

ALASKA LNG PROJECT	DOCKET NO. CP17-____-000 RESOURCE REPORT NO. 9 APPENDIX C – EMISSIONS ASSOCIATED WITH PROJECT CONSTRUCTION	Doc No: USAI-PE-SRREG-00- 000009-000 DATE: APRIL 14, 2017 REVISION: 0
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APPENDIX C EMISSIONS ASSOCIATED WITH PROJECT CONSTRUCTION



**EMISSIONS ASSOCIATED WITH PROJECT
CONSTRUCTION**

USAI-PE-SRZZZ-00-000004-000



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1.0 INTRODUCTION

The purpose of this report is to document the emissions expected to result from Alaska LNG Project (Project) construction, as well as the data, references, emission factors, and assumptions used to calculate construction emissions. For purposes of this report, the project is broken into three distinct sections:

- Gas Treatment Plant (GTP) construction, including construction of the Prudhoe Bay Unit Gas Transmission Line (PBTL) and utility lines.
- Pipeline construction, including construction of the Mainline Pipeline and anticipated compressor and heater stations, and the Point Thomson Gas Transmission Line (PTTL).
- Liquefaction Facility construction, including construction of the LNG Plant and Marine Terminal.

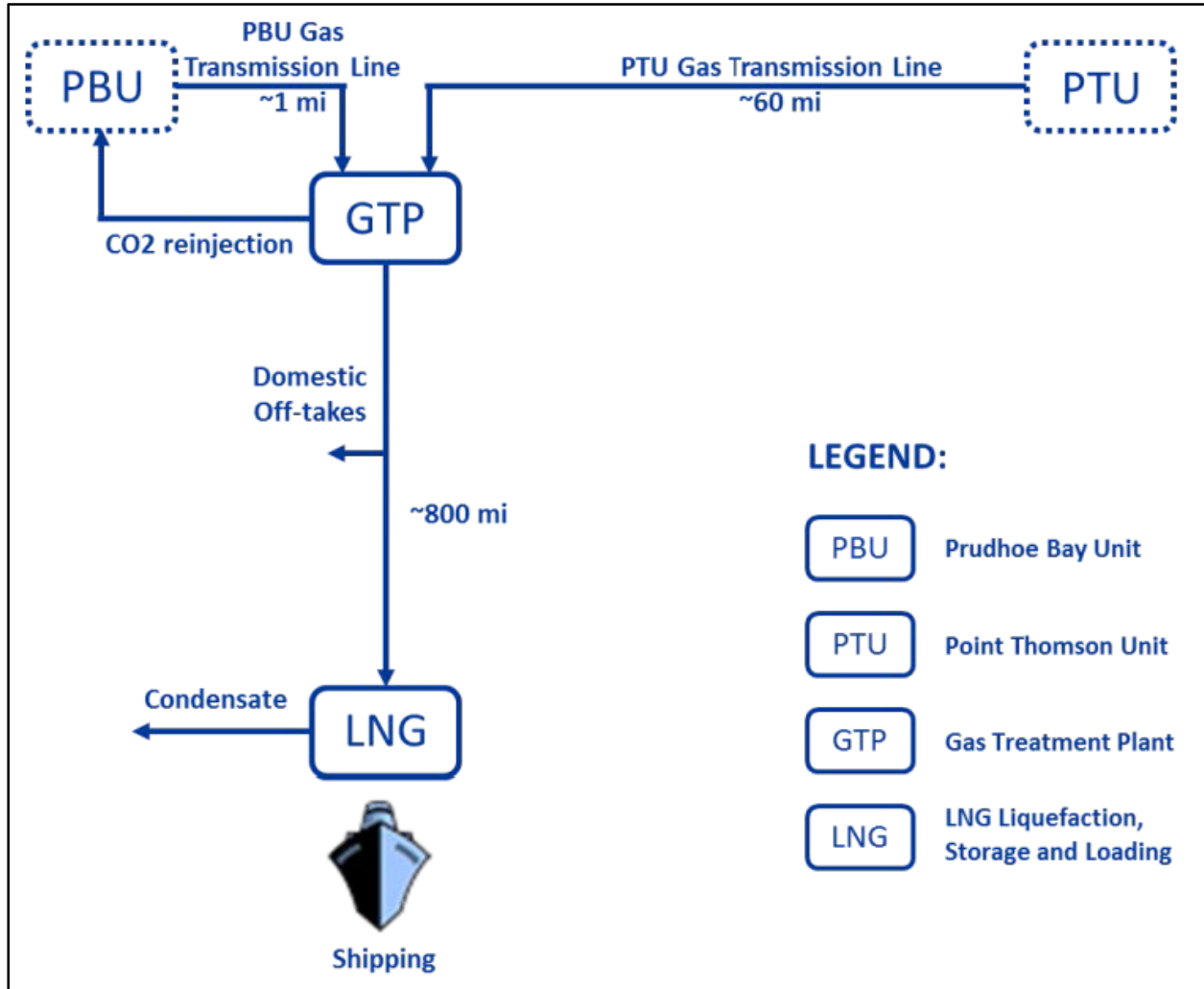
Emissions associated with construction of in-state pipeline take-offs are not included in this analysis.

1.1 ANALYTICAL APPROACH

This report documents the criteria pollutant and greenhouse gas emissions associated with project construction for the Project. Generally speaking, criteria pollutants are those pollutants (or their precursors) for which the U.S. Environmental Protection Agency has established an ambient air quality standard to protect human health and property. For this report, criteria pollutants include volatile organic compounds (VOC), nitrogen oxides (NO_x), carbon monoxide (CO), respirable particulate matter (particulate matter with an effective diameter of 10 microns or less, or PM₁₀), fine particulate matter (particulate matter with an effective diameter of 2.5 microns or less, or PM_{2.5}), and sulfur dioxide (SO₂).¹

¹ Lead is not included because of the progress made in reducing ambient lead concentrations, primarily due to the elimination of lead in gasoline. Since 1980, national average ambient lead concentrations have dropped more than 90 percent.


**FIGURE 1-1
Project Block Flow Diagram**




Greenhouse gases (GHGs) are gases that absorb and re-emit infrared radiation. This report focuses on three greenhouse gases commonly emitted by combustion processes (from on-road vehicles, non-road equipment, and external combustion devices): carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). GHG emissions are often expressed in “carbon dioxide equivalents (CO₂e), which equates a given mixture and amount of greenhouse gas to the quantity of CO₂ that would have the same global warming potential (GWP), when measured over a specified timescale.

Project construction emission calculations were calculated using well-documented analytical approaches, projected activity data provided by the Project Team, and publicly available emission factors and calculation techniques.

- Information was provided for on-road vehicle, non-road equipment, and external combustion equipment use; logistics activity associated with transporting equipment, modules, materials, supplies, and personnel to the construction sites; soil and gravel material handling; construction site disturbed areas; and other construction activities.

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- Nonroad equipment emission factors are based on the U.S. Environmental Protection Agency's (USEPA) NONROAD2008a model runs for equipment operating in Alaska reflecting all available equipment types and fuel types, Alaska-specific gasoline RVP data and temperature data, gasoline limited to 10 ppm sulfur, and onshore diesel limited to 15 ppm sulfur.
- Electrical generators at construction camps are assumed to comply with the federal New Source Performance Standards for stationary compression ignition internal combustion engines (Code of Federal Regulations Title 40 – Protection of the Environment, Part 60 – Standards of Performance for New Stationary Sources, Subpart IIII, at 40 CFR Sec. 60.4200 et seq.). Therefore, construction camp electrical generators are assumed to be powered by Tier 4 diesel-fired engines. Greenhouse gas emissions are based on information presented in The Climate Registry's (TCR) *General Reporting Protocol Version 2.0*. "2015 Climate Registry Default Emission Factors".
- Onroad vehicle emission factors are based on the USEPA's MOVES2014 model runs for gasoline- and diesel-fueled vehicles operating in Alaska, reflecting all available valid fuel type and vehicle type combinations, all available road types, all available criteria and greenhouse gas pollutants, and particulate matter exhaust, brake wear, and tire wear.
- External combustion equipment emission factors are based on information presented in the USEPA's *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (USEPA Document No. AP-42), Chapter 1 (External Combustion Sources) and The Climate Registry's (TCR) *General Reporting Protocol Version 2.0*. "2015 Climate Registry Default Emission Factors".
- Waste incinerator emission factors are based on information presented in the USEPA's *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (USEPA Document No. AP-42), Chapter 2 (Solid Waste Disposal) and Title 40 *Code of Federal Regulations Part 98* (Mandatory Greenhouse Gas Reporting), Subpart C (General Stationary Fuel Combustion Sources).
- Marine vessel emissions are calculated based on information presented in the USEPA's *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories (Final Report)*, prepared by ICF International.
- Locomotive emissions are calculated based on fleet-wide emission factors presented in the USEPA's *Emission Factors for Locomotives* document, reflecting the USEPA's 2008 locomotive emission standards.
- Aircraft emissions associated with operation of charter aircraft flights for crew transport are based on emission rates for similar aircraft as reported in the Greater Toronto Airport Authority's *2007 Emissions Inventory – Toronto Pearson International Airport, Toronto, Ontario: Final Report*. Aircraft emissions associated with operation of regularly scheduled commercial flights are not included in the project's construction emissions.
- Global warming potential used to convert CO₂, CH₄, and N₂O to CO₂e are based on the Intergovernmental Panel on Climate Change (IPCC) *Fourth Assessment Report (AR4)* as reported in the USEPA's *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013*.
- Fugitive particulate matter emissions associated with drilling, blasting, and crushing operations are based on information presented in the USEPA's *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (USEPA Document No. AP-42), Chapter 11 (Mineral Products Industry).
- Fugitive particulate matter emissions associated with paved roads, unpaved roads, and material handling are based on information presented in the USEPA's *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (USEPA Document No. AP-42), Chapter 13 (Miscellaneous Sources).

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- Fugitive particulate matter emissions associated with wind erosion of exposed areas are based on information presented in the Western Governors’ Association’s *WRAP Fugitive Dust Handbook*.
- Fugitive particulate matter associated with bulldozing and grading are based on information presented in the Mojave Desert Air Quality Management’s District *Emissions Inventory Guidance Mineral Handling and Processing Industries*.
- Criteria pollutant emissions associated with explosives detonation are based on information presented in the USEPA’s *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources (USEPA Document No. AP-42), Chapter 13 (Miscellaneous Sources)*. Greenhouse gas emissions associated with explosives detonation are based on information presented in the Australian Greenhouse Office’s *AGO Factors and Methods Workbook, December 2006, For Use in Australian Greenhouse Emissions Reporting*.
- Solvent evaporation emissions associated with application of field weld coating are based on manufacturer data related to solvent content and coating coverage.

Fugitive particulate matter emissions are assumed to be controlled by the following.

- Fugitive emissions from unpaved roads and wind erosion associated with the GTP, the PTTL, and Mainline Pipeline Spreads 1 and 2 are assumed to be controlled by 75%. During the winter construction season, fugitive particulate matter emissions are reduced by 100% when temperatures are below freezing and dirt/dust is either frozen or covered by snow, resulting in negligible emissions. During the summer construction season, fugitive particulate matter emissions are reduced by 50% based on use of wet suppression techniques in accordance with a dust control plan or application of calcium chloride on the Dalton Highway.
- Fugitive emissions from unpaved roads and wind erosion associated with the Liquefaction Facility and the Mainline Pipeline Spreads 3 and 4 are assumed to be controlled by 50% based on use of wet suppression techniques in accordance with a dust control plan.
- Fugitive emissions associated with material handling, bulldozing and grading, and drilling are assumed to be controlled by 50% based on use of wet suppression techniques in accordance with a dust control plan.

Emissions associated with potential emergency response, such as ambulances and emergency helicopters, are not included in the construction emission calculations for the Project.

1.2 SUMMARY

The following tables summarize emissions associated with Project construction for each year of the anticipated 9-year construction period. Additional details are provided in Appendices A, B, and C.

Table 1. Summary of Project Construction Emissions – Year 1

Facility/Project Component	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO _{2e}
<u>Gas Treatment Plant</u>										
GTP Facility Construction	1.8	15.0	6.0	104.2	22.4	0.0	5,116.6	0.0	0.1	5,154.7
Prudhoe Bay Unit Pipeline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	1.5	16.3	4.9	107.8	11.3	0.0	3,173.6	0.5	0.0	3,187.8
Construction Camp	0.0	0.1	0.0	4.1	0.4	0.0	22.0	0.0	0.0	22.0
Subtotal – GTP:	3.4	31.4	10.9	216.1	34.1	0.1	8,312.2	0.6	0.1	8,364.6
<u>Mainline Pipeline Spread 1</u>										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Spread 1:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<u>Mainline Pipeline Spread 2</u>										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Spread 2:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<u>Mainline Pipeline Spread 3</u>										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Spread 3:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<u>Mainline Pipeline Spread 4</u>										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Spread 4:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<u>Point Thomson Trans. Line</u>										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – P TTL:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<u>Liquefaction Facility</u>										
Liquefaction Facility Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Liquefaction Facility:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL YEAR 1 EMISSIONS	3.4	31.4	10.9	216.1	34.1	0.1	8,312.2	0.6	0.1	8,364.6

Table 2. Summary of Project Construction Emissions – Year 2

Facility/Project Component	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
<u>Gas Treatment Plant</u>										
GTP Facility Construction	14.1	112.4	52.5	835.8	196.8	0.7	37,599.4	0.3	0.9	37,881.2
Prudhoe Bay Unit Pipeline	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	4.0	42.2	12.8	302.9	31.5	0.1	8,842.1	1.5	0.0	8,883.3
Construction Camp	0.1	1.9	0.7	70.5	7.4	0.0	342.9	0.0	0.0	343.5
Subtotal – GTP:	18.2	156.5	66.0	1,209.5	235.7	0.8	46,784.3	1.8	0.9	47,107.9
<u>Mainline Pipeline Spread 1</u>										
Construction	2.1	13.8	11.0	148.4	28.8	0.0	4,638.3	0.1	0.1	4,673.1
Logistics	1.3	12.7	4.1	200.8	20.4	0.0	2,638.9	0.4	0.0	2,651.0
Construction Camps	4.5	5.8	27.1	0.9	0.9	0.7	5,240.8	0.3	0.1	5,265.8
Subtotal – Spread 1:	7.8	32.3	42.2	350.0	50.2	0.8	12,518.0	0.8	0.2	12,589.9
<u>Mainline Pipeline Spread 2</u>										
Construction	7.8	50.1	48.0	474.8	90.3	0.1	16,666.9	0.4	0.4	16,792.5
Logistics	1.0	10.5	3.4	96.4	10.0	0.0	2,047.1	0.3	0.0	2,056.4
Construction Camps	5.4	6.0	27.1	1.1	1.1	0.9	5,349.5	0.4	0.1	5,376.9
Subtotal – Spread 2:	14.2	66.6	78.5	572.4	101.4	1.1	24,063.6	1.0	0.5	24,225.8
<u>Mainline Pipeline Spread 3</u>										
Construction	5.7	39.5	30.6	523.2	85.5	0.1	12,366.5	0.2	0.3	12,458.9
Logistics	0.8	7.8	2.6	1.1	0.4	0.0	1,655.3	0.3	0.0	1,662.9
Construction Camps	4.3	5.8	27.1	0.9	0.9	0.7	5,226.3	0.3	0.1	5,250.9
Subtotal – Spread 3:	10.8	53.1	60.2	525.2	86.8	0.8	19,248.1	0.8	0.3	19,372.7
<u>Mainline Pipeline Spread 4</u>										
Construction	3.9	23.3	32.2	345.2	54.1	0.1	6,848.8	0.2	0.2	6,901.5
Logistics	0.9	9.2	3.0	44.7	4.8	0.1	1,895.0	0.3	0.0	1,903.6
Construction Camps	5.1	6.0	27.1	1.1	1.1	0.8	5,313.3	0.4	0.1	5,339.9
Subtotal – Spread 4:	9.9	38.4	62.2	391.0	59.9	0.9	14,057.1	0.9	0.2	14,145.0
<u>Point Thomson Trans. Line</u>										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – PTTL:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<u>Liquefaction Facility</u>										
Liquefaction Facility Construction	7.7	71.2	29.9	686.8	72.6	0.1	17,012.5	0.4	0.4	17,137.5
Logistics	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Construction Camp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Liquefaction Facility:	7.7	71.2	29.9	686.8	72.6	0.1	17,012.5	0.4	0.4	17,137.5
TOTAL YEAR 2 EMISSIONS	68.6	418.0	338.9	3,734.8	606.6	4.5	133,683.6	5.7	2.5	134,578.8

