

Appendix C-1

Air Quality and Greenhouse Gas Technical Assessment

Table 1
Construction Schedule and Trip Counts

Phase	Subphase Name	CalEEMod Phase Type	Start Date	End Date	Work Days Per Week	Work Days per Phase	Worker		Vendor		Hauling		On-Site Truck	
							One-Way Trips/Day	Miles/Trip	One-Way Trips/Day	Miles/Trip	One-Way Trips/Day	Miles/Trip	One-Way Trips/Day	Miles/Trip
1	CC-01 Demolition	Demolition	7/13/2026	2/25/2027	6	196	--	--	--	--	16	28.5	2	0.4
	CC-02 Preconstruction & Site Preparation	Site Preparation	12/18/2026	4/29/2027	6	114	--	--	--	--	16	28.5	2	0.4
	CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	Building Construction	6/24/2027	12/1/2027	6	138	--	--	--	--	8	28.5	--	--
	CC-05 Landside Piling / Ground Improvements	Building Construction	12/18/2026	6/22/2027	6	160	--	--	--	--	16	28.5	1	0.4
	CC-06 Landside Foundations & Paving	Paving	12/18/2026	7/27/2027	6	190	--	--	--	--	16	28.5	1	0.4
	CC-07 Structural Mechanical Installation	Building Construction	7/30/2027	1/28/2028	6	157	--	--	--	--	16	28.5	--	--
	CC-08 Utility Connection, Metering & Transformer Installation & Electrical Power & Controls	Building Construction	9/10/2027	4/25/2028	6	196	--	--	--	--	8	28.5	1	0.4
	CC-10 Unattended Truck Self-Loading Kiosk	Building Construction	7/16/2027	9/2/2027	6	42	--	--	--	--	4	28.5	--	--
	CC-11 Dome Construction	Building Construction	7/13/2027	5/10/2028	6	260	--	--	--	--	12	28.5	--	--
	CC-12 Rail Track Installation (Supply & Installation)	Building Construction	12/18/2026	4/8/2027	6	96	--	--	--	--	16	28.5	1	0.4
	Startup & Checkout	Building Construction	10/8/2027	5/5/2028	6	181	--	--	--	--	4	28.5	--	--
	Ship Unloader Installation	Building Construction	11/3/2027	11/30/2027	6	24	--	--	1.67	72.3	8	28.5	--	--
	Dry Commissioning	Building Construction	5/5/2028	5/19/2028	6	13	--	--	--	--	4	28.5	--	--
	Wet Commissioning	Building Construction	5/19/2028	6/2/2028	6	13	--	--	--	--	4	28.5	--	--
	Float	Building Construction	6/2/2028	8/25/2028	6	73	--	--	--	--	16	28.5	--	--
	Phase 1 Worker Trips	Building Construction	7/13/2026	8/25/2028	6	665	200	11.89000034	--	--	--	--	--	--
	Phase 1 CC1/2 Vendor Trips	Building Construction	7/13/2026	4/29/2027	6	250	--	--	60	9.100000381	--	--	--	--
	Phase 1 CC3-12 Vendor Trips	Building Construction	12/18/2026	5/10/2028	6	437	--	--	30	9.100000381	--	--	--	--
2	P.II CC-01 Demo: Bunker #6	Demolition	1/29/2030	5/6/2030	6	84	--	--	8	9.100000381	16	28.5	--	--
	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Building Construction	4/30/2030	9/5/2030	6	111	--	--	10	9.100000381	16	28.5	1	0.4
	P.II CC-07 Structural & Mechanical Installation	Building Construction	6/24/2030	9/30/2030	6	85	--	--	6	9.100000381	16	28.5	--	--
	P.II CC-08 Electrical and Instrumentation Installation	Building Construction	9/24/2030	1/2/2031	6	87	--	--	4	9.100000381	8	28.5	--	--
	P.II CC-11 Dome #6 Construction	Building Construction	8/1/2030	5/2/2031	6	236	--	--	12	9.100000381	12	28.5	--	--
	P.II Checkout	Building Construction	12/27/2030	4/29/2031	6	106	--	--	--	--	4	28.5	--	--

Table 1
Construction Schedule and Trip Counts

Phase	Subphase Name	CalEEMod Phase Type	Start Date	End Date	Work Days Per Week	Work Days per Phase	Worker		Vendor		Hauling		On-Site Truck	
							One-Way Trips/Day	Miles/Trip	One-Way Trips/Day	Miles/Trip	One-Way Trips/Day	Miles/Trip	One-Way Trips/Day	Miles/Trip
2 (cont.)	P.II Dry Commissioning	Building Construction	4/29/2031	5/6/2031	6	7	--	--	--	--	4	28.5	--	--
	P.II Wet Commissioning	Building Construction	5/6/2031	5/13/2031	6	7	--	--	--	--	4	28.5	--	--
	P.II Float	Building Construction	5/13/2031	6/10/2031	6	25	--	--	--	--	8	28.5	--	--
	Phase 2 Worker Trips	Building Construction	1/29/2030	6/10/2031	6	427	84	11.89000034	--	--	--	28.5	--	--

Notes:

1. To account for the overlapping phases, workers were analyzed in separate CalEEMod runs for trips only and used peak values provided by NCC. Vendor trips were allocated to phase when possible or the overall phase when there were multiple overlapping phases. Vendor trips associated with the ship unloader installation are based on anticipated shipments.

2. Worker and vendor trip distances are CalEEMod defaults with the exception of the ship unloader installation. The ship unloader will be transported from the Port of Oakland via containers. Hauling trip distance represents the average distance between the site and the anticipated disposal site (28.1 miles) and the on-site portion (0.4 mile).

