generator Post-Pumping

Shipcalls (vessels/yr)	Vessel Size	Crude Offloaded bbl/call	Fuel Type	Sulfur Content (%)	MCR (kW)	Load Factor	Activity Time (hr)	Energy (MMBtu)	Heating Value (MMBtu/1000 gal)	N_2O Emission Factor (g/kWh)	CO_2 Emission Factor (g/kWh)	CH_4 Emission Factor (g/kWh)	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
24.0	Aframax	700,000	Dist at 0.2	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0002	20.72	0.0029
46.0	VLCC	2,000,000	Dist at 0.2	0.20	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0004	39.71	0.0055
10.0	Panamax	350,000	Dist at 0.2	2.70	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0001	8.69	0.0012
52.0	Suezmax	1,000,000	Dist at 0.2	2.70	3,600	28%	1.0	3.4	150	0.0068	690.0	0.0952	0.0004	45.21	0.0062
						TOTAL							**0.0011**	**114.33**	**0.0158**

Table H.2.RPA.Mit.GHG.2040-7. 2040 Reduced Project Alternative Summary of Berth Operations Average Daily Mitigated GHG Emissions.

No AMP

Mode	Equipment	N_2O Emissions (tons/yr)	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Berth Operations	Boiler	0.1528	15503.60	2.1378
Berth Operations	Aux Generator	0.0437	4438.6882	0.6124

Mitigated Emissions with AMP - Year 2040

AMP Reduction 70%

Berth Operations	Boiler	0.1528	15503.60	2.1378
Berth Operations	Aux Generator	0.0131	1331.61	0.1837