Table 3. Summary of Project Construction Emissions – Year 3

Facility/Project Component	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
<u>Gas Treatment Plant</u>										
GTP Facility Construction	17.3	123.9	60.3	861.7	187.3	0.9	48,207.3	0.4	1.2	48,562.8
Prudhoe Bay Unit Pipeline	0.0	0.3	0.2	3.9	1.1	0.0	69.5	0.0	0.0	70.0
Logistics	2.9	29.7	9.2	231.3	24.0	0.1	6,696.2	1.2	0.0	6,728.6
Construction Camp	1.6	7.8	27.4	105.3	10.8	0.1	5,817.9	2.2	0.0	5,884.9
Subtotal – GTP:	21.8	161.7	97.1	1,202.2	223.2	1.0	60,790.8	3.8	1.2	61,246.3
<u>Mainline Pipeline Spread 1</u>										
Construction	10.1	62.4	46.3	741.8	141.9	0.2	24,555.7	0.4	0.6	24,738.9
Logistics	1.2	12.1	4.0	214.7	21.8	0.0	2,719.7	0.5	0.0	2,732.4
Construction Camps	4.5	5.8	27.1	0.9	0.9	0.7	5,240.8	0.3	0.1	5,265.8
Subtotal – Spread 1:	15.8	80.4	77.4	957.4	164.7	0.9	32,516.3	1.2	0.6	32,737.1
<u>Mainline Pipeline Spread 2</u>										
Construction	12.0	70.5	70.9	751.5	141.8	0.2	26,644.7	0.6	0.6	26,845.3
Logistics	1.2	12.5	4.1	135.2	13.9	0.0	2,692.8	0.4	0.0	2,705.7
Construction Camps	7.1	11.3	54.1	1.4	1.4	1.0	10,264.2	0.6	0.1	10,309.2
Subtotal – Spread 2:	20.3	94.3	129.2	888.2	157.2	1.3	39,601.7	1.6	0.7	39,860.2
<u>Mainline Pipeline Spread 3</u>										
Construction	19.1	118.1	115.9	1,855.1	297.9	0.3	41,092.1	0.9	1.0	41,399.6
Logistics	0.5	5.3	1.8	0.8	0.3	0.0	1,183.7	0.2	0.0	1,188.8
Construction Camps	5.4	6.0	27.1	1.1	1.1	0.9	5,349.5	0.4	0.1	5,376.9
Subtotal – Spread 3:	25.0	129.4	144.8	1,857.0	299.3	1.2	47,625.3	1.5	1.0	47,965.3
<u>Mainline Pipeline Spread 4</u>										
Construction	5.9	34.1	46.2	549.7	84.7	0.1	10,954.4	0.3	0.3	11,037.8
Logistics	0.6	6.2	2.1	35.2	3.8	0.0	1,428.9	0.2	0.0	1,435.5
Construction Camps	5.1	6.0	27.1	1.1	1.1	0.8	5,313.3	0.4	0.1	5,339.9
Subtotal – Spread 4:	11.6	46.2	75.3	586.0	89.5	1.0	17,696.5	0.9	0.3	17,813.2
<u>Point Thomson Trans. Line</u>										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – PTTL:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<u>Liquefaction Facility</u>										
Liquefaction Facility Construction	31.2	712.9	77.6	481.3	64.0	97.8	46,743.4	0.5	1.9	47,314.9
Logistics	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Construction Camp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Liquefaction Facility:	31.2	712.9	77.6	481.3	64.0	97.8	46,743.4	0.5	1.9	47,314.9
TOTAL YEAR 3 EMISSIONS	125.8	1,224.9	601.4	5,972.0	997.8	103.2	244,974.0	9.4	5.8	246,937.0

Table 4. Summary of Project Construction Emissions – Year 4

Facility/Project Component	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Gas Treatment Plant										
GTP Facility Construction	9.7	76.7	38.0	501.3	113.5	0.5	26,827.7	0.3	0.6	27,018.0
Prudhoe Bay Unit Pipeline	0.3	2.5	1.4	12.6	2.7	0.0	501.2	0.0	0.0	505.0
Logistics	2.1	21.8	7.0	184.0	19.0	0.0	5,287.0	1.0	0.0	5,313.4
Construction Camp	3.1	12.8	55.0	104.8	11.0	0.1	11,312.6	4.4	0.1	11,448.8
Subtotal – GTP:	15.3	113.8	101.3	802.7	146.2	0.7	43,928.5	5.7	0.7	44,285.1
Mainline Pipeline Spread 1										
Construction	11.9	85.1	53.7	735.9	127.0	0.2	26,892.4	0.6	0.6	27,090.0
Logistics	2.4	24.3	7.9	382.8	38.9	0.1	5,532.0	1.0	0.0	5,559.0
Construction Camps	7.1	11.3	54.1	1.4	1.4	1.0	10,264.2	0.6	0.1	10,309.2
Subtotal – Spread 1:	21.4	120.7	115.7	1,120.1	167.4	1.3	42,688.6	2.1	0.7	42,958.3
Mainline Pipeline Spread 2										
Construction	9.0	55.8	47.4	540.9	96.4	0.2	20,827.2	0.4	0.5	20,981.0
Logistics	1.0	10.9	3.5	97.2	10.0	0.0	2,305.3	0.4	0.0	2,316.8
Construction Camps	4.3	5.8	27.1	0.9	0.9	0.7	5,222.7	0.3	0.1	5,247.2
Subtotal – Spread 2:	14.3	72.5	78.0	638.9	107.3	0.9	28,355.2	1.2	0.5	28,545.0
Mainline Pipeline Spread 3										
Construction	9.8	69.7	54.5	941.4	137.8	0.2	20,348.0	0.5	0.5	20,498.1
Logistics	1.1	11.0	3.6	1.5	0.6	0.0	2,549.7	0.4	0.0	2,561.5
Construction Camps	10.2	11.9	54.2	2.1	2.1	1.7	10,633.8	0.7	0.1	10,687.1
Subtotal – Spread 3:	21.1	92.6	112.3	945.1	140.5	1.9	33,531.5	1.6	0.6	33,746.7
Mainline Pipeline Spread 4										
Construction	20.8	184.3	104.6	1,594.9	237.8	9.8	42,679.4	0.9	1.1	43,018.1
Logistics	2.0	26.9	6.1	80.7	8.8	1.8	4,134.3	0.6	0.0	4,158.9
Construction Camps	7.3	11.3	54.1	1.5	1.5	1.1	10,286.0	0.6	0.1	10,331.4
Subtotal – Spread 4:	30.0	222.5	164.7	1,677.0	248.1	12.7	57,099.7	2.1	1.2	57,508.4
Point Thomson Trans. Line										
Construction	5.3	31.2	50.6	222.1	29.5	0.1	7,288.6	0.3	0.2	7,345.7
Logistics	0.1	1.2	0.4	19.3	2.0	0.0	258.9	0.0	0.0	260.1
Construction Camps	2.9	5.5	27.0	0.6	0.6	0.4	5,052.4	0.3	0.0	5,073.1
Subtotal – PTTL:	8.3	37.9	78.0	241.9	32.0	0.4	12,599.8	0.6	0.2	12,678.9
Liquefaction Facility										
Liquefaction Facility Construction	104.3	1,459.6	734.8	2,567.0	291.5	151.2	162,644.6	2.3	5.1	164,232.0
Logistics	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Construction Camp	15.4	22.1	79.5	369.9	40.0	2.5	17,844.7	6.8	0.2	18,069.7
Subtotal – Liquefaction Facility:	119.7	1,481.7	814.3	2,936.8	331.5	153.7	180,489.4	9.1	5.3	182,301.7
TOTAL YEAR 4 EMISSIONS	230.1	2,141.7	1,464.4	8,362.6	1,173.0	171.6	398,692.6	22.4	9.3	402,024.1

Table 5. Summary of Project Construction Emissions – Year 5

Facility/Project Component	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
<u>Gas Treatment Plant</u>										
GTP Facility Construction	6.5	55.9	23.8	314.3	59.6	0.2	17,065.2	0.3	0.4	17,181.6
Prudhoe Bay Unit Pipeline	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	141.5	3,674.1	351.2	252.8	101.6	538.4	168,830.9	2.7	7.8	171,212.3
Construction Camp	3.3	14.7	56.8	198.5	20.4	0.1	12,040.0	4.5	0.1	12,180.2
Subtotal – GTP:	151.4	3,744.8	431.8	765.7	181.6	538.7	197,936.1	7.5	8.2	200,574.1
<u>Mainline Pipeline Spread 1</u>										
Construction	16.2	114.6	58.6	1,058.5	166.0	0.3	41,283.9	0.8	0.9	41,582.2
Logistics	1.7	16.7	5.6	287.6	29.2	0.0	4,059.8	0.7	0.0	4,079.8
Construction Camps	10.7	12.0	54.2	2.2	2.2	1.8	10,699.0	0.7	0.1	10,753.8
Subtotal – Spread 1:	28.6	143.4	118.3	1,348.3	197.4	2.2	56,042.8	2.3	1.1	56,415.8
<u>Mainline Pipeline Spread 2</u>										
Construction	17.5	145.5	57.2	874.2	125.7	0.3	40,880.9	0.8	0.9	41,177.4
Logistics	1.9	20.4	6.8	206.9	21.3	0.0	4,675.5	0.8	0.0	4,698.3
Construction Camps	13.5	17.5	81.2	2.8	2.8	2.1	15,729.7	1.0	0.2	15,804.7
Subtotal – Spread 2:	32.8	183.5	145.1	1,083.9	149.7	2.5	61,286.1	2.6	1.1	61,680.3
<u>Mainline Pipeline Spread 3</u>										
Construction	13.4	103.0	47.2	1,372.7	172.8	0.3	33,428.1	0.7	0.7	33,668.5
Logistics	0.6	5.9	2.0	0.9	0.3	0.0	1,470.9	0.2	0.0	1,477.0
Construction Camps	13.9	17.6	81.2	2.9	2.9	2.2	15,787.7	1.0	0.2	15,864.0
Subtotal – Spread 3:	27.9	126.5	130.4	1,376.5	176.0	2.5	50,686.7	1.9	0.9	51,009.5
<u>Mainline Pipeline Spread 4</u>										
Construction	67.5	1,519.4	168.8	1,341.7	196.4	211.0	94,978.7	1.1	3.7	96,115.9
Logistics	0.8	8.4	2.7	36.4	3.9	0.1	1,970.9	0.3	0.0	1,980.0
Construction Camps	10.9	12.1	54.2	2.3	2.3	1.8	10,713.5	0.7	0.1	10,768.7
Subtotal – Spread 4:	79.1	1,539.9	225.7	1,380.4	202.6	212.9	107,663.2	2.2	3.8	108,864.6
<u>Point Thomson Trans. Line</u>										
Construction	7.4	42.9	70.2	332.4	43.9	0.1	10,915.7	0.5	0.2	11,001.0
Logistics	0.2	1.9	0.6	32.6	3.3	0.0	435.6	0.1	0.0	437.9
Construction Camps	9.0	11.7	54.1	1.8	1.8	1.4	10,488.9	0.7	0.1	10,538.9
Subtotal – PTTL:	16.6	56.5	125.0	366.9	49.0	1.5	21,840.2	1.2	0.4	21,977.7
<u>Liquefaction Facility</u>										
Liquefaction Facility Construction	102.4	853.8	1,067.7	4,394.8	464.6	46.2	162,582.4	3.5	4.3	163,947.1
Logistics	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Construction Camp	34.0	48.0	166.8	990.3	105.7	5.6	38,114.0	14.2	0.4	38,589.6
Subtotal – Liquefaction Facility:	136.4	901.7	1,234.5	5,385.2	570.3	51.8	200,696.4	17.7	4.7	202,536.7
TOTAL YEAR 5 EMISSIONS	472.8	6,696.1	2,410.9	11,706.8	1,526.6	812.2	696,151.5	35.4	20.2	703,058.7

Table 6. Summary of Project Construction Emissions – Year 6

Facility/Project Component	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Gas Treatment Plant										
GTP Facility Construction	5.2	44.9	17.8	240.9	40.3	0.1	14,314.4	0.3	0.3	14,410.1
Prudhoe Bay Unit Pipeline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	111.7	2,895.1	285.2	198.8	80.9	422.3	133,411.4	2.3	6.1	135,291.2
Construction Camp	3.3	14.6	56.8	211.7	21.7	0.1	12,105.1	4.5	0.1	12,245.4
Subtotal – GTP:	120.3	2,954.6	359.8	651.4	142.9	422.5	159,830.9	7.1	6.5	161,946.6
Mainline Pipeline Spread 1										
Construction	11.5	89.0	36.2	686.2	96.5	0.2	28,746.6	0.6	0.7	28,955.3
Logistics	2.2	21.0	7.3	443.0	44.8	0.1	5,692.0	1.0	0.0	5,720.8
Construction Camps	10.6	12.0	54.2	2.2	2.2	1.8	10,677.3	0.7	0.1	10,731.6
Subtotal – Spread 1:	24.3	121.9	97.7	1,131.4	143.5	2.1	45,115.9	2.3	0.8	45,407.7
Mainline Pipeline Spread 2										
Construction	10.3	77.5	32.6	568.7	79.0	0.2	26,445.6	0.5	0.6	26,637.4
Logistics	1.3	13.5	4.7	178.3	18.2	0.0	3,550.2	0.6	0.0	3,568.7
Construction Camps	10.1	11.9	54.2	2.1	2.1	1.7	10,619.3	0.7	0.1	10,672.3
Subtotal – Spread 2:	21.8	102.9	91.5	749.1	99.4	1.9	40,615.1	1.9	0.7	40,878.4
Mainline Pipeline Spread 3										
Construction	12.2	101.8	41.1	1,195.1	148.8	0.2	28,378.3	0.6	0.6	28,584.4
Logistics	1.3	12.0	4.2	2.0	0.7	0.0	3,321.7	0.6	0.0	3,338.0
Construction Camps	12.7	17.3	81.2	2.6	2.6	2.0	15,642.7	0.9	0.2	15,715.8
Subtotal – Spread 3:	26.2	131.2	126.5	1,199.7	152.1	2.2	47,342.8	2.2	0.8	47,638.2
Mainline Pipeline Spread 4										
Construction	8.8	64.8	29.7	900.8	113.4	0.2	22,072.2	0.5	0.5	22,230.6
Logistics	1.5	18.1	4.9	90.5	9.6	0.9	3,788.7	0.6	0.0	3,810.6
Construction Camps	12.8	17.4	81.2	2.6	2.6	2.0	15,650.0	1.0	0.2	15,723.2
Subtotal – Spread 4:	23.1	100.3	115.8	993.9	125.6	3.1	41,510.9	2.1	0.7	41,764.3
Point Thomson Trans. Line										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.1	1.3	0.4	23.9	2.4	0.0	318.6	0.1	0.0	320.3
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – PTTL:	0.1	1.3	0.4	23.9	2.4	0.0	318.6	0.1	0.0	320.3
Liquefaction Facility										
Liquefaction Facility Construction	98.4	307.6	1,045.6	6,351.0	650.2	1.4	183,193.9	3.6	4.4	184,609.8
Logistics	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Construction Camp	39.4	52.8	193.4	991.5	106.8	6.6	43,967.4	16.6	0.5	44,521.7
Subtotal – Liquefaction Facility:	137.9	360.4	1,239.0	7,342.5	757.0	7.9	227,161.3	20.2	4.9	229,131.5
TOTAL YEAR 6 EMISSIONS	353.6	3,772.6	2,030.8	12,091.8	1,423.0	439.8	561,895.6	35.9	14.4	567,087.1