3. The number of haul trucks and on-site trucks were provided in the equipment list. Each truck was assumed to travel 0.4 mile on site each day. Each haul truck was assumed to make one round trip to and from the site each day.

--: not applicable

Table 2
Construction Demolition Quantities

Construction Phase	Item	Estimated Demolished Area (square feet)
1	Transit Shed No. 4	67,620.00
	Shed near Bunker 7 and Shed cover between Bunkers 6 and 7	8,800.00
	Bunker 7, including its foundation, floor slab, and below-grade turner	13,677.84
	Exit shed	3,560.00
	Complete removal of the floor slabs and below-grade concrete columns and foundations of Transit Sheds 3 and 4 (approximately 90 feet by 900 feet in plan area) – PD	81,000.00
	Rail loading tank near Bunkers 1 and 2	706.50
	Shed cover between Bunkers 3 and 4	3,800.00
	Paving	1,500.00
	Total	180,664.34
2	Bunker 6	13,677.84

Note:

1. Demolition amounts were estimated in Google Earth based on the project description.

Table 3
Construction Equipment List

Construction Phase	Activity	Equipment Used	CalEEMod Equipment Matching	Equipment Quantity	Daily Availability (Hours/Day/Unit)	Equipment Utilization	Daily Runtime (Hours/Day/Unit)	Notes
1	CC-01 Demolition	100-ton cranes	Cranes	1	8	50%	4	300 hp
1	CC-01 Demolition	Personnel Lifts	Aerial Lifts	1	8	50%	4	--
1	CC-01 Demolition	Excavators	Excavators	3	8	50%	4	--
1	CC-01 Demolition	Miscellaneous Generators	Generator Sets	1	8	75%	6	--
1	CC-01 Demolition	Air Compressors	Air Compressors	1	8	25%	2	--
1	CC-01 Demolition	Forklifts	Forklifts	1	8	25%	2	--
1	CC-01 Demolition	Welding Machines	Welders	1	8	25%	2	--
1	CC-01 Demolition	Light Towers	Other Construction Equipment	2	8	25%	2	--
1	CC-01 Demolition	Front-End Loaders	Tractors/Loaders/Backhoes	2	8	75%	6	--
1	CC-01 Demolition	Haul/Dump Trucks	Haul Truck	8	8	50%	--	Modeled as haul truck
1	CC-01 Demolition	Water Trucks	On-Site Truck	1	8	25%	--	Modeled as on-site truck
1	CC-01 Demolition	Power-Pole Bucket Truck	On-Site Truck	1	8	75%	--	Modeled as on-site truck
1	CC-02 Preconstruction & Site Preparation	100-ton cranes	Cranes	1	8	50%	4	300 hp
1	CC-02 Preconstruction & Site Preparation	Personnel Lifts	Aerial Lifts	1	8	50%	4	--
1	CC-02 Preconstruction & Site Preparation	Dozers	Rubber Tired Dozers	2	8	75%	6	--
1	CC-02 Preconstruction & Site Preparation	Graders	Graders	1	8	75%	6	--
1	CC-02 Preconstruction & Site Preparation	Excavators	Excavators	1	8	50%	4	--
1	CC-02 Preconstruction & Site Preparation	Dewatering Pumps	Pumps	1	24	50%	12	--
1	CC-02 Preconstruction & Site Preparation	Miscellaneous Generators	Generator Sets	2	8	75%	6	--
1	CC-02 Preconstruction & Site Preparation	Air Compressors	Air Compressors	2	8	25%	2	--
1	CC-02 Preconstruction & Site Preparation	Forklifts	Forklifts	2	8	25%	2	--
1	CC-02 Preconstruction & Site Preparation	Welding Machines	Welders	2	8	25%	2	--
1	CC-02 Preconstruction & Site Preparation	Light Towers	Other Construction Equipment	2	8	25%	2	--
1	CC-02 Preconstruction & Site Preparation	Front-End Loaders	Tractors/Loaders/Backhoes	2	8	75%	6	--
1	CC-02 Preconstruction & Site Preparation	Haul/Dump Trucks	Haul Truck	8	8	50%	--	Modeled as haul truck
1	CC-02 Preconstruction & Site Preparation	Water Trucks	On-Site Truck	1	8	25%	--	Modeled as on-site truck
1	CC-02 Preconstruction & Site Preparation	Power-Pole Bucket Truck	On-Site Truck	1	8	75%	--	Modeled as on-site truck
1	CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	Personnel Lifts	Aerial Lifts	2	8	50%	4	--
1	CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	Miscellaneous Generators	Generator Sets	2	8	75%	6	--
1	CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	Air Compressors	Air Compressors	2	8	25%	2	--
1	CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	Forklifts	Forklifts	2	8	25%	2	--
1	CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	Welding Machines	Welders	2	8	25%	2	--
1	CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	Marine Tug/Work Barges	--	1	8	50%	--	Modeled as harbor craft
1	CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	Light Towers	Other Construction Equipment	2	8	25%	2	--
1	CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	Haul/Dump Trucks	Haul Truck	4	8	50%	--	Modeled as haul truck