Table 7. Summary of Project Construction Emissions – Year 7


Facility/Project Component	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Gas Treatment Plant										
GTP Facility Construction	5.0	41.3	16.0	249.5	41.0	0.1	14,393.2	0.3	0.3	14,489.3
Prudhoe Bay Unit Pipeline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	65.5	1,663.0	184.3	244.8	61.3	236.5	80,514.1	2.4	3.5	81,610.7
Construction Camp	3.3	14.4	56.9	222.0	22.7	0.1	12,181.2	4.5	0.1	12,322.0
Subtotal – GTP:	73.7	1,718.6	257.2	716.3	125.1	236.8	107,088.6	7.2	3.9	108,422.0
Mainline Pipeline Spread 1										
Construction	0.6	5.2	1.8	26.3	3.9	0.0	1,164.6	0.0	0.0	1,173.3
Logistics	0.9	8.3	2.9	174.5	17.7	0.0	2,346.5	0.5	0.0	2,359.0
Construction Camps	0.6	1.3	6.7	0.1	0.1	0.1	1,233.3	0.1	0.0	1,238.1
Subtotal – Spread 1:	2.1	14.8	11.3	200.9	21.7	0.1	4,744.4	0.5	0.0	4,770.4
Mainline Pipeline Spread 2										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.5	4.7	1.6	56.8	5.8	0.0	1,291.5	0.3	0.0	1,298.5
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Spread 2:	0.5	4.7	1.6	56.8	5.8	0.0	1,291.5	0.3	0.0	1,298.5
Mainline Pipeline Spread 3										
Construction	1.1	10.5	3.5	88.6	11.4	0.0	2,329.1	0.0	0.1	2,346.5
Logistics	0.7	6.2	2.2	1.0	0.3	0.0	1,803.9	0.3	0.0	1,813.5
Construction Camps	0.9	1.4	6.7	0.2	0.2	0.1	1,263.7	0.1	0.0	1,269.2
Subtotal – Spread 3:	2.6	18.1	12.4	89.8	11.9	0.2	5,396.7	0.5	0.1	5,429.2
Mainline Pipeline Spread 4										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.6	5.4	1.8	32.5	3.4	0.0	1,459.6	0.3	0.0	1,467.5
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Spread 4:	0.6	5.4	1.8	32.5	3.4	0.0	1,459.6	0.3	0.0	1,467.5
Point Thomson Trans. Line										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – PTTL:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Liquefaction Facility										
Liquefaction Facility Construction	88.8	251.7	814.4	6,534.5	666.3	1.4	186,824.3	3.1	4.5	188,257.5
Logistics	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Construction Camp	32.6	45.4	166.4	991.7	105.5	5.4	38,023.8	14.2	0.4	38,497.2
Subtotal – Liquefaction Facility:	121.4	297.2	980.8	7,526.2	771.8	6.8	224,848.1	17.3	4.9	226,754.7
TOTAL YEAR 7 EMISSIONS	200.9	2,058.8	1,265.2	8,622.6	939.7	243.8	344,828.9	26.1	8.9	348,142.2

Table 8. Summary of Project Construction Emissions – Year 8

Facility/Project Component	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Gas Treatment Plant										
GTP Facility Construction	4.9	39.0	15.2	260.5	41.9	0.1	14,536.2	0.3	0.3	14,633.4
Prudhoe Bay Unit Pipeline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	64.3	1,651.1	180.3	126.5	49.2	236.5	77,164.9	1.7	3.5	78,243.7
Construction Camp	3.2	13.9	56.6	217.8	22.3	0.1	12,125.4	4.5	0.1	12,265.8
Subtotal – GTP:	72.4	1,704.0	252.1	604.8	113.4	236.7	103,826.4	6.6	3.9	105,142.9
Mainline Pipeline Spread 1										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Spread 1:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mainline Pipeline Spread 2										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Spread 2:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mainline Pipeline Spread 3										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Spread 3:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mainline Pipeline Spread 4										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Spread 4:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Point Thomson Trans. Line										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – PTTL:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Liquefaction Facility										
Liquefaction Facility Construction	58.7	172.6	462.1	5,236.8	532.2	1.1	143,856.0	2.0	3.5	144,952.6
Logistics	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Construction Camp	20.0	31.9	111.4	987.2	102.6	3.2	26,010.8	9.4	0.3	26,322.0
Subtotal – Liquefaction Facility:	78.7	204.5	573.5	6,224.1	634.8	4.2	169,866.8	11.4	3.8	171,274.6
TOTAL YEAR 8 EMISSIONS	151.1	1,908.5	825.6	6,828.9	748.2	241.0	273,693.2	18.0	7.6	276,417.5

Table 9. Summary of Project Construction Emissions – Year 9

Facility/Project Component	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO _{2e}
Gas Treatment Plant										
GTP Facility Construction	1.9	14.6	5.7	121.2	19.2	0.1	5,990.4	0.1	0.1	6,030.1
Prudhoe Bay Unit Pipeline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.4	3.5	1.2	40.2	4.1	0.0	1,121.8	0.2	0.0	1,128.0
Construction Camp	2.0	7.6	34.3	138.0	14.1	0.1	7,394.1	2.8	0.1	7,479.5
Subtotal – GTP:	4.2	25.6	41.3	299.3	37.4	0.1	14,506.2	3.1	0.2	14,637.6
Mainline Pipeline Spread 1										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Spread 1:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mainline Pipeline Spread 2										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Spread 2:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mainline Pipeline Spread 3										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Spread 3:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mainline Pipeline Spread 4										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – Spread 4:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Point Thomson Trans. Line										
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Logistics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Construction Camps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal – PTTL:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Liquefaction Facility										
Liquefaction Facility Construction	20.1	63.3	389.1	1,381.0	141.7	0.2	19,304.4	1.1	0.4	19,463.0
Logistics	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Construction Camp	15.8	25.3	84.0	986.4	101.7	2.5	20,294.6	7.1	0.2	20,530.9
Subtotal – Liquefaction Facility:	35.8	88.5	473.1	2,367.3	243.4	2.7	39,599.0	8.2	0.6	39,993.9
TOTAL YEAR 9 EMISSIONS	40.1	114.2	514.4	2,666.6	280.8	2.8	54,105.2	11.3	0.8	54,631.6

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2.0 GAS TREATMENT PLANT CONSTRUCTION

The GTP and associated facilities in the Prudhoe Bay Unit (PBU) would receive natural gas from the PBTL and the PTTL. The GTP would treat/process the natural gas for delivery into the Mainline. There would be custody transfer, verification, and process metering between the GTP and PBU for fuel gas, propane makeup, and by-products. All of these would be on the GTP or PBU pads.

Construction of the GTP is expected to last approximately nine years, and expected to include the following activities:

- Establishment and operation of construction camps to support construction of the GTP.
- Operation of a quarry to provide required gravel material to the Project.
- Construction/widening of heavy haul roads and module staging areas.
- Improvements to the existing West Dock to support the four marine sea lifts.
- Widening of the existing causeway to support transport of GTP facility modules brought in via the marine sea lifts.
- Construction of the GTP facility gravel pad.
- Installation of vertical support member piles to provide structural support for the GTP facility modules.
- Construction of a new water supply reservoir on-site.
- Drilling of two UIC Class I industrial wells.
- Dredging of a navigation channel to support the marine sea lifts.
- Installation, hookup, pre-commissioning, commissioning and start-up of the operations support facilities and utility/process modules that comprise the GTP facility.
- Construction of the PBTL and utility lines.


To support GTP facility construction, equipment, modules, supplies, and personnel will need to be transported to the GTP site. This will include the following logistical support activities:

- Four marine sea lifts to transport approximately 120 GTP facility modules to the North Slope.
- Operation of Self Propelled Module Transporters (SPMTs) and associated equipment to offload the GTP facility modules from the transport barges and transport the modules to the GTP facility.
- Transport of construction camp units, camp food/supplies, machinery/equipment, vertical support member piles, structural steel, pipe spools, electrical cable reels, and pump stations to the site via heavy haul truck transport.
- Transport of construction personnel to the GTP site.


Emissions associated with constructing the GTP facility are summarized in Attachment A. Emissions were calculated using the analytical approach outlined in Section 1.1, and operational/activity data provided by the Project. Due to the limitations of data available at the Pre-Front End Engineering Design (Pre-FEED) stage, information was not available for the following activities:

- Operation of SPMTs and associated equipment to offload GTP facility modules from the transport barges and transport the modules to the GTP facility.

Information was also not available for the following activities. However, assumptions were made for these activities to allow emissions to be estimated.

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- Blasting activities to support operation of the gravel quarry. (Blasting data associated with an oil and gas development project in the Alaska North Slope area was substituted for the missing blasting data.)
- Transport of construction camp units, camp food/supplies, machinery/equipment, vertical support member piles, structural steel, pipe spools, electrical cable reels, fuel, and pump stations to the site. (It was assumed that transport of everything other than fuel would be made by truck from Anchorage to the GTP site, and that fuel would be transported from Nikiski.)

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3.0 MAINLINE AND PTTL PIPELINE CONSTRUCTION

This section addresses construction of the PTTL and the Mainline Pipeline. The PTTL would be a new 32-inch natural gas transmission line extending approximately 62 miles from the outlet flange of the PTU gas production facility to the inlet flange of the GTP. The PTTL would include one meter station on the GTP pad, four Mainline block valves (MLBVs), and two pig launcher and receiver facilities – one each at the PTU and GTP pads.

The Mainline would be a new 42-inch-diameter natural gas pipeline approximately 804 miles in length extending from the Liquefaction Facility to the GTP in the PBU, including the structures, equipment, and all other associated systems. The proposed design anticipates up to eight compressor stations; one stand-alone heater station, one heater station collocated with a compressor station, and six cooling stations associated with six of the compressor stations; four meter stations; 53 MLBVs; one pig launcher facility at the GTP meter station, one pig receiver facility at the Nikiski meter station, and combined pig launcher and receiver facilities at each of the compressor stations; and associated infrastructure facilities.

Along the Mainline route, there would be at least five gas interconnection points to allow for future in-state deliveries of natural gas. None of the potential third-party facilities used to condition, if required, or move natural gas away from these gas interconnection points are part of the Project. As mentioned previously, emissions associated with construction of in-state pipeline take-offs are not included in this analysis.

Construction of the Mainline is expected to last approximately six years, beginning in Year 2 of the overall Alaska LNG Project construction schedule, through Year 7. PTTL construction is expected to commence in Year 4 and be completed in Year 5. The Mainline will be constructed simultaneously in four spreads, each approximately 200 miles long. Construction of Spread 4 also will encompass construction of a 28-mile offshore pipeline crossing the Cook Inlet. The PTTL will be constructed simultaneously in two spreads, each approximately 30 miles long.


Eight compressor stations, including one combined compressor station and collocated heater station, plus one stand-alone heater station, would be constructed at the same time and within the same area as construction of the Mainline. Due to their proximity to Mainline pipeline construction activities, compressor and heater construction emissions were included with the pipeline construction emissions within each area. Actual station construction would occur using three separate pipeline facility construction contractors operating independently from Mainline spread construction contractors.

Construction is expected to include the following activities:

- Establishment and operation of material sites, construction camps, and storage yards to support construction of the Mainline and PTTL pipelines.
- Preparation of site access roads and pipeline rights of way.
- Pipelaying, including ditching, welding, inspection, lowering-in, and backfill (Mainline Pipeline).
- Drilling holes and installing vertical support members (VSMs) (PTTL).
- Construction of two shore crossings on either side of the Cook Inlet.
- Offshore pipeline installation.
- Construction of compressor stations, heater stations, and metering stations.

To support construction of the Mainline and PTTL pipelines, equipment, modules, supplies, and personnel will need to be transported to the construction sites. This will include the following logistical support activities:

- Transport of construction equipment, construction camp units (PTTL camps will be rented), compressor and heater station modules, food/supplies, fuel and fuel tanks, pipe and pipe bends,

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bridge components, fittings, MLBVs, fuel and fuel storage tanks, structural steel and pilings, and miscellaneous equipment to the construction sites via heavy haul trucks, barges, and rail.


- Transport of construction camps and fuel storage tanks between spreads as the camps are relocated.
- Transport of construction personnel to the construction sites via buses and aircraft.

Emissions associated with constructing the Mainline and PTTL pipelines are summarized in Attachment B. Emissions were calculated using the analytical approach outlined in Section 1.1, and operational/activity data provided by the Alaska LNG Project Team. Due to the limitations of data available at the Pre-FEED stage, information was not available for the following activities:

- Open burning (if any).
- Operation of gravel extraction activities at borrow sites, including grading and blasting activities.
- Drilling and blasting activities associated with trench blasting.
- Transport of construction equipment, camp units, fuel, and fuel tanks for the PTTL pipeline.
- Transport of construction equipment, and pipe for the offshore pipeline (Cook Inlet crossing). Crew transport, camps, groceries, and freight for the offshore pipeline are assumed to have been addressed in the logistics transport information provided for Mainline Pipeline Spread 4.

Information was also not available for the following activities. However, assumptions were made for these activities to allow emissions to be estimated.

- Operation of construction camp generators and waste incinerators was estimated based on the estimated number of construction personnel living in the Mainline and PTTL construction camps, based on the expected peak personnel count for each calendar year. Construction camp electricity is expected to be self-generated by the project, without connection to the grid.
- Horsepower ratings for specific equipment to support construction of the compressor and heater stations were not available. Horsepower ratings used in the calculations are based on data for other similar equipment provided by the Project or manufacturer data for equipment matching the equipment specifications (if any).

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4.0 LIQUEFACTION FACILITY CONSTRUCTION

The Liquefaction Facility would include the structures, equipment, underlying access rights, and all other associated systems for final processing and liquefaction of natural gas, as well as storage and loading of LNG, including terminal facilities and auxiliary marine vessels used to support Marine Terminal operations (excluding LNG carriers).

Based on information provided by the Project, construction of the LNG Facility is expected to last approximately eight years, beginning in Year 2 of the overall Project construction schedule. Construction is expected to include the following activities:

- Establishment and operation of camps to support construction of the Liquefaction Facility.
- Construction of the LNG Plant and storage facilities.
- Construction of the Marine Terminal, including a marine offloading facility (MOF) and product loading facility (PLF).

To support LNG Facility construction, equipment, modules, supplies, and personnel will need to be transported to the LNG Facility site. This will include the following logistical support activities:


- Transport of approximately 380 LNG Facility modules to the project site.
- Transport of construction personnel, construction camp units, camp food/supplies, machinery/equipment, fuel, and other materials/supplies to the project site.

Emissions associated with constructing the LNG Facility are summarized in Attachment C. Emissions were calculated using the analytical approach outlined in Section 1.1, and operational/activity data provided by the Project. Due to the limitations of data available at the Pre-FEED stage, information was not available for the following activities:

- Material handling and wind erosion associated with active exposed construction areas (all of which result in fugitive dust emissions).
- Operation of heavy haul trucks or SPMTs and associated equipment to transport LNG Facility modules to the construction site.
- Transport of construction personnel, construction camp units, camp food/supplies, machinery/equipment, fuel, and other materials to the LNG Facility construction site.

Information was also not available for the following activities. However, assumptions were made for these activities to allow emissions to be estimated.

- Operation of construction camp generators and waste incinerators was estimated based on the estimated peak personnel count living in the construction camp for each calendar year. Construction camp electricity is expected to be self-generated by the project, without connection to the grid.
- Horsepower ratings for equipment to support construction of the marine terminal were not provided. Horsepower ratings used in the calculations are based on data for other similar equipment provided by the Project or manufacturer data for equipment matching the equipment specifications (if any).

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6.0 ABBREVIATIONS AND DEFINITIONS

The following abbreviations and definitions apply to this document.

Abbreviation	Definition/Meaning
Btu	British Thermal Units
cc	Cubic Centimeter
CH ₄	Methane (a GHG)
CO	Carbon Monoxide
CO ₂	Carbon Dioxide (a GHG)
CO ₂ e	Carbon Dioxide Equivalents: this equates a given mixture and amount of greenhouse gas to the quantity of CO ₂ that would have the same GWP, when measured over a specified timescale
FEED	Front End Engineering Design
g	Gram
GHG	Greenhouse Gases
GVWR	Gross Vehicle Weight Rating
GWP	Global Warming Potential
GTP	Gas Treatment Plant
HP	Horsepower
IPCC	United Nations Intergovernmental Panel on Climate Change
kg	Kilogram (1,000 grams)
kW or KW	Kilowatt (1,000 watts)
LNG	Liquefied Natural Gas
LTO	Landing – Takeoff Cycle, including approach to an airport (below 3,000 feet elevation) to touchdown, taxi-in from touchdown to gate, taxi-out from gate to runway, and takeoff from runway through wheels off and aircraft ascent to cutback
MOF	Marine Offloading Facility
MMBtu	Million British Thermal Units
N ₂ O	Nitrous Oxide (a GHG)
NMOG	Non-Methane Organic Gases
NMTOC	Non-Methane Total Organic Compounds
NO _x	Nitrogen Oxides
PBTL	PBU Gas Transmission Line
PBU	Prudhoe Bay Unit
PLF	Product Loading Facility
PM10	Respirable particulate matter (particulate matter with an effective diameter of 10 microns or less)
PM2.5	Fine particulate matter (particulate matter with an effective diameter of 2.5 microns or less)
Ppm	Parts per Million
Pre-FEED	Pre-Front End Engineering Design
PTTL	PTU Gas Transmission Line

Abbreviation	Definition/Meaning
PTU	Point Thomson Unit
RVP	Reid Vapor Pressure
SCC	Source Classification Code (as determined by the USEPA)
SPMT	Self-Propelled Modular Transporter
TCR	The Climate Registry
TOC	Total Organic Compounds
TOG	Total Organic Gases
Tonne	Metric Ton (1,000 kilograms, or 1,000,000 grams)
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Gases
VSM	Vertical Support Member
W	Watt

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7.0 ATTACHMENTS

7.1 ATTACHMENT A: CONSTRUCTION EMISSIONS – GAS TREATMENT PLANT

(Summary Table A-1 provided – additional documentation available upon request.)