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Construction Phase	Activity	Equipment Used	CalEEMod Equipment Matching	Equipment Quantity	Daily Availability (Hours/Day/Unit)	Equipment Utilization	Daily Runtime (Hours/Day/Unit)	Notes
1	CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	Floating 200-ton barge mounted crane, winches, & ancillary equipment	Cranes	1	8	75%	6	511 hp
1	CC-05 Landside Piling / Ground Improvements	Excavators	Excavators	1	8	50%	4	--
1	CC-05 Landside Piling / Ground Improvements	Miscellaneous Generators	Generator Sets	2	8	75%	6	--
1	CC-05 Landside Piling / Ground Improvements	Air Compressors	Air Compressors	2	8	25%	2	--
1	CC-05 Landside Piling / Ground Improvements	Forklifts	Forklifts	2	8	25%	2	--
1	CC-05 Landside Piling / Ground Improvements	Welding Machines	Welders	2	8	25%	2	--
1	CC-05 Landside Piling / Ground Improvements	Light Towers	Other Construction Equipment	2	8	25%	2	--
1	CC-05 Landside Piling / Ground Improvements	Crane for Land/Berth 3/4 Piles &/or ADP Installation	Cranes	3	8	75%	6	325 hp
1	CC-05 Landside Piling / Ground Improvements	Haul/Dump Trucks	Haul Truck	8	8	50%	--	Modeled as haul truck
1	CC-05 Landside Piling / Ground Improvements	Water Trucks	On-Site Truck	1	8	25%	--	Modeled as on-site truck
1	CC-05 Landside Piling / Ground Improvements	Cement silos, pumps, etc.	Other Material Handling Equipment	3	8	75%	6	425 hp
1	CC-06 Landside Foundations & Paving	100-ton cranes	Cranes	2	8	50%	4	300 hp
1	CC-06 Landside Foundations & Paving	Dozers	Rubber Tired Dozers	1	8	75%	6	--
1	CC-06 Landside Foundations & Paving	Excavators	Excavators	2	8	50%	4	--
1	CC-06 Landside Foundations & Paving	Dewatering Pumps	Pumps	2	24	50%	12	--
1	CC-06 Landside Foundations & Paving	Miscellaneous Generators	Generator Sets	2	8	75%	6	--
1	CC-06 Landside Foundations & Paving	Air Compressors	Air Compressors	2	8	25%	2	--
1	CC-06 Landside Foundations & Paving	Forklifts	Forklifts	2	8	25%	2	--
1	CC-06 Landside Foundations & Paving	Welding Machines	Welders	2	8	25%	2	--
1	CC-06 Landside Foundations & Paving	Light Towers	Other Construction Equipment	2	8	25%	2	--
1	CC-06 Landside Foundations & Paving	Front-End Loaders	Tractors/Loaders/Backhoes	1	8	75%	6	--
1	CC-06 Landside Foundations & Paving	Haul/Dump Trucks	Haul Truck	8	8	50%	--	Modeled as haul truck
1	CC-06 Landside Foundations & Paving	Water Trucks	On-Site Truck	1	8	25%	--	Modeled as on-site truck
1	CC-06 Landside Foundations & Paving	Cement silos, pumps, etc.	Other Material Handling Equipment	2	8	75%	6	425 hp
1	CC-06 Landside Foundations & Paving	Trencher	Trenchers	1	8	25%	2	--
1	CC-06 Landside Foundations & Paving	Asphalt paver	Pavers	1	8	25%	2	--
1	CC-06 Landside Foundations & Paving	Roller or compactor	Rollers	2	8	25%	2	--
1	CC-07 Structural Mechanical Installation	100-ton cranes	Cranes	2	8	50%	4	300 hp
1	CC-07 Structural Mechanical Installation	Personnel Lifts	Aerial Lifts	2	8	50%	4	--
1	CC-07 Structural Mechanical Installation	Dewatering Pumps	Pumps	2	24	50%	12	--
1	CC-07 Structural Mechanical Installation	Miscellaneous Generators	Generator Sets	2	8	75%	6	--
1	CC-07 Structural Mechanical Installation	Air Compressors	Air Compressors	2	8	25%	2	--
1	CC-07 Structural Mechanical Installation	Forklifts	Forklifts	2	8	25%	2	--
1	CC-07 Structural Mechanical Installation	Welding Machines	Welders	3	8	25%	2	--