Appendix A: Construction Emissions - Gas Treatment Plant

Table A-1. Summary of Gas Treatment Plant Construction-Related Emissions

Year 1

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
GTP Facility Construction										
Onroad Vehicles	0.03	0.22	0.09	0.01	0.01	0.001	64.21	0.009	0.000	64.50
Nonroad Equipment	0.37	2.79	1.27	0.22	0.21	0.006	712.30	0.005	0.018	717.73
Stationary Nonroad Generators	--	--	--	--	--	--	--	--	--	--
External Combustion	0.00	0.08	0.02	0.00	0.00	0.001	76.96	0.003	0.001	77.25
Fugitives	--	--	--	18.36	1.86	--	--	--	--	--
Subtotal - GTP Facility:	0.40	3.08	1.39	18.59	2.08	0.007	853.48	0.018	0.019	859.48
GTP Quarry										
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	--	--	--
Subtotal - GTP Quarry:	--	--	--	--	--	--	--	--	--	--
PBU Pipeline Construction										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	--	--	--
Subtotal - Pipelines:	--	--	--	--	--	--	--	--	--	--
GTP Construction Camp										
Onroad Vehicles	0.03	0.39	0.13	0.02	0.02	0.001	70.62	0.004	0.000	70.75
Stationary Nonroad Generators	0.67	2.41	12.53	0.11	0.11	0.027	2,495.76	1.012	0.020	2,527.10
Fugitives	--	--	--	13.20	1.32	--	--	--	--	--
Subtotal - Construction Camp	0.70	2.80	12.67	13.33	1.44	0.027	2,566.38	1.016	0.020	2,597.85
GTP Logistics										
Onroad Vehicles	1.42	15.00	4.56	0.67	0.43	0.028	3,144.94	0.544	0.004	3,159.61
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives (Paved & Unpaved)	--	--	--	106.78	10.75	--	--	--	--	--
Marine Cargo (Anchorage)	0.30	8.05	0.96	0.13	0.12	0.156	275.71	0.008	0.013	279.92
Marine Sealifts (Prudhoe Bay)	--	--	--	--	--	--	--	--	--	--
Subtotal - Logistics:	1.72	23.05	5.52	107.58	11.30	0.184	3,420.65	0.552	0.017	3,439.53
Total Emissions:	2.82	28.94	19.58	139.49	14.81	0.218	6,840.51	1.586	0.056	6,896.86

Year 2

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
GTP Facility Construction										
Onroad Vehicles	0.15	1.27	0.47	0.06	0.04	0.003	340.37	0.055	0.001	341.99
Nonroad Equipment	8.59	49.42	19.79	3.05	2.96	0.198	25,741.40	0.118	0.642	25,935.68
Stationary Nonroad Generators	0.12	1.50	0.43	0.06	0.06	0.002	250.22	0.002	0.006	252.12
External Combustion	0.00	0.16	0.04	0.01	0.00	0.002	159.60	0.007	0.001	160.20
Fugitives	--	--	--	226.07	23.99	--	--	--	--	--
Subtotal - GTP Facility:	8.86	52.35	20.73	229.26	27.06	0.205	26,491.59	0.182	0.651	26,690.00
GTP Quarry										
Nonroad Equipment	1.58	12.27	4.32	0.74	0.71	0.037	4,581.92	0.022	0.114	4,616.52
Fugitives	--	14.63	57.67	78.30	69.43	1.722	260.82	--	--	260.82
Subtotal - GTP Quarry:	1.58	26.90	61.99	79.04	70.15	1.758	4,842.73	0.022	0.114	4,877.34
PBU Pipeline Construction										
Onroad Vehicles	0.01	0.05	0.02	0.00	0.00	0.000	10.86	0.002	0.000	10.91
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	2.12	0.21	--	--	--	--	--
Subtotal - Pipelines:	0.01	0.05	0.02	2.12	0.21	0.000	10.86	0.002	0.000	10.91
GTP Construction Camp										
Onroad Vehicles	0.13	1.77	0.62	0.10	0.07	0.003	357.26	0.017	0.001	357.86
Stationary Nonroad Generators	2.33	8.33	43.30	0.37	0.37	0.092	8,621.71	3.497	0.070	8,729.98
Fugitives	--	--	--	69.99	7.10	--	--	--	--	--
Subtotal - Construction Camp	2.46	10.10	43.92	70.45	7.54	0.095	8,978.97	3.514	0.071	9,087.83
GTP Logistics										
Onroad Vehicles	3.74	38.83	12.09	1.73	1.07	0.077	8,765.76	1.576	0.010	8,808.16
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives (Paved & Unpaved)	--	--	--	300.22	30.23	--	--	--	--	--
Marine Cargo (Anchorage)	0.67	18.30	2.19	0.29	0.26	0.355	626.61	0.019	0.031	636.19
Marine Sealifts (Prudhoe Bay)	--	--	--	--	--	--	--	--	--	--
Subtotal - Logistics:	4.41	57.13	14.28	302.24	31.56	0.432	9,392.36	1.594	0.041	9,444.35
Total Emissions:	17.32	146.53	140.94	683.11	136.52	2.490	49,716.51	5.314	0.876	50,110.43

Appendix A: Construction Emissions - Gas Treatment Plant

Table A-1. Summary of Gas Treatment Plant Construction-Related Emissions

Year 3

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
GTP Facility Construction										
Onroad Vehicles	0.21	1.88	0.68	0.09	0.05	0.005	512.38	0.087	0.001	514.91
Nonroad Equipment	6.18	38.53	16.01	2.54	2.47	0.127	16,247.89	0.085	0.405	16,370.80
Stationary Nonroad Generators	0.51	1.09	9.48	0.05	0.05	0.020	1,887.29	0.766	0.015	1,910.99
External Combustion	0.02	1.78	0.45	0.09	0.02	0.019	1,805.15	0.081	0.016	1,811.99
Fugitives	--	--	--	171.78	18.86	--	--	--	--	--
Subtotal - GTP Facility:	6.92	43.29	26.61	174.55	21.46	0.171	20,452.71	1.019	0.438	20,608.68
GTP Quarry										
Nonroad Equipment	0.91	6.52	2.31	0.37	0.36	0.021	2,710.39	0.013	0.068	2,730.85
Fugitives	--	10.68	42.10	54.36	50.39	1.257	190.38	--	--	190.38
Subtotal - GTP Quarry:	0.91	17.20	44.41	54.73	50.75	1.278	2,900.78	0.013	0.068	2,921.24
PBU Pipeline Construction										
Onroad Vehicles	0.02	0.19	0.06	0.01	0.01	0.000	41.87	0.008	0.000	42.08
Nonroad Equipment	0.52	3.84	1.85	0.30	0.29	0.007	891.31	0.007	0.022	898.11
Fugitives	--	--	--	11.07	1.70	--	--	--	--	--
Subtotal - Pipelines:	0.54	4.03	1.91	11.37	2.00	0.008	933.18	0.015	0.022	940.19
GTP Construction Camp										
Onroad Vehicles	0.19	2.67	0.96	0.15	0.11	0.006	599.70	0.025	0.001	600.61
Stationary Nonroad Generators	2.60	9.29	48.29	0.41	0.41	0.102	9,616.18	3.901	0.078	9,736.94
Fugitives	--	--	--	116.09	11.61	--	--	--	--	--
Subtotal - Construction Camp	2.79	11.96	49.25	116.64	12.12	0.108	10,215.87	3.925	0.079	10,337.55
GTP Logistics										
Onroad Vehicles	2.69	27.43	8.75	1.22	0.72	0.058	6,642.53	1.235	0.008	6,675.71
Nonroad Equipment	0.13	1.42	0.60	0.09	0.09	0.003	340.10	0.002	0.008	342.67
Fugitives (Paved & Unpaved)	--	--	--	230.97	23.26	--	--	--	--	--
Marine Cargo (Anchorage)	0.32	8.78	1.05	0.14	0.13	0.170	300.77	0.009	0.015	305.37
Marine Sealifts (Prudhoe Bay)	6.18	130.15	51.53	6.85	6.49	5.289	7,635.01	0.804	0.251	7,729.81
Subtotal - Logistics:	9.32	167.78	61.93	239.27	30.69	5.520	14,918.41	2.049	0.282	15,053.55
Total Emissions:	20.48	244.25	184.11	596.58	117.02	7.085	49,420.94	7.021	0.888	49,861.22

Year 4

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
GTP Facility Construction										
Onroad Vehicles	0.24	2.08	0.78	0.10	0.06	0.006	632.93	0.110	0.002	636.15
Nonroad Equipment	4.42	30.03	13.46	2.08	2.02	0.079	9,907.06	0.061	0.247	9,982.24
Stationary Nonroad Generators	0.51	1.09	9.45	0.05	0.05	0.020	1,882.13	0.763	0.015	1,905.77
External Combustion	0.03	2.92	0.73	0.15	0.04	0.031	2,956.29	0.132	0.026	2,967.48
Fugitives	--	--	--	165.62	18.66	--	--	--	--	--
Subtotal - GTP Facility:	5.20	36.11	24.42	168.00	20.82	0.137	15,378.40	1.066	0.290	15,491.63
GTP Quarry										
Nonroad Equipment	0.32	2.32	0.81	0.13	0.13	0.007	875.47	0.004	0.022	882.09
Fugitives	--	2.31	9.09	11.36	10.85	0.271	41.12	--	--	41.12
Subtotal - GTP Quarry:	0.32	4.63	9.90	11.49	10.98	0.278	916.59	0.004	0.022	923.21
PBU Pipeline Construction										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	--	--	--
Subtotal - Pipelines:	--	--	--	--	--	--	--	--	--	--
GTP Construction Camp										
Onroad Vehicles	0.21	2.94	1.06	0.17	0.12	0.007	733.03	0.031	0.001	734.16
Stationary Nonroad Generators	3.92	14.00	72.82	0.62	0.62	0.154	14,500.14	5.882	0.118	14,682.24
Fugitives	--	--	--	142.82	14.28	--	--	--	--	--
Subtotal - Construction Camp	4.13	16.95	73.88	143.61	15.02	0.161	15,233.17	5.912	0.119	15,416.40
GTP Logistics										
Onroad Vehicles	2.02	20.27	6.62	0.91	0.51	0.046	5,248.20	1.004	0.006	5,275.14
Nonroad Equipment	0.13	1.39	0.59	0.09	0.08	0.003	368.79	0.002	0.009	371.57
Fugitives (Paved & Unpaved)	--	--	--	184.31	18.56	--	--	--	--	--
Marine Cargo (Anchorage)	0.27	7.32	0.87	0.11	0.11	0.142	250.64	0.007	0.012	254.48
Marine Sealifts (Prudhoe Bay)	6.18	130.15	51.53	6.85	6.49	5.289	7,635.01	0.804	0.251	7,729.81
Subtotal - Logistics:	8.61	159.13	59.62	192.27	25.76	5.479	13,502.63	1.817	0.278	13,630.99
Total Emissions:	18.26	216.81	167.82	515.36	72.58	6.056	45,030.80	8.801	0.709	45,462.24

Appendix A: Construction Emissions - Gas Treatment Plant

Table A-1. Summary of Gas Treatment Plant Construction-Related Emissions

Year 5										
Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
GTP Facility Construction										
Onroad Vehicles	0.22	1.74	0.71	0.09	0.05	0.006	641.66	0.110	0.002	644.99
Nonroad Equipment	5.24	40.38	17.27	2.59	2.52	0.091	11,224.12	0.072	0.280	11,309.38
Stationary Nonroad Generators	0.51	1.09	9.45	0.05	0.05	0.020	1,882.13	0.763	0.015	1,905.77
External Combustion	0.03	2.99	0.75	0.15	0.04	0.032	3,026.30	0.135	0.027	3,037.76
Fugitives	--	--	--	173.21	20.50	--	--	--	--	--
Subtotal - GTP Facility:	6.00	46.20	28.18	176.11	23.15	0.149	16,774.20	1.082	0.324	16,897.90
GTP Quarry										
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	--	--	--
Subtotal - GTP Quarry:	--	--	--	--	--	--	--	--	--	--
PBU Pipeline Construction										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	--	--	--
Subtotal - Pipelines:	--	--	--	--	--	--	--	--	--	--
GTP Construction Camp										
Onroad Vehicles	0.30	4.10	1.49	0.24	0.16	0.011	1,128.31	0.053	0.002	1,130.19
Stationary Nonroad Generators	7.12	25.45	132.31	1.12	1.12	0.280	26,346.88	10.687	0.214	26,677.75
Fugitives	--	--	--	219.83	21.98	--	--	--	--	--
Subtotal - Construction Camp	7.43	29.55	133.80	221.18	23.26	0.291	27,475.19	10.740	0.216	27,807.94
GTP Logistics										
Onroad Vehicles	1.70	16.68	5.58	0.75	0.41	0.040	4,597.58	0.901	0.005	4,621.73
Nonroad Equipment	0.40	3.86	1.65	0.24	0.23	0.009	1,143.15	0.006	0.029	1,151.79
Fugitives (Paved & Unpaved)	--	--	--	166.47	16.76	--	--	--	--	--
Marine Cargo (Anchorage)	0.24	6.59	0.79	0.10	0.09	0.128	225.58	0.007	0.011	229.03
Marine Sealifts (Prudhoe Bay)	6.62	141.76	52.50	7.12	6.75	7.030	8,150.60	0.807	0.275	8,252.85
Subtotal - Logistics:	8.96	168.90	60.52	174.68	24.24	7.207	14,116.91	1.721	0.320	14,255.40
Total Emissions:	22.39	244.64	222.50	571.97	70.66	7.648	58,366.31	13.542	0.860	58,961.24

Year 6										
Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
GTP Facility Construction										
Onroad Vehicles	0.22	1.69	0.69	0.09	0.04	0.006	655.49	0.116	0.002	658.98
Nonroad Equipment	5.64	42.89	18.32	2.69	2.61	0.102	12,591.31	0.078	0.314	12,686.87
Stationary Nonroad Generators	0.51	1.09	9.45	0.05	0.05	0.020	1,882.13	0.763	0.015	1,905.77
External Combustion	0.03	2.99	0.75	0.15	0.04	0.032	3,026.30	0.135	0.027	3,037.76
Fugitives	--	--	--	175.90	20.88	--	--	--	--	--
Subtotal - GTP Facility:	6.39	48.65	29.21	178.89	23.63	0.160	18,155.23	1.093	0.358	18,289.38
GTP Quarry										
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	--	--	--
Subtotal - GTP Quarry:	--	--	--	--	--	--	--	--	--	--
PBU Pipeline Construction										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	--	--	--
Subtotal - Pipelines:	--	--	--	--	--	--	--	--	--	--
GTP Construction Camp										
Onroad Vehicles	0.31	4.13	1.51	0.24	0.16	0.012	1,261.93	0.062	0.002	1,264.11
Stationary Nonroad Generators	7.78	27.79	144.48	1.22	1.22	0.306	28,769.71	11.670	0.233	29,131.01
Fugitives	--	--	--	246.79	24.68	--	--	--	--	--
Subtotal - Construction Camp	8.09	31.92	146.00	248.26	26.06	0.318	30,031.65	11.732	0.235	30,395.12
GTP Logistics										
Onroad Vehicles	1.26	12.18	4.16	0.55	0.28	0.031	3,560.09	0.715	0.004	3,579.22
Nonroad Equipment	0.35	3.11	1.34	0.19	0.19	0.008	1,032.56	0.005	0.026	1,040.36
Fugitives (Paved & Unpaved)	--	--	--	130.35	13.12	--	--	--	--	--
Marine Cargo (Anchorage)	0.13	3.66	0.44	0.06	0.05	0.071	125.32	0.004	0.006	127.24
Marine Sealifts (Prudhoe Bay)	6.62	141.76	52.50	7.12	6.75	7.030	8,150.60	0.807	0.275	8,252.85
Subtotal - Logistics:	8.37	160.72	58.44	138.28	20.40	7.141	12,868.57	1.530	0.312	12,999.66
Total Emissions:	22.85	241.28	233.65	565.42	70.08	7.619	61,055.45	14.355	0.905	61,684.15