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1	CC-07 Structural Mechanical Installation	Light Towers	Other Construction Equipment	3	8	25%	2	--
1	CC-07 Structural Mechanical Installation	Haul/Dump Trucks	Haul Truck	8	8	50%	--	Modeled as haul truck
1	CC-07 Structural Mechanical Installation	200-ton crane	Cranes	1	8	25%	2	340 hp
1	CC-08 Utility Connection, Metering & Transformer Installation & Electrical Power & Controls	Personnel Lifts	Aerial Lifts	3	8	50%	4	--
1	CC-08 Utility Connection, Metering & Transformer Installation & Electrical Power & Controls	Miscellaneous Generators	Generator Sets	3	8	75%	6	--
1	CC-08 Utility Connection, Metering & Transformer Installation & Electrical Power & Controls	Air Compressors	Air Compressors	3	8	25%	2	--
1	CC-08 Utility Connection, Metering & Transformer Installation & Electrical Power & Controls	Forklifts	Forklifts	2	8	25%	2	--
1	CC-08 Utility Connection, Metering & Transformer Installation & Electrical Power & Controls	Welding Machines	Welders	3	8	25%	2	--
1	CC-08 Utility Connection, Metering & Transformer Installation & Electrical Power & Controls	Light Towers	Other Construction Equipment	3	8	25%	2	--
1	CC-08 Utility Connection, Metering & Transformer Installation & Electrical Power & Controls	Haul/Dump Trucks	Haul Truck	4	8	50%	--	Modeled as haul truck
1	CC-08 Utility Connection, Metering & Transformer Installation & Electrical Power & Controls	Power-Pole Bucket Truck	On-Site Truck	1	8	75%	--	Modeled as on-site truck
1	CC-10 Unattended Truck Self-Loading Kiosk	100-ton cranes	Cranes	1	10	10%	1	300 hp
1	CC-10 Unattended Truck Self-Loading Kiosk	Personnel Lifts	Aerial Lifts	1	10	25%	2.5	--
1	CC-10 Unattended Truck Self-Loading Kiosk	Miscellaneous Generators	Generator Sets	1	10	50%	5	--
1	CC-10 Unattended Truck Self-Loading Kiosk	Air Compressors	Air Compressors	1	10	25%	2.5	--
1	CC-10 Unattended Truck Self-Loading Kiosk	Forklifts	Forklifts	1	10	25%	2.5	--
1	CC-10 Unattended Truck Self-Loading Kiosk	Welding Machines	Welders	1	10	25%	2.5	--
1	CC-10 Unattended Truck Self-Loading Kiosk	Light Towers	Other Construction Equipment	1	10	25%	2.5	--
1	CC-10 Unattended Truck Self-Loading Kiosk	Haul/Dump Trucks	Haul Truck	2	10	50%	--	Modeled as haul truck
1	CC-11 Dome Construction	100-ton cranes	Cranes	1	10	50%	5	300 hp
1	CC-11 Dome Construction	Personnel Lifts	Aerial Lifts	3	10	50%	5	--
1	CC-11 Dome Construction	Dewatering Pumps	Pumps	1	24	50%	12	--
1	CC-11 Dome Construction	Miscellaneous Generators	Generator Sets	1	10	75%	7.5	--
1	CC-11 Dome Construction	Air Compressors	Air Compressors	1	10	25%	2.5	--
1	CC-11 Dome Construction	Forklifts	Forklifts	1	10	25%	2.5	--
1	CC-11 Dome Construction	Welding Machines	Welders	2	10	25%	2.5	--
1	CC-11 Dome Construction	Light Towers	Other Construction Equipment	4	10	25%	2.5	--
1	CC-11 Dome Construction	Front-End Loaders	Tractors/Loaders/Backhoes	1	10	75%	7.5	--
1	CC-11 Dome Construction	Haul/Dump Trucks	Haul Truck	6	10	50%	--	Modeled as haul truck

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Construction Phase	Activity	Equipment Used	CalEEMod Equipment Matching	Equipment Quantity	Daily Availability (Hours/Day/Unit)	Equipment Utilization	Daily Runtime (Hours/Day/Unit)	Notes
1	CC-11 Dome Construction	Cement silos, pumps, etc.	Other Material Handling Equipment	2	10	75%	7.5	425 hp
1	CC-11 Dome Construction	Roller or compactor	Rollers	1	10	25%	2.5	--
1	CC-12 Rail Track Installation (Supply & Installation)	Dozers	Rubber Tired Dozers	1	10	75%	7.5	--
1	CC-12 Rail Track Installation (Supply & Installation)	Miscellaneous Generators	Generator Sets	2	10	75%	7.5	--
1	CC-12 Rail Track Installation (Supply & Installation)	Air Compressors	Air Compressors	2	10	25%	2.5	--
1	CC-12 Rail Track Installation (Supply & Installation)	Forklifts	Forklifts	1	10	25%	2.5	--
1	CC-12 Rail Track Installation (Supply & Installation)	Welding Machines	Welders	1	10	25%	2.5	--
1	CC-12 Rail Track Installation (Supply & Installation)	Light Towers	Other Construction Equipment	2	10	25%	2.5	--
1	CC-12 Rail Track Installation (Supply & Installation)	Front-End Loaders	Tractors/Loaders/Backhoes	1	10	75%	7.5	--
1	CC-12 Rail Track Installation (Supply & Installation)	Haul/Dump Trucks	Haul Truck	8	10	50%	--	Modeled as haul truck
1	CC-12 Rail Track Installation (Supply & Installation)	Water Trucks	On-Site Truck	1	10	25%	--	Modeled as on-site truck
1	CC-12 Rail Track Installation (Supply & Installation)	Rail tamper	Other Construction Equipment	1	10	50%	5	500 hp
1	CC-12 Rail Track Installation (Supply & Installation)	Roller or compactor	Rollers	2	10	25%	2.5	--
1	Ship Unloader installation	100-ton cranes	Cranes	1	8	50%	4	300 hp
1	Ship Unloader installation	Personnel Lifts	Aerial Lifts	2	8	50%	4	--
1	Ship Unloader installation	Miscellaneous Generators	Generator Sets	2	8	75%	6	--
1	Ship Unloader installation	Air Compressors	Air Compressors	2	8	25%	2	--
1	Ship Unloader installation	Forklifts	Forklifts	1	8	25%	2	--
1	Ship Unloader installation	Welding Machines	Welders	2	8	25%	2	--
1	Ship Unloader installation	Light Towers	Other Construction Equipment	3	8	25%	2	--
1	Ship Unloader installation	Haul/Dump Trucks	Haul Truck	4	8	50%	--	Modeled as haul truck
1	Ship Unloader installation	200-ton crane	Cranes	1	8	50%	4	340 hp
1	Startup & Checkout	Personnel Lifts	Aerial Lifts	2	8	50%	4	--
1	Startup & Checkout	Miscellaneous Generators	Generator Sets	2	8	75%	6	--
1	Startup & Checkout	Air Compressors	Air Compressors	2	8	25%	2	--
1	Startup & Checkout	Forklifts	Forklifts	1	8	25%	2	--
1	Startup & Checkout	Welding Machines	Welders	2	8	25%	2	--
1	Startup & Checkout	Haul/Dump Trucks	Haul Truck	2	8	50%	--	Modeled as haul truck
1	Dry Commissioning	Personnel Lifts	Aerial Lifts	2	8	50%	4	--
1	Dry Commissioning	Miscellaneous Generators	Generator Sets	2	8	75%	6	--
1	Dry Commissioning	Air Compressors	Air Compressors	2	8	25%	2	--
1	Dry Commissioning	Forklifts	Forklifts	1	8	25%	2	--
1	Dry Commissioning	Welding Machines	Welders	2	8	25%	2	--
1	Dry Commissioning	Haul/Dump Trucks	Haul Truck	2	8	50%	--	Modeled as haul truck
1	Wet Commissioning	Personnel Lifts	Aerial Lifts	2	8	50%	4	--
1	Wet Commissioning	Miscellaneous Generators	Generator Sets	2	8	75%	6	--
1	Wet Commissioning	Air Compressors	Air Compressors	2	8	25%	2	--