Appendix A: Construction Emissions - Gas Treatment Plant

Table A-1. Summary of Gas Treatment Plant Construction-Related Emissions

Year 7

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
GTP Facility Construction										
Onroad Vehicles	0.21	1.64	0.68	0.09	0.04	0.007	681.82	0.124	0.002	685.53
Nonroad Equipment	5.22	38.13	15.56	2.28	2.21	0.100	12,479.51	0.072	0.311	12,574.08
Stationary Nonroad Generators	0.51	1.09	9.48	0.05	0.05	0.020	1,887.29	0.766	0.015	1,910.99
External Combustion	0.03	3.01	0.75	0.15	0.04	0.032	3,048.59	0.136	0.027	3,060.14
Fugitives	--	--	--	183.14	20.17	--	--	--	--	--
Subtotal - GTP Facility:	5.98	43.87	26.47	185.72	22.52	0.159	18,097.21	1.098	0.356	18,230.74
GTP Quarry										
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	--	--	--
Subtotal - GTP Quarry:	--	--	--	--	--	--	--	--	--	--
PBU Pipeline Construction										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	--	--	--
Subtotal - Pipelines:	--	--	--	--	--	--	--	--	--	--
GTP Construction Camp										
Onroad Vehicles	0.28	3.70	1.37	0.22	0.14	0.012	1,259.61	0.064	0.002	1,261.83
Stationary Nonroad Generators	5.99	21.38	111.18	0.94	0.94	0.235	22,139.16	8.980	0.180	22,417.19
Fugitives	--	--	--	247.47	24.75	--	--	--	--	--
Subtotal - Construction Camp	6.27	25.08	112.55	248.63	25.83	0.247	23,398.77	9.044	0.182	23,679.02
GTP Logistics										
Onroad Vehicles	1.50	14.33	5.01	0.65	0.32	0.038	4,427.77	0.908	0.005	4,452.05
Nonroad Equipment	0.34	2.77	1.20	0.17	0.17	0.008	1,032.72	0.005	0.026	1,040.52
Fugitives (Paved & Unpaved)	--	--	--	161.75	16.28	--	--	--	--	--
Marine Cargo (Anchorage)	0.24	6.59	0.79	0.10	0.09	0.128	225.58	0.007	0.011	229.03
Marine Sealifts (Prudhoe Bay)	6.33	134.02	51.86	6.94	6.58	5.869	7,806.87	0.805	0.259	7,904.15
Subtotal - Logistics:	8.42	157.71	58.85	169.61	23.45	6.044	13,492.94	1.725	0.301	13,625.75
Total Emissions:	20.66	226.66	197.87	603.96	71.79	6.450	54,988.92	11.866	0.839	55,535.50

Year 8


Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
GTP Facility Construction										
Onroad Vehicles	0.21	1.60	0.69	0.09	0.04	0.007	715.06	0.132	0.002	719.02
Nonroad Equipment	5.14	35.96	14.70	2.12	2.06	0.101	12,694.13	0.071	0.317	12,790.26
Stationary Nonroad Generators	0.51	1.09	9.45	0.05	0.05	0.020	1,882.13	0.763	0.015	1,905.77
External Combustion	0.03	2.99	0.75	0.15	0.04	0.032	3,026.30	0.135	0.027	3,037.76
Fugitives	--	--	--	194.54	21.30	--	--	--	--	--
Subtotal - GTP Facility:	5.89	41.63	25.58	196.95	23.50	0.159	18,317.62	1.102	0.361	18,452.81
GTP Quarry										
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	--	--	--
Subtotal - GTP Quarry:	--	--	--	--	--	--	--	--	--	--
PBU Pipeline Construction										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	--	--	--
Subtotal - Pipelines:	--	--	--	--	--	--	--	--	--	--
GTP Construction Camp										
Onroad Vehicles	0.25	3.30	1.23	0.20	0.12	0.012	1,243.02	0.064	0.002	1,245.25
Stationary Nonroad Generators	0.58	2.08	10.80	0.09	0.09	0.023	2,151.01	0.873	0.017	2,178.02
Fugitives	--	--	--	245.21	24.52	--	--	--	--	--
Subtotal - Construction Camp	0.83	5.37	12.03	245.50	24.73	0.035	3,394.02	0.937	0.020	3,423.27
GTP Logistics										
Onroad Vehicles	0.76	7.14	2.54	0.32	0.15	0.020	2,320.10	0.486	0.003	2,333.07
Nonroad Equipment	0.34	2.47	1.06	0.15	0.15	0.008	1,032.61	0.005	0.026	1,040.40
Fugitives (Paved & Unpaved)	--	--	--	87.51	8.81	--	--	--	--	--
Marine Cargo (Anchorage)	--	--	--	--	--	--	--	--	--	--
Marine Sealifts (Prudhoe Bay)	6.18	130.15	51.53	6.85	6.49	5.289	7,635.01	0.804	0.251	7,729.81
Subtotal - Logistics:	7.28	139.76	55.14	94.83	15.60	5.317	10,987.72	1.294	0.279	11,103.28
Total Emissions:	14.00	186.77	92.76	537.29	63.83	5.511	32,699.36	3.333	0.660	32,979.35

Appendix A: Construction Emissions - Gas Treatment Plant

Table A-1. Summary of Gas Treatment Plant Construction-Related Emissions

Year 9

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
<u>GTP Facility Construction</u>										
Onroad Vehicles	0.08	0.56	0.26	0.03	0.01	0.003	287.99	0.053	0.001	289.61
Nonroad Equipment	2.21	18.75	6.11	0.93	0.90	0.043	5,349.46	0.030	0.133	5,389.99
Stationary Nonroad Generators	0.34	0.73	6.29	0.04	0.04	0.013	1,253.03	0.508	0.010	1,268.77
External Combustion	0.01	1.30	0.32	0.06	0.02	0.014	1,315.30	0.059	0.012	1,320.28
Fugitives	--	--	--	83.03	8.74	--	--	--	--	--
Subtotal - GTP Facility:	2.64	21.34	12.99	84.09	9.70	0.073	8,205.78	0.651	0.156	8,268.64
<u>GTP Quarry</u>										
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	--	--	--
Subtotal - GTP Quarry:	--	--	--	--	--	--	--	--	--	--
<u>PBU Pipeline Construction</u>										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	--	--	--
Subtotal - Pipelines:	--	--	--	--	--	--	--	--	--	--
<u>GTP Construction Camp</u>										
Onroad Vehicles	0.11	1.44	0.55	0.09	0.05	0.006	615.53	0.031	0.001	616.62
Stationary Nonroad Generators	0.39	1.38	7.19	0.06	0.06	0.015	1,432.04	0.581	0.012	1,450.02
Fugitives	--	--	--	122.29	12.23	--	--	--	--	--
Subtotal - Construction Camp	0.50	2.83	7.74	122.44	12.34	0.021	2,047.57	0.612	0.013	2,066.64
<u>GTP Logistics</u>										
Onroad Vehicles	0.35	3.28	1.19	0.15	0.07	0.010	1,116.97	0.238	0.001	1,123.32
Nonroad Equipment	0.01	0.03	0.01	0.00	0.00	0.000	16.23	0.000	0.000	16.36
Fugitives (Paved & Unpaved)	--	--	--	39.99	4.03	--	--	--	--	--
Marine Cargo (Anchorage)	--	--	--	--	--	--	--	--	--	--
Marine Sealifts (Prudhoe Bay)	--	--	--	--	--	--	--	--	--	--
Subtotal - Logistics:	0.36	3.31	1.21	40.14	4.09	0.010	1,133.20	0.238	0.002	1,139.68
Total Emissions:	3.50	27.48	21.93	246.66	26.14	0.103	11,386.55	1.501	0.171	11,474.96

	APPENDIX C – EMISSIONS ASSOCIATED WITH PROJECT CONSTRUCTION	USAI-PE-SRZZZ-00-000004-000 APRIL 14, 2017 REVISION: 0
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7.2 ATTACHMENT B: CONSTRUCTION EMISSIONS – MAINLINE AND PTTL PIPELINES

(Summary Tables B.1-1 to B.1-6 provided – additional documentation available upon request.)

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Appendix B: Construction Emissions - Mainline and PTTL Pipelines

Part B.1: Summary

Table B.1-1. Summary of Alaska Pipeline Construction-Related Emissions - Year 2

Year 2										
Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Spread 1										
Civil Work										
Onroad	0.09	0.61	0.62	0.03	0.02	0.002	161.99	0.029	0.000	162.79
Nonroad	1.45	8.92	7.75	0.50	0.49	0.028	3,579.15	0.035	0.089	3,606.63
External Combustion	0.00	0.03	0.01	0.00	0.00	0.000	32.97	0.001	0.000	33.10
Fugitives	NA	0.68	2.69	72.07	11.46	0.080	12.13	NA	NA	12.13
Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	NA	NA	--
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	1.18	11.58	3.82	0.54	0.33	0.025	2,595.66	0.445	0.004	2,608.08
Rail	--	--	--	--	--	--	--	--	--	--
Marine	0.55	15.06	1.80	0.24	0.22	0.292	515.51	0.015	0.025	523.39
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	198.78	19.93	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	4.47	5.83	27.07	0.92	0.92	0.706	5,240.82	0.326	0.056	5,265.76
Subtotal - Spread 1	7.83	42.71	43.76	273.07	33.36	1.133	12,138.22	0.852	0.176	12,211.86
Spread 2										
Civil Work										
Onroad	0.45	3.12	3.31	0.16	0.09	0.008	844.09	0.154	0.001	848.33
Nonroad	7.10	43.94	41.34	2.47	2.40	0.135	17,158.60	0.182	0.428	17,290.71
External Combustion	0.00	0.24	0.06	0.01	0.00	0.003	240.42	0.011	0.002	241.33
Fugitives	NA	8.15	32.13	350.38	70.94	0.959	144.83	NA	NA	144.83
Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	NA	NA	--
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	0.88	8.89	2.94	0.42	0.26	0.019	1,959.04	0.318	0.003	1,967.92
Rail	0.03	0.76	0.20	0.02	0.02	0.001	70.82	0.006	0.002	71.49
Marine	0.89	24.19	2.89	0.38	0.35	0.469	828.03	0.025	0.040	840.69
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.28	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	95.97	9.66	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	5.37	6.02	27.08	1.12	1.12	0.900	5,349.52	0.364	0.061	5,376.92
Subtotal - Spread 2	14.99	95.31	109.95	450.93	84.83	2.493	26,595.35	1.059	0.538	26,782.21
Spread 3										
Civil Work										
Onroad	0.33	2.50	2.19	0.13	0.07	0.006	638.90	0.115	0.001	642.05
Nonroad	5.16	35.09	26.34	2.03	1.96	0.101	12,820.49	0.115	0.320	12,918.69
External Combustion	0.00	0.20	0.05	0.01	0.00	0.002	200.96	0.009	0.002	201.72
Fugitives	NA	0.39	1.52	412.30	49.59	0.045	6.85	NA	NA	6.85
Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	NA	NA	--
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A

Appendix B: Construction Emissions - Mainline and PTTL Pipelines

Part B.1: Summary

Table B.1-1. Summary of Alaska Pipeline Construction-Related Emissions - Year 2

Year 2										
Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Logistics										
Onroad	0.74	7.14	2.40	0.34	0.21	0.016	1,640.38	0.275	0.003	1,648.13
Rail	--	--	--	--	--	--	--	--	--	--
Marine	1.05	28.63	3.42	0.45	0.41	0.555	980.14	0.029	0.048	995.12
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.29	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	0.71	0.17	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	4.34	5.80	27.06	0.89	0.89	0.680	5,226.33	0.321	0.056	5,250.94
Subtotal - Spread 3	11.91	79.75	62.99	416.84	53.31	1.406	21,514.04	0.864	0.429	21,663.50
Spread 4										
Civil Work										
Onroad	0.22	1.35	1.86	0.07	0.04	0.004	400.68	0.076	0.001	402.76
Nonroad	3.54	20.16	27.99	1.20	1.16	0.054	6,843.13	0.117	0.171	6,896.94
External Combustion	0.00	0.10	0.02	0.00	0.00	0.001	96.46	0.004	0.001	96.83
Fugitives	NA	0.28	1.11	275.72	32.35	0.033	5.02	NA	NA	5.02
Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	NA	NA	--
Offshore Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
Marine	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	0.84	8.19	2.75	0.38	0.24	0.018	1,867.58	0.309	0.003	1,876.30
Rail	--	--	--	--	--	--	--	--	--	--
Marine	0.74	20.30	2.41	0.32	0.29	0.397	698.38	0.020	0.034	709.04
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.37	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	42.58	4.36	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	5.07	5.95	27.08	1.05	1.05	0.835	5,313.29	0.351	0.060	5,339.86
Subtotal - Spread 4	10.78	56.34	63.23	321.34	39.49	1.343	15,224.53	0.878	0.269	15,326.76
Point Thomson Gas Transmission Line										
Civil Work/Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	--	--	--	--	--	--	--	--	--	--
Rail	--	--	--	--	--	--	--	--	--	--
Marine	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	--	--	--	--	--	--	--	--	--	--
Subtotal - Point Thomson Gas Transmission Line	--	--	--	--	--	--	--	--	--	--
Double Jointing and Coating Facilities										
Fairbanks										
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Seward										
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Subtotal - Double Jointing and Coating Facilities	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Year 2 Total Emissions	45.52	274.10	279.94	1,462.19	211.00	6.375	75,472.14	3.652	1.412	75,984.34

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Appendix B: Construction Emissions - Mainline and PTTL Pipelines

Part B.1: Summary

Table B.1-2. Summary of Alaska Pipeline Construction-Related Emissions - Year 3

Year 3

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Spread 1										
Civil Work										
Onroad	0.58	4.38	3.99	0.23	0.13	0.012	1,201.91	0.224	0.002	1,208.03
Nonroad	9.76	56.59	40.16	3.14	3.04	0.207	26,857.31	0.198	0.670	27,061.89
External Combustion	0.00	0.37	0.09	0.02	0.00	0.004	372.24	0.017	0.003	373.65
Fugitives	NA	6.96	27.44	535.85	93.94	0.819	123.68	NA	NA	123.68
Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	NA	NA	--
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	1.15	11.27	3.81	0.53	0.31	0.026	2,716.62	0.466	0.005	2,729.66
Rail	0.04	1.23	0.35	0.03	0.03	0.001	121.00	0.009	0.003	122.14
Marine	1.15	31.25	3.73	0.49	0.45	0.606	1,069.81	0.032	0.052	1,086.17
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	215.69	21.62	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	4.47	5.83	27.07	0.92	0.92	0.706	5,240.82	0.326	0.056	5,265.76
Subtotal - Spread 1	17.28	117.87	106.64	756.89	120.44	2.381	37,703.40	1.271	0.791	37,970.98
Spread 2										
Civil Work										
Onroad	0.66	4.56	4.93	0.24	0.13	0.013	1,322.79	0.254	0.002	1,329.76
Nonroad	10.98	61.25	60.76	3.38	3.28	0.212	27,411.10	0.277	0.684	27,621.80
External Combustion	0.00	0.40	0.10	0.02	0.00	0.004	404.47	0.018	0.004	406.00
Fugitives	NA	16.77	66.09	569.40	124.02	1.973	297.90	NA	NA	297.90
Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	NA	NA	--
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	1.07	10.35	3.55	0.49	0.29	0.025	2,552.75	0.425	0.005	2,564.78
Rail	0.09	2.39	0.68	0.06	0.05	0.002	235.29	0.018	0.006	237.51
Marine	1.18	32.17	3.84	0.50	0.46	0.624	1,101.35	0.033	0.054	1,118.19
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.33	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	134.68	13.55	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	7.12	11.28	54.10	1.42	1.42	1.022	10,264.24	0.575	0.103	10,309.19
Subtotal - Spread 2	21.43	139.16	194.05	710.20	143.22	3.875	43,589.89	1.601	0.856	43,885.13
Spread 3										
Civil Work										
Onroad	1.10	8.03	7.67	0.42	0.23	0.022	2,240.66	0.426	0.003	2,252.33
Nonroad	17.40	102.11	99.54	5.82	5.64	0.325	41,720.58	0.444	1.041	42,041.84
External Combustion	0.01	1.11	0.28	0.06	0.01	0.012	1,121.63	0.050	0.010	1,125.88
Fugitives	NA	1.72	6.77	1,459.93	172.60	0.202	30.53	NA	NA	30.53
Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	NA	NA	--
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A