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Construction Phase	Activity	Equipment Used	CalEEMod Equipment Matching	Equipment Quantity	Daily Availability (Hours/Day/Unit)	Equipment Utilization	Daily Runtime (Hours/Day/Unit)	Notes
1	Wet Commissioning	Forklifts	Forklifts	1	8	25%	2	--
1	Wet Commissioning	Welding Machines	Welders	2	8	25%	2	--
1	Wet Commissioning	Haul/Dump Trucks	Haul Truck	2	8	50%	--	Modeled as haul truck
1	Float	100-ton cranes	Cranes	2	8	50%	4	300 hp
1	Float	Personnel Lifts	Aerial Lifts	2	8	50%	4	--
1	Float	Dewatering Pumps	Pumps	2	24	50%	12	--
1	Float	Miscellaneous Generators	Generator Sets	2	8	75%	6	--
1	Float	Air Compressors	Air Compressors	3	8	25%	2	--
1	Float	Forklifts	Forklifts	2	8	25%	2	--
1	Float	Welding Machines	Welders	3	8	25%	2	--
1	Float	Light Towers	Other Construction Equipment	3	8	25%	2	--
1	Float	Haul/Dump Trucks	Haul Truck	8	8	50%	--	Modeled as haul truck
1	Float	200-ton crane	Cranes	1	8	50%	4	340 hp
2	P.II CC-01 Demo: Bunker #6	100-ton cranes	Cranes	1	8	50%	4	300 hp
2	P.II CC-01 Demo: Bunker #6	Personnel Lifts	Aerial Lifts	1	8	50%	4	--
2	P.II CC-01 Demo: Bunker #6	Excavators	Excavators	2	8	50%	4	--
2	P.II CC-01 Demo: Bunker #6	Miscellaneous Generators	Generator Sets	1	8	75%	6	--
2	P.II CC-01 Demo: Bunker #6	Air Compressors	Air Compressors	1	8	25%	2	--
2	P.II CC-01 Demo: Bunker #6	Forklifts	Forklifts	1	8	25%	2	--
2	P.II CC-01 Demo: Bunker #6	Welding Machines	Welders	1	8	25%	2	--
2	P.II CC-01 Demo: Bunker #6	Light Towers	Other Construction Equipment	2	8	25%	2	--
2	P.II CC-01 Demo: Bunker #6	Front-End Loaders	Tractors/Loaders/Backhoes	2	8	75%	6	--
2	P.II CC-01 Demo: Bunker #6	Haul/Dump Trucks	Haul Truck	8	8	50%	--	Modeled as haul truck
2	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Excavators	Excavators	1	8	50%	4	--
2	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Dewatering Pumps	Pumps	2	24	50%	12	--
2	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Miscellaneous Generators	Generator Sets	2	8	75%	6	--
2	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Air Compressors	Air Compressors	2	8	25%	2	--
2	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Forklifts	Forklifts	2	8	25%	2	--
2	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Welding Machines	Welders	2	8	25%	2	--
2	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Light Towers	Other Construction Equipment	2	8	25%	2	--
2	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Front-End Loaders	Tractors/Loaders/Backhoes	1	8	25%	2	--
2	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Crane for Land/Berth 3/4 Piles &/or ADP Installation	Cranes	2	8	75%	6	325 hp
2	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Haul/Dump Trucks	Haul Truck	8	8	50%	--	Modeled as haul truck
2	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Water Trucks	On-Site Truck	1	8	25%	--	Modeled as on-site truck
2	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Cement silos, pumps, etc.	Other Material Handling Equipment	2	8	75%	6	425 hp
2	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Trencher	Trenchers	1	8	25%	2	--