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Appendix B: Construction Emissions - Mainline and PTTL Pipelines

Part B.1: Summary

Table B.1-2. Summary of Alaska Pipeline Construction-Related Emissions - Year 3

Year 3										
Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO _{2e}
Logistics										
Onroad	0.49	5.00	1.70	0.24	0.15	0.012	1,199.63	0.189	0.002	1,204.96
Rail	0.02	0.43	0.12	0.01	0.01	0.000	42.67	0.003	0.001	43.07
Marine	1.45	39.49	4.72	0.62	0.57	0.766	1,352.14	0.040	0.066	1,372.82
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.34	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	0.51	0.12	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	5.37	6.02	27.08	1.12	1.12	0.900	5,349.52	0.364	0.061	5,376.92
Subtotal - Spread 3	26.17	163.91	147.89	1,468.72	180.46	2.239	53,057.37	1.516	1.185	53,448.33
Spread 4										
Civil Work										
Onroad	0.38	2.54	3.00	0.14	0.07	0.007	760.18	0.149	0.001	764.26
Nonroad	5.67	30.85	42.34	1.82	1.76	0.090	11,476.09	0.180	0.286	11,565.93
External Combustion	0.00	0.26	0.06	0.01	0.00	0.003	258.40	0.012	0.002	259.38
Fugitives	NA	0.37	1.46	468.85	53.35	0.044	6.58	NA	NA	6.58
Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	NA	NA	--
Offshore Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
Marine	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	0.86	7.27	2.81	0.38	0.22	0.021	2,195.27	0.347	0.006	2,205.77
Rail	--	--	--	--	--	--	--	--	--	--
Marine	1.04	28.38	3.39	0.45	0.41	0.552	972.96	0.029	0.047	987.83
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.47	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	69.01	7.07	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	5.07	5.95	27.08	1.05	1.05	0.835	5,313.29	0.351	0.060	5,339.86
Subtotal - Spread 4	13.50	75.63	80.14	541.70	63.94	1.552	20,982.77	1.067	0.403	21,129.61
Point Thomson Gas Transmission Line										
Civil Work/Pipeline Construction										
Onroad	0.37	3.08	2.01	0.15	0.09	0.008	801.42	0.145	0.001	805.43
Nonroad	3.63	26.65	21.53	1.61	1.56	0.053	6,410.27	0.087	0.160	6,460.11
Fugitives	0.02	N/A	N/A	226.55	29.81	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	1.00	10.19	3.25	0.45	0.27	0.022	2,239.54	0.416	0.003	2,250.72
Rail	0.06	1.61	0.46	0.04	0.03	0.002	158.47	0.012	0.004	159.96
Marine	0.56	15.23	1.82	0.24	0.22	0.295	521.42	0.015	0.025	529.40
Fugitives	N/A	N/A	N/A	165.32	16.55	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	2.90	5.50	27.04	0.56	0.56	0.368	5,052.40	0.259	0.048	5,073.08
Subtotal - Point Thomson Gas Transmission Line	8.54	62.26	56.10	394.92	49.10	0.748	15,183.53	0.935	0.241	15,278.69
Double Jointing and Coating Facilities										
Fairbanks										
Fugitives	4.53	NA	NA	1.20	1.20	NA	NA	NA	NA	NA
Seward										
Fugitives	0.04	NA	NA	0.55	0.55	NA	NA	NA	NA	NA
Subtotal - Double Jointing and Coating Facilities	4.58	N/A	N/A	1.75	1.75	N/A	N/A	N/A	N/A	N/A
Year 3 Total Emissions	91.50	558.84	584.82	3,874.18	558.89	10.794	170,516.95	6.390	3.477	171,712.75

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Appendix B: Construction Emissions - Mainline and PTTL Pipelines

Part B.1: Summary

Table B.1-3. Summary of Alaska Pipeline Construction-Related Emissions - Year 4

Year 4

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Spread 1										
Civil Work										
Onroad	0.43	3.19	3.06	0.17	0.09	0.009	943.00	0.184	0.001	948.04
Nonroad	7.75	39.65	37.03	2.11	2.04	0.157	20,606.68	0.180	0.514	20,764.37
External Combustion	0.00	0.48	0.12	0.02	0.01	0.005	483.23	0.022	0.004	485.06
Fugitives	NA	5.60	22.07	424.11	74.32	0.659	99.49	NA	NA	99.49
Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	NA	NA	--
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	1.42	13.98	4.69	0.64	0.36	0.033	3,454.66	0.634	0.005	3,472.03
Rail	0.17	4.65	1.39	0.10	0.10	0.005	484.00	0.038	0.012	488.57
Marine	2.21	60.16	7.19	0.94	0.86	1.167	2,059.66	0.061	0.101	2,091.16
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	248.06	24.87	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	7.12	11.28	54.10	1.42	1.42	1.022	10,264.24	0.575	0.103	10,309.19
Subtotal - Spread 1	19.28	139.00	129.65	677.59	104.07	3.057	38,394.96	1.694	0.740	38,657.90
Spread 2										
Civil Work										
Onroad	0.33	2.25	2.48	0.12	0.06	0.007	696.79	0.140	0.001	700.61
Nonroad	5.99	30.30	33.59	1.61	1.56	0.115	15,062.48	0.156	0.376	15,178.36
External Combustion	0.00	0.21	0.05	0.01	0.00	0.002	211.71	0.009	0.002	212.51
Fugitives	NA	9.82	38.69	308.72	69.07	1.155	174.40	NA	NA	174.40
Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	NA	NA	--
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	0.83	8.27	2.76	0.38	0.22	0.019	2,016.27	0.369	0.003	2,026.33
Rail	0.21	5.75	1.72	0.13	0.12	0.006	597.93	0.047	0.015	603.57
Marine	2.00	54.60	6.52	0.86	0.78	1.059	1,869.41	0.055	0.091	1,897.99
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.31	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	88.70	8.93	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	4.31	5.80	27.06	0.88	0.88	0.673	5,222.70	0.319	0.056	5,247.23
Subtotal - Spread 2	13.99	116.99	112.88	401.41	81.62	3.037	25,851.69	1.096	0.543	26,041.00
Spread 3										
Civil Work										
Onroad	0.35	2.28	2.79	0.13	0.06	0.007	728.18	0.150	0.001	732.29
Nonroad	5.17	26.87	34.33	1.52	1.47	0.089	11,478.03	0.151	0.286	11,567.14
External Combustion	0.00	0.31	0.08	0.02	0.00	0.003	310.75	0.014	0.003	311.93
Fugitives	NA	0.47	1.84	504.34	57.46	0.055	8.29	NA	NA	8.29
Pipeline Construction										
Onroad	0.16	1.18	1.15	0.07	0.03	0.004	370.84	0.069	0.001	372.75
Nonroad	1.65	12.80	4.66	0.73	0.71	0.033	4,091.21	0.023	0.102	4,122.19
External Combustion	0.01	0.61	0.15	0.03	0.01	0.007	620.26	0.028	0.006	622.61
Fugitives	0.03	0.05	0.19	182.96	18.75	0.006	0.85	NA	NA	0.85
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A

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Appendix B: Construction Emissions - Mainline and PTTL Pipelines

Part B.1: Summary

Table B.1-3. Summary of Alaska Pipeline Construction-Related Emissions - Year 4

Year 4										
Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Logistics										
Onroad	0.97	9.35	3.22	0.44	0.25	0.023	2,417.27	0.429	0.004	2,429.24
Rail	0.06	1.64	0.49	0.04	0.03	0.002	170.67	0.013	0.004	172.28
Marine	2.11	57.63	6.89	0.90	0.83	1.118	1,972.95	0.059	0.096	2,003.12
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.32	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	1.02	0.25	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	10.20	11.92	54.16	2.12	2.12	1.684	10,633.82	0.705	0.120	10,687.14
Subtotal - Spread 3	21.02	125.11	109.93	694.31	81.99	3.029	32,803.13	1.640	0.623	33,029.82
Spread 4										
Civil Work										
Onroad	0.59	4.18	4.38	0.23	0.12	0.012	1,271.45	0.255	0.002	1,278.42
Nonroad	9.48	49.31	63.18	2.77	2.68	0.163	21,139.40	0.278	0.527	21,303.52
External Combustion	0.00	0.44	0.11	0.02	0.01	0.005	444.92	0.020	0.004	446.61
Fugitives	NA	0.71	2.80	749.70	85.43	0.084	12.61	NA	NA	12.61
Pipeline Construction										
Onroad	0.17	1.17	1.32	0.07	0.04	0.004	383.11	0.071	0.001	385.09
Nonroad	1.85	13.32	5.71	0.79	0.77	0.035	4,433.20	0.028	0.111	4,466.86
External Combustion	0.00	0.42	0.11	0.02	0.01	0.005	430.54	0.019	0.004	432.17
Fugitives	0.03	0.35	1.36	195.04	20.80	0.041	6.15	NA	NA	6.15
Offshore Pipeline Construction										
Onroad	0.05	0.37	0.15	0.03	0.01	0.002	218.00	0.019	0.001	218.65
Nonroad	2.99	18.23	6.26	0.88	0.85	0.071	9,274.59	0.041	0.231	9,344.55
Marine	3.93	103.82	8.65	1.49	1.34	3.146	4,609.74	0.029	0.221	4,676.37
Fugitives	0.01	N/A	N/A	153.61	15.56	N/A	N/A	N/A	N/A	N/A
Compressor/Heater Stations										
Onroad	0.28	1.82	2.01	0.10	0.05	0.006	721.95	0.135	0.001	725.74
Nonroad	5.48	53.98	17.37	2.65	2.57	0.085	11,133.75	0.083	0.278	11,218.63
External Combustion	0.06	1.04	0.60	0.06	0.06	0.001	995.90	0.016	0.072	1,017.67
Fugitives	0.22	N/A	N/A	291.84	29.25	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	1.88	18.72	6.39	0.89	0.51	0.045	4,725.18	0.802	0.008	4,747.48
Rail	0.03	0.80	0.24	0.02	0.02	0.001	83.03	0.007	0.002	83.81
Marine	3.90	105.83	12.05	1.64	1.49	2.232	3,790.11	0.095	0.184	3,847.45
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	94.26	9.67	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	7.30	11.31	54.10	1.46	1.46	1.061	10,285.98	0.582	0.104	10,331.43
Subtotal - Spread 4	38.73	385.81	186.79	1,497.55	172.69	6.999	73,959.61	2.481	1.750	74,543.19
Point Thomson Gas Transmission Line										
Civil Work/Pipeline Construction										
Onroad	0.52	4.27	2.83	0.21	0.12	0.011	1,187.83	0.224	0.002	1,193.98
Nonroad	5.16	36.57	29.64	2.16	2.09	0.078	9,614.91	0.121	0.240	9,689.45
Fugitives	0.03	N/A	N/A	339.82	44.72	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	0.17	1.67	0.55	0.07	0.04	0.004	393.34	0.075	0.000	395.34
Rail	--	--	--	--	--	--	--	--	--	--
Marine	0.06	1.71	0.20	0.03	0.02	0.033	58.66	0.002	0.003	59.55
Fugitives	N/A	N/A	N/A	29.42	2.95	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	8.99	11.67	54.13	1.85	1.85	1.424	10,488.89	0.654	0.113	10,538.93
Subtotal - Point Thomson Gas Transmission Line	14.93	55.90	87.36	373.56	51.79	1.551	21,743.62	1.076	0.358	21,877.25
Double Jointing and Coating Facilities										
Fairbanks										
Fugitives	0.28	NA	NA	3.44	3.44	NA	NA	NA	NA	NA
Seward										
Fugitives	0.18	NA	NA	2.19	2.19	NA	NA	NA	NA	NA
Subtotal - Double Jointing and Coating Facilities	0.45	N/A	N/A	5.62	5.62	N/A	N/A	N/A	N/A	N/A
Year 4 Total Emissions	108.40	822.80	626.61	3,650.04	497.79	17.673	192,753.02	7.986	4.015	194,149.16

Appendix B: Construction Emissions - Mainline and PTTL Pipelines

Part B.1: Summary

Table B.1-4. Summary of Alaska Pipeline Construction-Related Emissions - Year 5

Year 5										
Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Spread 1										
Civil Work										
Onroad	0.16	1.19	1.14	0.06	0.03	0.004	372.12	0.076	0.001	374.19
Nonroad	2.82	13.56	11.01	0.69	0.67	0.061	8,017.35	0.058	0.200	8,078.40
External Combustion	0.00	0.26	0.07	0.01	0.00	0.003	264.07	0.012	0.002	265.07
Fugitives	NA	2.17	8.54	168.82	29.73	0.255	38.49	NA	NA	38.49
Pipeline Construction										
Onroad	0.89	6.46	6.24	0.36	0.19	0.021	2,149.06	0.406	0.004	2,160.36
Nonroad	10.80	77.67	29.06	4.13	4.01	0.223	28,334.51	0.156	0.707	28,549.04
External Combustion	0.03	2.56	0.64	0.13	0.03	0.027	2,598.11	0.116	0.023	2,607.95
Fugitives	0.14	10.35	40.78	660.18	96.12	1.217	183.81	NA	NA	183.81
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	4.84	44.58	15.87	2.13	1.14	0.122	12,728.35	2.344	0.024	12,794.15
Rail	0.12	3.29	1.04	0.07	0.07	0.004	363.00	0.028	0.009	366.42
Marine	2.27	61.84	7.39	0.97	0.89	1.199	2,117.12	0.063	0.103	2,149.49
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	1,070.93	107.36	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	10.74	12.04	54.17	2.25	2.25	1.800	10,699.05	0.728	0.123	10,753.84
Subtotal - Spread 1	32.97	235.96	175.95	1,910.73	242.49	4.936	67,865.03	3.988	1.196	68,321.20
Spread 2										
Civil Work										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	NA	--	--	--	--	--	--	NA	NA	--
Pipeline Construction										
Onroad	0.91	6.67	6.34	0.38	0.19	0.021	2,222.95	0.414	0.004	2,234.52
Nonroad	11.76	83.67	31.06	4.45	4.31	0.243	30,893.65	0.171	0.771	31,127.58
External Combustion	0.02	2.09	0.52	0.10	0.03	0.022	2,117.07	0.095	0.019	2,125.09
Fugitives	0.14	12.08	47.59	626.64	97.41	1.421	214.51	NA	NA	214.51
Compressor/Heater Stations										
Onroad	0.11	0.66	0.79	0.04	0.02	0.002	286.24	0.056	0.001	287.80
Nonroad	1.93	18.60	5.79	0.88	0.86	0.032	4,251.35	0.029	0.106	4,283.70
External Combustion	0.04	0.60	0.35	0.03	0.03	0.001	580.94	0.009	0.042	593.64
Fugitives	0.06	N/A	N/A	61.70	6.19	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	3.77	35.04	12.47	1.68	0.91	0.096	9,981.24	1.807	0.019	10,032.01
Rail	0.18	5.05	1.60	0.11	0.10	0.006	556.18	0.044	0.014	561.43
Marine	2.61	71.32	8.52	1.12	1.02	1.383	2,441.86	0.072	0.119	2,479.20
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.29	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	528.99	53.25	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	13.46	17.50	81.20	2.77	2.77	2.130	15,729.71	0.980	0.169	15,804.68
Subtotal - Spread 2	35.28	253.27	196.24	1,228.88	167.09	5.358	69,275.72	3.677	1.263	69,744.16
Spread 3										
Civil Work										
Onroad	0.05	0.29	0.42	0.02	0.01	0.001	104.31	0.023	0.000	104.94
Nonroad	0.73	3.58	4.96	0.20	0.20	0.012	1,583.95	0.022	0.040	1,596.27
External Combustion	0.00	0.06	0.01	0.00	0.00	0.001	59.50	0.003	0.001	59.73
Fugitives	NA	0.02	0.09	76.17	8.39	0.003	0.42	NA	NA	0.42
Pipeline Construction										
Onroad	0.94	6.75	6.63	0.38	0.20	0.022	2,276.19	0.424	0.004	2,288.03
Nonroad	11.33	82.08	30.28	4.41	4.27	0.233	29,512.32	0.164	0.736	29,735.80
External Combustion	0.02	1.95	0.49	0.10	0.02	0.021	1,976.58	0.088	0.018	1,984.07
Fugitives	0.13	6.86	27.02	1,182.18	138.61	0.807	121.81	NA	NA	121.81
Compressor/Heater Stations										
Onroad	0.21	1.32	1.58	0.08	0.04	0.005	572.49	0.112	0.001	575.61
Nonroad	3.86	37.20	11.59	1.76	1.71	0.064	8,502.71	0.059	0.212	8,567.40
External Combustion	0.07	1.21	0.70	0.07	0.07	0.002	1,161.89	0.019	0.084	1,187.28
Fugitives	0.12	N/A	N/A	246.76	24.71	N/A	N/A	N/A	N/A	N/A