Table 3
Construction Equipment List

Construction Phase	Activity	Equipment Used	CalEEMod Equipment Matching	Equipment Quantity	Daily Availability (Hours/Day/Unit)	Equipment Utilization	Daily Runtime (Hours/Day/Unit)	Notes
2	P.II CC-05 Landside Piling or ADP & CC-06 Foundation	Roller or compactor	Rollers	1	8	25%	2	--
2	P.II CC-07 Structural & Mechanical Installation	100-ton cranes	Cranes	1	8	75%	6	300 hp
2	P.II CC-07 Structural & Mechanical Installation	Personnel Lifts	Aerial Lifts	2	8	50%	4	--
2	P.II CC-07 Structural & Mechanical Installation	Dewatering Pumps	Pumps	1	24	50%	12	--
2	P.II CC-07 Structural & Mechanical Installation	Miscellaneous Generators	Generator Sets	2	8	75%	6	--
2	P.II CC-07 Structural & Mechanical Installation	Air Compressors	Air Compressors	1	8	25%	2	--
2	P.II CC-07 Structural & Mechanical Installation	Forklifts	Forklifts	1	8	25%	2	--
2	P.II CC-07 Structural & Mechanical Installation	Welding Machines	Welders	2	8	25%	2	--
2	P.II CC-07 Structural & Mechanical Installation	Light Towers	Other Construction Equipment	2	8	25%	2	--
2	P.II CC-07 Structural & Mechanical Installation	Haul/Dump Trucks	Haul Truck	8	8	50%	--	Modeled as haul truck
2	P.II CC-08 Electrical and Instrumentation Installation	Personnel Lifts	Aerial Lifts	2	8	50%	4	--
2	P.II CC-08 Electrical and Instrumentation Installation	Miscellaneous Generators	Generator Sets	2	8	75%	6	--
2	P.II CC-08 Electrical and Instrumentation Installation	Air Compressors	Air Compressors	2	8	25%	2	--
2	P.II CC-08 Electrical and Instrumentation Installation	Forklifts	Forklifts	1	8	25%	2	--
2	P.II CC-08 Electrical and Instrumentation Installation	Welding Machines	Welders	2	8	25%	2	--
2	P.II CC-08 Electrical and Instrumentation Installation	Light Towers	Other Construction Equipment	2	8	25%	2	--
2	P.II CC-08 Electrical and Instrumentation Installation	Haul/Dump Trucks	Haul Truck	4	8	50%	--	Modeled as haul truck
2	P.II CC-11 Dome #6 Construction	100-ton cranes	Cranes	1	10	25%	2.5	300 hp
2	P.II CC-11 Dome #6 Construction	Personnel Lifts	Aerial Lifts	3	10	50%	5	--
2	P.II CC-11 Dome #6 Construction	Dewatering Pumps	Pumps	1	24	50%	12	--
2	P.II CC-11 Dome #6 Construction	Miscellaneous Generators	Generator Sets	1	10	75%	7.5	--
2	P.II CC-11 Dome #6 Construction	Air Compressors	Air Compressors	1	10	25%	2.5	--
2	P.II CC-11 Dome #6 Construction	Forklifts	Forklifts	1	10	25%	2.5	--
2	P.II CC-11 Dome #6 Construction	Welding Machines	Welders	2	10	25%	2.5	--
2	P.II CC-11 Dome #6 Construction	Light Towers	Other Construction Equipment	4	10	25%	2.5	--
2	P.II CC-11 Dome #6 Construction	Front-End Loaders	Tractors/Loaders/Backhoes	1	10	75%	7.5	--
2	P.II CC-11 Dome #6 Construction	Haul/Dump Trucks	Haul Truck	6	10	50%	--	Modeled as haul truck
2	P.II CC-11 Dome #6 Construction	Cement silos, pumps, etc.	Other Material Handling Equipment	2	10	75%	7.5	425 hp
2	P.II CC-11 Dome #6 Construction	Roller or compactor	Rollers	1	10	25%	2.5	--
2	P.II Checkout	Personnel Lifts	Aerial Lifts	1	8	50%	4	--
2	P.II Checkout	Miscellaneous Generators	Generator Sets	1	8	75%	6	--
2	P.II Checkout	Air Compressors	Air Compressors	1	8	25%	2	--
2	P.II Checkout	Forklifts	Forklifts	1	8	25%	2	--
2	P.II Checkout	Welding Machines	Welders	1	8	25%	2	--
2	P.II Checkout	Haul/Dump Trucks	Haul Truck	2	8	50%	--	Modeled as haul truck
2	P.II Dry Commissioning	Personnel Lifts	Aerial Lifts	1	8	50%	4	--
2	P.II Dry Commissioning	Miscellaneous Generators	Generator Sets	1	8	75%	6	--

Table 3
Construction Equipment List

Construction Phase	Activity	Equipment Used	CalEEMod Equipment Matching	Equipment Quantity	Daily Availability (Hours/Day/Unit)	Equipment Utilization	Daily Runtime (Hours/Day/Unit)	Notes
2	P.II Dry Commissioning	Air Compressors	Air Compressors	1	8	25%	2	--
2	P.II Dry Commissioning	Forklifts	Forklifts	1	8	25%	2	--
2	P.II Dry Commissioning	Welding Machines	Welders	1	8	25%	2	--
2	P.II Dry Commissioning	Haul/Dump Trucks	Haul Truck	2	8	50%	--	Modeled as haul truck
2	P.II Wet Commissioning	Personnel Lifts	Aerial Lifts	1	8	50%	4	--
2	P.II Wet Commissioning	Miscellaneous Generators	Generator Sets	1	8	75%	6	--
2	P.II Wet Commissioning	Air Compressors	Air Compressors	1	8	25%	2	--
2	P.II Wet Commissioning	Forklifts	Forklifts	1	8	25%	2	--
2	P.II Wet Commissioning	Welding Machines	Welders	1	8	25%	2	--
2	P.II Wet Commissioning	Haul/Dump Trucks	Haul Truck	2	8	50%	--	Modeled as haul truck
2	P.II Float	100-ton cranes	Cranes	1	8	25%	2	300 hp
2	P.II Float	Personnel Lifts	Aerial Lifts	1	8	50%	4	--
2	P.II Float	Miscellaneous Generators	Generator Sets	1	8	75%	6	--
2	P.II Float	Air Compressors	Air Compressors	1	8	25%	2	--
2	P.II Float	Forklifts	Forklifts	1	8	25%	2	--
2	P.II Float	Welding Machines	Welders	1	8	25%	2	--
2	P.II Float	Light Towers	Other Construction Equipment	1	8	25%	2	--
2	P.II Float	Haul/Dump Trucks	Haul Truck	4	8	50%	--	Modeled as haul truck
2	P.II Float	200-ton crane	Cranes	1	8	25%	2	340 hp

Notes:

1. Equipment list was provided by the applicant and matched to CalEEMod equipment types. Default horsepower and load factors were used unless noted in the table above. Daily operational hours were provided by the applicant.