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Appendix B: Construction Emissions - Mainline and PTTL Pipelines

Part B.1: Summary

Table B.1-4. Summary of Alaska Pipeline Construction-Related Emissions - Year 5

Year 5										
Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Logistics										
Onroad	1.22	12.15	4.23	0.58	0.33	0.031	3,261.60	0.544	0.005	3,276.71
Rail	0.13	3.66	1.16	0.08	0.08	0.004	403.28	0.032	0.010	407.09
Marine	2.52	68.73	8.21	1.08	0.99	1.333	2,353.02	0.070	0.115	2,389.00
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.28	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	1.31	0.32	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	13.94	17.60	81.21	2.88	2.88	2.234	15,787.68	1.000	0.172	15,863.97
Subtotal - Spread 3	35.54	243.45	178.59	1,518.06	182.81	4.772	67,677.75	2.558	1.397	68,158.12
Spread 4										
Civil Work										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	NA	--	--	--	--	--	--	NA	NA	--
Pipeline Construction										
Onroad	0.83	5.99	5.86	0.34	0.17	0.019	1,997.46	0.378	0.004	2,007.99
Nonroad	9.49	65.90	29.58	3.59	3.48	0.186	23,570.12	0.153	0.588	23,749.17
External Combustion	0.02	1.62	0.40	0.08	0.02	0.017	1,639.62	0.073	0.015	1,645.83
Fugitives	0.11	3.95	15.57	963.05	108.56	0.465	70.17	NA	NA	70.17
Offshore Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
Marine	182.07	4,806.77	400.56	69.19	61.91	145.660	213,432.75	1.321	10.241	216,517.57
Fugitives	0.06	N/A	N/A	0.70	0.70	N/A	N/A	N/A	N/A	N/A
Compressor/Heater Stations										
Onroad	0.02	0.15	0.18	0.01	0.00	0.001	64.18	0.013	0.000	64.53
Nonroad	0.43	4.13	1.31	0.20	0.19	0.007	923.11	0.007	0.023	930.14
External Combustion	0.01	0.12	0.07	0.01	0.01	0.000	110.66	0.002	0.008	113.07
Fugitives	0.02	N/A	N/A	26.97	2.70	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	0.68	6.70	2.33	0.32	0.18	0.017	1,805.54	0.311	0.003	1,814.16
Rail	0.07	1.91	0.61	0.04	0.04	0.002	210.78	0.017	0.005	212.77
Marine	3.35	91.17	10.62	1.42	1.30	1.851	3,198.15	0.087	0.156	3,246.77
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.34	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	35.49	3.64	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	10.86	12.06	54.17	2.27	2.27	1.826	10,713.54	0.733	0.123	10,768.66
Subtotal - Spread 4	208.36	5,000.46	521.25	1,103.67	185.18	150.051	257,736.08	3.094	11.166	261,140.82
Point Thomson Gas Transmission Line										
Civil Work/Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	--	--	--	--	--	--	--	--	--	--
Rail	--	--	--	--	--	--	--	--	--	--
Marine	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	--	--	--	--	--	--	--	--	--	--
Subtotal - Point Thomson Gas Transmission Line	--	--	--	--	--	--	--	--	--	--
Double Jointing and Coating Facilities										
Fairbanks										
Fugitives	0.21	NA	NA	2.58	2.58	NA	NA	NA	NA	NA
Seward										
Fugitives	0.13	NA	NA	1.64	1.64	NA	NA	NA	NA	NA
Subtotal - Double Jointing and Coating Facilities	0.34	N/A	N/A	4.22	4.22	N/A	N/A	N/A	N/A	N/A
Year 5 Total Emissions	312.49	5,733.14	1,072.02	5,765.57	781.78	165.117	462,554.58	13.317	15.023	467,364.28

Appendix B: Construction Emissions - Mainline and PTTL Pipelines

Part B.1: Summary

Table B.1-5. Summary of Alaska Pipeline Construction-Related Emissions - Year 6

Year 6

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Spread 1										
Civil Work										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	NA	--	--	--	--	--	--	NA	NA	--
Pipeline Construction										
Onroad	0.71	5.12	4.99	0.29	0.14	0.017	1,817.20	0.350	0.003	1,826.93
Nonroad	9.13	60.53	22.95	3.20	3.10	0.194	24,945.93	0.133	0.622	25,134.67
External Combustion	0.01	1.40	0.35	0.07	0.02	0.015	1,422.88	0.064	0.013	1,428.26
Fugitives	0.12	9.90	39.02	565.18	85.14	1.165	175.90	NA	NA	175.90
Compressor/Heater Stations										
Onroad	0.20	1.21	1.48	0.07	0.03	0.005	561.94	0.113	0.001	565.09
Nonroad	3.57	33.64	10.26	1.56	1.51	0.062	8,278.55	0.054	0.207	8,341.46
External Combustion	0.07	1.09	0.63	0.06	0.06	0.002	1,045.70	0.017	0.075	1,068.55
Fugitives	0.11	N/A	N/A	133.90	13.42	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	5.40	49.47	17.84	2.36	1.21	0.142	14,827.19	2.803	0.027	14,905.39
Rail	--	--	--	--	--	--	--	--	--	--
Marine	1.71	46.72	5.58	0.73	0.67	0.906	1,599.67	0.047	0.078	1,624.13
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	1,227.85	123.09	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	2.60	2.96	13.36	0.54	0.54	0.434	2,632.76	0.178	0.030	2,646.15
Subtotal - Spread 1	23.82	212.04	116.46	1,935.83	228.95	2.942	57,307.71	3.758	1.057	57,716.53
Spread 2										
Civil Work										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	NA	--	--	--	--	--	--	NA	NA	--
Pipeline Construction										
Onroad	0.74	5.40	5.10	0.31	0.15	0.018	1,901.34	0.367	0.003	1,911.56
Nonroad	9.30	61.70	23.87	3.26	3.16	0.198	25,302.88	0.137	0.631	25,494.37
External Combustion	0.02	1.57	0.39	0.08	0.02	0.017	1,587.94	0.071	0.014	1,593.95
Fugitives	0.11	5.64	22.22	518.66	68.64	0.663	100.16	NA	NA	100.16
Compressor/Heater Stations										
Onroad	0.13	0.81	0.99	0.05	0.02	0.003	376.32	0.076	0.001	378.43
Nonroad	2.44	22.80	7.00	1.07	1.03	0.042	5,668.86	0.037	0.141	5,711.94
External Combustion	0.05	0.81	0.46	0.04	0.04	0.001	774.59	0.012	0.056	791.52
Fugitives	0.08	N/A	N/A	82.27	8.25	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	2.36	21.86	7.89	1.05	0.55	0.063	6,549.68	1.202	0.012	6,583.30
Rail	0.05	1.41	0.48	0.03	0.03	0.002	165.48	0.013	0.004	167.04
Marine	1.58	43.07	5.15	0.68	0.62	0.835	1,474.60	0.044	0.072	1,497.14
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.33	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	344.57	34.68	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	2.48	2.93	13.35	0.52	0.52	0.409	2,618.47	0.173	0.029	2,631.53
Subtotal - Spread 2	19.68	167.99	86.90	952.58	117.71	2.251	46,520.31	2.131	0.964	46,860.94
Spread 3										
Civil Work										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	NA	--	--	--	--	--	--	NA	NA	--
Pipeline Construction										
Onroad	0.60	4.24	4.21	0.24	0.12	0.014	1,513.06	0.295	0.003	1,521.27
Nonroad	6.61	45.49	18.42	2.40	2.33	0.135	17,222.59	0.102	0.430	17,353.15
External Combustion	0.01	1.20	0.30	0.06	0.02	0.013	1,216.13	0.054	0.011	1,220.73
Fugitives	0.10	4.76	18.75	774.78	91.72	0.560	84.52	NA	NA	84.52
Compressor/Heater Stations										
Onroad	0.07	0.41	0.49	0.02	0.01	0.002	188.16	0.038	0.000	189.21
Nonroad	1.22	11.40	3.50	0.53	0.52	0.021	2,834.43	0.019	0.071	2,855.97
External Combustion	0.02	0.40	0.23	0.02	0.02	0.001	387.30	0.006	0.028	395.76
Fugitives	0.04	N/A	N/A	82.25	8.24	N/A	N/A	N/A	N/A	N/A

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Appendix B: Construction Emissions - Mainline and PTTL Pipelines

Part B.1: Summary

Table B.1-5. Summary of Alaska Pipeline Construction-Related Emissions - Year 6

Year 6										
Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Logistics										
Onroad	0.78	7.23	2.63	0.35	0.18	0.021	2,209.35	0.395	0.004	2,220.48
Rail	0.05	1.44	0.48	0.03	0.03	0.002	168.51	0.013	0.004	170.10
Marine	1.62	44.09	5.27	0.69	0.63	0.855	1,509.60	0.045	0.074	1,532.68
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.33	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	1.01	0.25	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	3.14	4.28	20.02	0.64	0.64	0.487	3,857.12	0.234	0.041	3,875.12
Subtotal - Spread 3	14.59	124.94	74.31	863.04	104.71	2.111	31,190.75	1.200	0.665	31,418.99
Spread 4										
Civil Work										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	NA	--	--	--	--	--	--	NA	NA	--
Pipeline Construction										
Onroad	0.63	4.54	4.38	0.26	0.13	0.015	1,601.72	0.312	0.003	1,610.38
Nonroad	7.23	47.43	20.13	2.56	2.48	0.147	18,856.47	0.112	0.470	18,999.45
External Combustion	0.01	1.37	0.34	0.07	0.02	0.015	1,393.31	0.062	0.012	1,398.59
Fugitives	0.09	0.76	2.98	765.96	79.86	0.089	13.45	NA	NA	13.45
Offshore Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
Marine	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	1.26	11.33	4.16	0.55	0.28	0.034	3,531.49	0.652	0.007	3,549.91
Rail	--	--	--	--	--	--	--	--	--	--
Marine	6.26	166.86	15.64	2.46	2.22	4.531	6,919.55	0.082	0.333	7,020.93
Aircraft	0.00	0.05	0.09	--	--	0.007	17.56	0.002	0.001	17.76
Fuel Storage	0.55	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	89.05	9.12	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	3.15	4.28	20.02	0.64	0.64	0.490	3,858.90	0.235	0.041	3,876.94
Subtotal - Spread 4	19.20	236.62	67.76	861.56	94.75	5.329	36,192.45	1.456	0.868	36,487.42
Point Thomson Gas Transmission Line										
Civil Work/Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	0.12	1.19	0.41	0.05	0.03	0.003	316.73	0.064	0.000	318.43
Rail	--	--	--	--	--	--	--	--	--	--
Marine	0.04	0.98	0.12	0.02	0.01	0.019	33.46	0.001	0.002	33.97
Fugitives	N/A	N/A	N/A	23.83	2.39	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	--	--	--	--	--	--	--	--	--	--
Subtotal - Point Thomson Gas Transmission Line	0.16	2.17	0.52	23.90	2.43	0.022	350.19	0.065	0.002	352.40
Double Jointing and Coating Facilities										
Fairbanks										
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Seward										
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Subtotal - Double Jointing and Coating Facilities	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Year 6 Total Emissions	77.44	743.77	345.95	4,636.90	548.54	12.654	171,561.40	8.610	3.556	172,836.28

Appendix B: Construction Emissions - Mainline and PTTL Pipelines

Part B.1: Summary

Table B.1-6. Summary of Alaska Pipeline Construction-Related Emissions - Year 7


Year 7										
Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Spread 1										
Civil Work										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	NA	--	--	--	--	--	--	NA	NA	--
Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	NA	NA	--
Compressor/Heater Stations										
Onroad	0.09	0.56	0.69	0.04	0.01	0.002	276.79	0.057	0.001	278.38
Nonroad	1.69	15.38	4.64	0.70	0.68	0.030	4,102.06	0.026	0.102	4,133.20
External Combustion	0.03	0.52	0.30	0.03	0.03	0.001	503.48	0.008	0.036	514.49
Fugitives	0.05	N/A	N/A	66.90	6.71	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	1.02	9.47	3.39	0.44	0.22	0.027	2,815.08	0.556	0.004	2,830.25
Rail	--	--	--	--	--	--	--	--	--	--
Marine	--	--	--	--	--	--	--	--	--	--
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	206.68	20.72	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	0.61	1.33	6.66	0.11	0.11	0.068	1,233.29	0.060	0.011	1,238.11
Subtotal - Spread 1	3.66	27.27	15.69	274.90	28.48	0.129	8,930.70	0.707	0.155	8,994.42
Spread 2										
Civil Work										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	NA	--	--	--	--	--	--	NA	NA	--
Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	NA	NA	--
Compressor/Heater Stations										
Onroad	0.03	0.19	0.23	0.01	0.01	0.001	92.82	0.019	0.000	93.36
Nonroad	0.58	5.24	1.60	0.24	0.23	0.010	1,417.30	0.009	0.035	1,428.06
External Combustion	0.01	0.20	0.12	0.01	0.01	0.000	193.65	0.003	0.014	197.88
Fugitives	0.02	N/A	N/A	20.57	2.06	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	0.53	4.99	1.78	0.23	0.12	0.014	1,467.50	0.287	0.002	1,475.31
Rail	0.00	0.05	0.02	0.00	0.00	0.000	5.90	0.000	0.000	5.96
Marine	--	--	--	--	--	--	--	--	--	--
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.34	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	66.34	6.68	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	--	--	--	--	--	--	--	--	--	--
Subtotal - Spread 2	1.51	10.67	3.74	87.40	9.11	0.026	3,177.17	0.319	0.052	3,200.56
Spread 3										
Civil Work										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	NA	--	--	--	--	--	--	NA	NA	--
Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	NA	NA	--
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A

Appendix B: Construction Emissions - Mainline and PTTL Pipelines

Part B.1: Summary

Table B.1-6. Summary of Alaska Pipeline Construction-Related Emissions - Year 7

Year 7										
Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
Logistics										
Onroad	0.60	5.45	1.98	0.26	0.13	0.016	1,679.36	0.334	0.003	1,688.55
Rail	--	--	--	--	--	--	--	--	--	--
Marine	--	--	--	--	--	--	--	--	--	--
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.36	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	0.71	0.17	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	0.86	1.39	6.67	0.17	0.17	0.123	1,263.67	0.070	0.013	1,269.17
Subtotal - Spread 3										
	1.82	6.84	8.65	1.14	0.47	0.139	2,943.02	0.404	0.015	2,957.71
Spread 4										
Civil Work										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	NA	--	--	--	--	--	--	NA	NA	--
Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--	--	NA	NA	--
Offshore Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
Marine	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Compressor/Heater Stations										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	0.52	4.86	1.74	0.22	0.11	0.014	1,443.09	0.290	0.002	1,451.00
Rail	--	--	--	--	--	--	--	--	--	--
Marine	0.01	0.27	0.02	0.00	0.00	0.008	11.79	0.000	0.001	11.96
Aircraft	--	--	--	--	--	--	--	--	--	--
Fuel Storage	0.72	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	N/A	31.04	3.18	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	--	--	--	--	--	--	--	--	--	--
Subtotal - Spread 4										
	1.25	5.13	1.76	31.27	3.29	0.022	1,454.88	0.290	0.003	1,462.95
Point Thomson Gas Transmission Line										
Civil Work/Pipeline Construction										
Onroad	--	--	--	--	--	--	--	--	--	--
Nonroad	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Logistics										
Onroad	--	--	--	--	--	--	--	--	--	--
Rail	--	--	--	--	--	--	--	--	--	--
Marine	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Construction Camps										
Stationary	--	--	--	--	--	--	--	--	--	--
Subtotal - Point Thomson Gas Transmission Line										
	--	--	--	--	--	--	--	--	--	--
Double Jointing and Coating Facilities										
Fairbanks										
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Seward										
Fugitives	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Subtotal - Double Jointing and Coating Facilities										
	--	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Year 7 Total Emissions										
	8.25	49.91	29.83	394.71	41.35	0.315	16,505.78	1.719	0.224	16,615.65

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7.3 ATTACHMENT C: CONSTRUCTION EMISSIONS – LIQUEFACTION FACILITY

(Summary Table C-1 provided – additional documentation available upon request.)