2. Haul trucks and onsite trucks were analyzed using the trip section of CalEEMod using the provided quantity of trucks.

3. Marine tug/work barges are modeled outside of CalEEMod.

hp: horsepower

--: not applicable

Table 4
Marine-Based Construction Emissions

Marine Construction Equipment and Activity

Activity	Equipment Used	Equipment Quantity	Daily Runtime (per Unit)	Start Date	End Date	Working Days in 2026	Working Days in 2027	Working Days in 2028	Total Hours in 2026	Total Hours in 2027	Total Hours in 2028
CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	Tugboat	1	4.0	6/24/2027	12/1/2027	0	138	0	0	552	0
CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	Work Barge (Auxiliary Engine)	1	4.0	6/24/2027	12/1/2027	0	138	0	0	552	0
CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	Work Boat	1	4.0	6/24/2027	12/1/2027	0	138	0	0	552	0
Ship Unloader Installation	Tugboats - to assist delivery vessel	2	1.8	11/3/2027	11/30/2027	0	2	0	0	7.22	0
Ship Unloader Installation	OGV- Bulk Carrier - Delivery Vessel	1	24	11/3/2027	11/30/2027	0	5	0	0	120	0

- Notes:
- Marine construction equipment quantity during CC-03 from Intermat. Utilization of 50% conservatively assumed for duration of phase.
 - Tugboat daily runtime is the sum of berth time (i.e., 0.33 hr/call) and total Maneuvering (Pilot to Berth) time (i.e., 1.48 hr/call). It is assumed that tugboat assist occurs twice during the Ship Unloader Installation (once upon arrival, once upon departure).
 - Ship unloader ocean going vessel assumed to berth over a 5 day period during the installation phase.

EPA Average Harbor Craft Emission Factors by Engine Tier

Tier	NO _x (g/kWh)	PM ₁₀ (g/kWh)	PM _{2.5} (g/kWh)	VOC (g/kWh)	CO (g/kWh)	CO ₂ (g/kWh)	SO ₂ (g/kWh)	NO _x (g/bhp-hr)	PM ₁₀ (g/bhp-hr)	PM _{2.5} (g/bhp-hr)	VOC (g/bhp-hr)	CO (g/bhp-hr)	CO ₂ (g/bhp-hr)	SO ₂ (g/bhp-hr)
Tier 0	10.282	0.259	0.251	0.296	1.613	679.470	0.006	7.667	0.193	0.187	0.220	1.203	506.681	0.005
Tier 1	9.624	0.259	0.251	0.296	1.610	679.470	0.006	4.207	0.110	0.107	0.220	0.685	506.681	0.005
Tier 2	5.642	0.148	0.144	0.296	0.919	679.470	0.006	4.207	0.110	0.107	0.220	0.685	506.681	0.005
Tier 3	4.749	0.083	0.080	0.125	0.919	679.470	0.006	3.541	0.062	0.060	0.093	0.685	506.681	0.005
Tier 4	1.300	0.030	0.029	0.125	0.919	679.470	0.006	0.969	0.022	0.022	0.093	0.685	506.681	0.005

- Notes:
- Emission factors are from EPA Ports Emissions Inventory Guidance, April 2022 - Appendix H. Tables of C1 and C2 Emission Factors
 - Tier 2 engines were assumed for the harbor craft associated with construction.

Ocean-Going Vessel - Bulk Carrier - Ship Unloader Delivery Vessel

Engine/Source Type	Engine Rating (kW) Berth/Hotelling	Exhaust Emission Factors (g/kWh) - Annual Fleet Mix									
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄
Propulsion Engine	--	0.184	0.169	0.184	14.554	0.362	1.400	0.632	593	0.029	0.012
Auxiliary Engine	369	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696	0.029	0.008
Auxiliary Boiler	123	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962	0.075	0.002

- Note:
- Emission factors taken from operational OGV emission calculations for a bulk carrier.

Table 4
Marine-Based Construction Emissions

Ocean-Going Vessel Emissions, Berth, Maneuvering, and Transit in San Joaquin Valley Air Pollution Control District

Mode	Engine/Source Type	Daily Emissions (lb/day)							Annual Emissions (lb/yr)										
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Berth	Propulsion Engine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Berth	Auxiliary Engine	3.69	3.40	3.69	212.90	8.28	21.48	8.22	18.45	16.99	18.45	1064.49	41.39	107.38	41.12	30.83	0.0013	3.5E-04	31.18
Berth	Auxiliary Boiler	1.31	1.21	0.00	13.02	3.82	1.30	0.69	6.57	6.05	0.00	65.08	19.10	6.51	3.43	14.20	0.0011	3.0E-05	14.50
Maneuvering	All	1.03	0.95	0.97	51.22	1.36	8.90	7.95	2.07	1.90	1.95	102.43	2.71	17.80	15.89	2.01	3.6E-04	3.7E-05	2.11
Transit	All	1.13	1.04	1.08	79.59	2.26	9.36	4.28	2.26	2.07	2.17	159.18	4.51	18.72	8.57	3.35	2.0E-04	5.9E-05	3.41
Total (lb/day; ton/yr MT/yr for GHGs ²)		7.17	6.59	5.75	356.72	15.71	41.04	21.14	0.01	0.01	0.01	0.70	0.03	0.08	0.03	0.02	1.3E-06	2.2E-07	0.02

Notes:

1. Emissions were calculated for the OGV associated with delivery of the new ship unloader using emission factors from operational calculations.