Appendix C: Construction Emissions - Liquefaction Facility

Table C-1. Summary of Liquefaction Facility Construction-Related Emissions.

Year 2

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
<u>LNG Plant Construction</u>										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Subtotal - LNG Plant	--	--	--	--	--	--	--	--	--	--
<u>Marine Facilities Construction</u>										
Onroad Vehicles	0.80	6.45	4.59	0.31	0.18	0.015	1,535.72	0.296	0.002	1,543.73
Nonroad Equipment	6.43	58.18	21.99	3.73	3.62	0.126	15,454.98	0.089	0.386	15,572.09
Marine Vessels	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	635.98	66.84	N/A	N/A	N/A	N/A	N/A
Subtotal - Marine Facilities	7.23	64.63	26.57	640.02	70.64	0.141	16,990.70	0.385	0.388	17,115.82
<u>Construction Camp</u>										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	2.41	0.36	N/A	N/A	N/A	N/A	N/A
Subtotal - Construction Camp	--	--	--	2.41	0.36	--	--	--	--	--
<u>Logistics</u>										
Onroad Vehicles	0.50	4.66	1.62	0.22	0.13	0.011	1,128.39	0.189	0.002	1,133.79
Marine Vessels	10.79	296.24	32.13	4.31	3.92	6.069	10,128.83	0.239	0.502	10,284.46
Fugitives	N/A	N/A	N/A	2.05	0.50	N/A	N/A	N/A	N/A	N/A
Subtotal - Logistics	11.29	300.90	33.75	6.59	4.56	6.080	11,257.21	0.427	0.505	11,418.26
Total Construction Emissions:	18.52	365.53	60.32	649.01	75.56	6.221	28,247.91	0.812	0.892	28,534.08

Year 3

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
<u>LNG Plant Construction</u>										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Nonroad Equipment	0.63	7.00	2.98	0.43	0.42	0.014	1,677.56	0.009	0.042	1,690.25
Fugitives	N/A	N/A	N/A	34.71	3.73	N/A	N/A	N/A	N/A	N/A
Subtotal - LNG Plant	0.63	7.00	2.98	35.14	4.15	0.014	1,677.56	0.009	0.042	1,690.25
<u>Marine Facilities Construction</u>										
Onroad Vehicles	0.45	3.29	3.07	0.16	0.09	0.009	896.05	0.186	0.001	901.08
Nonroad Equipment	4.49	40.50	14.53	2.45	2.38	0.086	10,574.36	0.062	0.264	10,654.52
Marine Vessels	17.70	446.84	39.45	6.85	6.17	13.183	24,632.53	0.151	1.104	24,965.30
Fugitives	N/A	N/A	N/A	431.66	45.78	N/A	N/A	N/A	N/A	N/A
Subtotal - Marine Facilities	22.65	490.63	57.05	441.12	54.41	13.278	36,102.94	0.399	1.369	36,520.90
<u>Construction Camp</u>										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
External Combustion	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Subtotal - Construction Camp	--	--	--	--	--	--	--	--	--	--
<u>Logistics</u>										
Onroad Vehicles	0.74	6.82	2.39	0.33	0.19	0.017	1,773.53	0.308	0.004	1,782.32
Marine Vessels	5.18	132.22	17.81	2.64	2.42	3.406	5,998.87	0.165	0.271	6,083.62
Fugitives	N/A	N/A	N/A	3.26	0.80	N/A	N/A	N/A	N/A	N/A
Subtotal - Logistics	5.92	139.03	20.20	6.22	3.40	3.423	7,772.39	0.473	0.274	7,865.94
Total Construction Emissions:	29.20	636.67	80.24	482.48	61.96	16.715	45,552.89	0.881	1.685	46,077.10

Appendix C: Construction Emissions - Liquefaction Facility

Table C-1. Summary of Liquefaction Facility Construction-Related Emissions.

Year 4

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
<u>LNG Plant Construction</u>										
Onroad Vehicles	1.22	8.04	8.76	0.44	0.22	0.025	2,642.95	0.538	0.004	2,657.73
Nonroad Equipment	60.84	412.66	615.33	14.49	14.00	0.805	106,543.41	1.457	2.659	107,372.13
Fugitives	N/A	N/A	N/A	2,121.32	215.02	N/A	N/A	N/A	N/A	N/A
Subtotal - LNG Plant	62.06	420.70	624.09	2,136.25	229.24	0.830	109,186.36	1.995	2.663	110,029.86
<u>Marine Facilities Construction</u>										
Onroad Vehicles	0.03	0.10	0.27	0.01	0.00	0.000	44.54	0.011	0.000	44.84
Nonroad Equipment	0.44	4.35	1.45	0.24	0.24	0.008	954.87	0.006	0.024	962.12
Marine Vessels	27.42	690.75	60.82	10.57	9.53	20.292	38,331.44	0.235	1.710	38,846.79
Fugitives	N/A	N/A	N/A	35.76	3.88	N/A	N/A	N/A	N/A	N/A
Subtotal - Marine Facilities	27.89	695.20	62.54	46.58	13.65	20.301	39,330.84	0.252	1.734	39,853.75
<u>Construction Camp</u>										
Onroad Vehicles	0.31	4.34	1.58	0.25	0.18	0.010	1,084.35	0.037	0.002	1,085.81
External Combustion	10.86	2.29	0.22	2.48	2.48	2.339	1,307.16	0.461	0.061	1,336.73
Fugitives	N/A	N/A	N/A	366.47	36.65	N/A	N/A	N/A	N/A	N/A
Subtotal - Construction Camp	11.17	6.63	1.79	369.20	39.31	2.350	2,391.51	0.498	0.062	2,422.54
<u>Logistics</u>										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Marine Vessels	5.29	137.44	16.84	2.49	2.27	3.483	5,916.29	0.142	0.273	6,001.29
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Subtotal - Logistics	5.29	137.44	16.84	2.49	2.27	3.483	5,916.29	0.142	0.273	6,001.29
Total Construction Emissions:	106.40	1,259.98	705.27	2,554.52	284.47	26.964	156,825.00	2.887	4.732	158,307.44

Year 5

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
<u>LNG Plant Construction</u>										
Onroad Vehicles	2.18	13.66	16.69	0.77	0.36	0.046	4,855.97	1.054	0.008	4,884.80
Nonroad Equipment	86.59	520.40	1,000.16	19.89	19.22	1.090	144,208.87	2.332	3.599	145,339.66
Fugitives	N/A	N/A	N/A	3,686.60	375.68	N/A	N/A	N/A	N/A	N/A
Subtotal - LNG Plant	88.76	534.06	1,016.85	3,707.26	395.26	1.137	149,064.85	3.386	3.607	150,224.46
<u>Marine Facilities Construction</u>										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Marine Vessels	8.00	203.92	17.64	3.06	2.75	6.074	10,949.29	0.067	0.499	11,099.61
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Subtotal - Marine Facilities	8.00	203.92	17.64	3.06	2.75	6.074	10,949.29	0.067	0.499	11,099.61
<u>Construction Camp</u>										
Onroad Vehicles	0.75	10.43	3.82	0.62	0.42	0.028	2,893.48	0.102	0.005	2,897.48
External Combustion	24.44	5.15	0.49	5.59	5.59	5.263	2,941.11	1.038	0.136	3,007.64
Fugitives	N/A	N/A	N/A	982.71	98.27	N/A	N/A	N/A	N/A	N/A
Subtotal - Construction Camp	25.19	15.58	4.30	988.92	104.28	5.291	5,834.59	1.139	0.141	5,905.12
<u>Logistics</u>										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Marine Vessels	3.05	81.96	8.39	1.24	1.12	2.013	3,200.12	0.055	0.155	3,247.61
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Subtotal - Logistics	3.05	81.96	8.39	1.24	1.12	2.013	3,200.12	0.055	0.155	3,247.61
Total Construction Emissions:	125.00	835.52	1,047.18	4,700.47	503.42	14.514	169,048.85	4.647	4.402	170,476.80

Appendix C: Construction Emissions - Liquefaction Facility

Table C-1. Summary of Liquefaction Facility Construction-Related Emissions.

Year 6

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
<u>LNG Plant Construction</u>										
Onroad Vehicles	2.30	15.09	16.54	0.85	0.39	0.053	5,576.04	1.203	0.010	5,608.99
Nonroad Equipment	63.27	206.10	978.09	12.96	12.50	0.534	69,122.67	2.016	1.726	69,687.52
Fugitives	N/A	N/A	N/A	3,504.46	359.15	N/A	N/A	N/A	N/A	N/A
Subtotal - LNG Plant	65.57	221.20	994.63	3,518.27	372.04	0.587	74,698.71	3.219	1.736	75,296.51
<u>Marine Facilities Construction</u>										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Marine Vessels	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Subtotal - Marine Facilities	--	--	--	--	--	--	--	--	--	--
<u>Construction Camp</u>										
Onroad Vehicles	0.67	9.31	3.43	0.56	0.37	0.028	2,879.75	0.105	0.005	2,883.82
External Combustion	28.52	6.01	0.57	6.52	6.52	6.140	3,431.30	1.211	0.159	3,508.92
Fugitives	N/A	N/A	N/A	982.71	98.27	N/A	N/A	N/A	N/A	N/A
Subtotal - Construction Camp	29.19	15.32	4.00	989.80	105.16	6.168	6,311.05	1.315	0.164	6,392.74
<u>Logistics</u>										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Marine Vessels	2.11	56.67	5.78	0.85	0.77	1.398	2,218.67	0.037	0.107	2,251.57
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Subtotal - Logistics	2.11	56.67	5.78	0.85	0.77	1.398	2,218.67	0.037	0.107	2,251.57
Total Construction Emissions:	96.87	293.18	1,004.41	4,508.92	477.98	8.153	83,228.43	4.571	2.007	83,940.82

Year 7

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
<u>LNG Plant Construction</u>										
Onroad Vehicles	1.93	11.95	14.76	0.71	0.30	0.046	4,855.03	1.093	0.009	4,884.97
Nonroad Equipment	48.28	148.10	750.08	10.40	10.03	0.400	51,541.76	1.494	1.287	51,962.74
Fugitives	N/A	N/A	N/A	3,224.89	331.04	N/A	N/A	N/A	N/A	N/A
Subtotal - LNG Plant	50.21	160.05	764.83	3,236.00	341.37	0.447	56,396.79	2.587	1.296	56,847.71
<u>Marine Facilities Construction</u>										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Marine Vessels	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Subtotal - Marine Facilities	--	--	--	--	--	--	--	--	--	--
<u>Construction Camp</u>										
Onroad Vehicles	0.60	8.29	3.09	0.51	0.32	0.028	2,872.00	0.107	0.005	2,876.15
External Combustion	23.15	4.88	0.46	5.29	5.29	4.984	2,785.33	0.983	0.129	2,848.33
Fugitives	N/A	N/A	N/A	984.51	98.45	N/A	N/A	N/A	N/A	N/A
Subtotal - Construction Camp	23.75	13.17	3.55	990.31	104.07	5.012	5,657.33	1.090	0.134	5,724.48
<u>Logistics</u>										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Marine Vessels	1.90	50.92	5.20	0.77	0.69	1.256	1,993.08	0.034	0.096	2,022.64
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Subtotal - Logistics	1.90	50.92	5.20	0.77	0.69	1.256	1,993.08	0.034	0.096	2,022.64
Total Construction Emissions:	75.86	224.14	773.58	4,227.08	446.14	6.714	64,047.20	3.710	1.526	64,594.83

Appendix C: Construction Emissions - Liquefaction Facility

Table C-1. Summary of Liquefaction Facility Construction-Related Emissions.

Year 8

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
<u>LNG Plant Construction</u>										
Onroad Vehicles	1.31	7.27	11.09	0.48	0.19	0.032	3,377.62	0.801	0.007	3,399.60
Nonroad Equipment	25.73	95.44	415.54	6.52	6.31	0.251	32,237.84	0.798	0.805	32,497.67
Fugitives	N/A	N/A	N/A	2,525.93	258.89	N/A	N/A	N/A	N/A	N/A
Subtotal - LNG Plant	27.04	102.70	426.63	2,532.93	265.38	0.283	35,615.46	1.599	0.812	35,897.28
<u>Marine Facilities Construction</u>										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Marine Vessels	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Subtotal - Marine Facilities	--	--	--	--	--	--	--	--	--	--
<u>Construction Camp</u>										
Onroad Vehicles	0.54	7.39	2.78	0.47	0.28	0.027	2,854.87	0.109	0.005	2,859.06
External Combustion	13.58	2.86	0.27	3.11	3.11	2.924	1,633.95	0.576	0.076	1,670.91
Fugitives	N/A	N/A	N/A	982.71	98.27	N/A	N/A	N/A	N/A	N/A
Subtotal - Construction Camp	14.12	10.25	3.05	986.29	101.66	2.951	4,488.82	0.686	0.081	4,529.97
<u>Logistics</u>										
Onroad Vehicles	0.28	2.41	0.93	0.12	0.05	0.008	857.68	0.169	0.002	862.45
Marine Vessels	1.56	41.74	4.25	0.63	0.57	1.033	1,637.47	0.027	0.079	1,661.74
Fugitives	N/A	N/A	N/A	1.63	0.40	N/A	N/A	N/A	N/A	N/A
Subtotal - Logistics	1.84	44.15	5.18	2.38	1.02	1.041	2,495.15	0.196	0.081	2,524.19
Total Construction Emissions:	43.00	157.10	434.85	3,521.59	368.07	4.276	42,599.42	2.481	0.973	42,951.44

Year 9

Equipment Type	Criteria Pollutants, tons/year						Greenhouse Gases, metric tons/year			
	VOC	NOx	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e
<u>LNG Plant Construction</u>										
Onroad Vehicles	0.63	4.08	4.40	0.24	0.10	0.017	1,780.79	0.402	0.003	1,791.81
Nonroad Equipment	19.08	56.97	382.64	3.84	3.70	0.137	17,532.50	0.685	0.438	17,680.17
Fugitives	N/A	N/A	N/A	1,125.57	115.38	N/A	N/A	N/A	N/A	N/A
Subtotal - LNG Plant	19.71	61.05	387.04	1,129.65	119.18	0.154	19,313.30	1.087	0.441	19,471.98
<u>Marine Facilities Construction</u>										
Onroad Vehicles	--	--	--	--	--	--	--	--	--	--
Nonroad Equipment	--	--	--	--	--	--	--	--	--	--
Marine Vessels	--	--	--	--	--	--	--	--	--	--
Fugitives	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A
Subtotal - Marine Facilities	--	--	--	--	--	--	--	--	--	--
<u>Construction Camp</u>										
Onroad Vehicles	0.48	6.49	2.47	0.42	0.24	0.027	2,843.21	0.111	0.005	2,847.46
External Combustion	10.86	2.29	0.22	2.48	2.48	2.339	1,307.16	0.461	0.061	1,336.73
Fugitives	N/A	N/A	N/A	982.71	98.27	N/A	N/A	N/A	N/A	N/A
Subtotal - Construction Camp	11.35	8.77	2.69	985.62	101.00	2.366	4,150.37	0.573	0.065	4,184.19
<u>Logistics</u>										
Onroad Vehicles	0.61	5.16	2.03	0.26	0.11	0.018	1,930.26	0.387	0.004	1,941.19
Marine Vessels	1.32	34.88	3.98	0.58	0.53	0.860	1,424.52	0.031	0.067	1,445.33
Fugitives	N/A	N/A	N/A	3.68	0.90	N/A	N/A	N/A	N/A	N/A
Subtotal - Logistics	1.93	40.04	6.01	4.52	1.55	0.878	3,354.79	0.418	0.071	3,386.51
Total Construction Emissions:	32.99	109.87	395.73	2,119.79	221.72	3.398	26,818.46	2.077	0.578	27,042.67