2. GHGs listed here are CO₂, CH₄, N₂O, and CO₂e.

Marine Construction Emissions Summary (Ocean-Going Vessels and Commercial Harbor Craft)

Construction Activity	Year	Equipment	Horsepower	Load Factor	Emissions, lb/day							Emissions, ton/year							
					PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂ e (MT/year)
CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	2027	Tugboat (push/tow) - propulsion and auxiliary	824	0.37	0.30	0.29	0.30	11.31	0.01	1.84	0.59	0.02	0.02	0.02	0.78	0.00	0.13	0.04	85.29
CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	2027	Barge	224	0.31	0.07	0.07	0.07	2.58	0.00	0.42	0.13	0.00	0.00	0.00	0.18	0.00	0.03	0.01	19.43
CC-03 BERTH 3/4 Marine Piling & Dock Upgrade	2027	Work Boat	718	0.33	0.23	0.22	0.23	8.79	0.01	1.43	0.46	0.02	0.02	0.02	0.61	0.00	0.10	0.03	66.29
Ship Unloader Installation	2027	Tugboat (assist)	2,720	0.17	0.40	0.39	0.40	15.30	0.02	2.49	0.80	0.00	0.00	0.00	0.02	0.00	0.00	0.00	1.67
Ship Unloader Installation	2027	OGV- Bulk Carrier - Delivery Vessel	--	--	7.17	6.59	5.75	356.72	15.71	41.04	21.14	0.01	0.01	0.01	0.70	0.03	0.08	0.03	0.02
2027 Total					8.16	7.56	6.74	394.70	15.75	47.22	23.13	0.06	0.05	0.05	2.28	0.04	0.33	0.12	172.70

Notes:

1. Construction tugboat, workboat and barge horsepower are based on Table H-1 (Summary of Engine Profile Data from CARB Reporting Data) of CARB's 2021 Update to the Emission Inventory for Commercial Harbor Craft: Methodology and Results. Propulsion and auxiliary engine horsepower was conservatively summed together. Load factors are from Table H-9, for push/tow tugboats. The maximum value between the propulsion and auxiliary engines is used in the calculations for harbor craft.

2. See operational harbor craft tables for assist tug parameters. A weighted average was caluclated for the load factor based on the load factors and horsepower of the propulsion/auxiliary engines for assist tugs.

Abbreviations:

--: not applicable

CH₄: methane

CO: carbon monoxide

CO₂: carbon dioxide

CO₂e: carbon dioxide equivalent

DPM: diesel particulate matter

g/bhp-hr: gram per brake horsepower-hour

GHG: greenhouse gas

MT: metric ton

NO₂: nitrogen dioxide

NO_x: oxides of nitrogen

OGV: ocean-going vessel

PM₁₀: particulate matter less than 10 micrometers in diameter

PM_{2.5}: particulate matter less than 2.5 micrometers in diameter

SO_x: oxides of sulfur

VOC: volatile organic compound

Table 5
Construction Emissions Summary (Unmitigated)

Unmitigated Construction Emissions Summary

Year	PM ₁₀ (Total)	PM _{2.5} (Total)	DPM	NO _x	SO _x	CO	VOC	CO _{2e}
Annual (tons per year, MT per year for GHG¹)								
2026	0.48	0.14	0.04	1.35	0.00	1.77	0.17	587.23
2027	1.68	0.76	0.36	11.26	0.06	10.17	1.17	3206.04
2028	0.33	0.12	0.06	2.09	0.01	2.81	0.27	816.51
2030	0.32	0.13	0.08	2.55	0.01	3.20	0.31	1072.49
2031	0.10	0.04	0.02	0.84	0.00	1.19	0.11	380.17
Significance Threshold, SJVAPCD	15	15	N/A	10	27	100	10	--
Significant?	No	No	No	Yes	No	No	No	--
Maximum Daily (pounds per day)								
2026	23.35	10.12	3.58	97.49	0.27	98.59	10.78	--
2027	31.30	10.67	13.55	488.51	16.02	144.49	33.62	--
2028	4.69	1.86	1.13	37.90	0.12	45.26	4.45	--
2030	3.80	1.65	1.13	35.58	0.14	42.91	4.32	--
2031	2.00	0.85	0.54	19.52	0.07	25.34	2.31	--
Screening Threshold, SJVAPCD	100	100	100	100	100	100	100	--
Exceed?	No	No	No	Yes	No	Yes	No	--

Table 5
Construction Emissions Summary (Unmitigated)

Unmitigated Annual Construction Emissions

Activity/Year	Emissions (tons per year, MT per year for GHG ¹)							
	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂ e
2026 Land-Based Source Emissions	0.48	0.14	0.04	1.35	0.00	1.77	0.17	587.23
2027 Land-Based Source Emissions	1.62	0.71	0.31	8.99	0.03	9.83	1.05	3,033.34
2027 Marine-Based Source Emissions	0.06	0.05	0.05	2.28	0.04	0.33	0.12	172.70
2028 Land-Based Source Emissions	0.33	0.12	0.06	2.09	0.01	2.81	0.27	816.51
2030 Land-Based Source Emissions	0.32	0.13	0.08	2.55	0.01	3.20	0.31	1,072.49
2031 Land-Based Source Emissions	0.10	0.04	0.02	0.84	0.00	1.19	0.11	380.17

Unmitigated Daily Construction Emissions

Activity/Year	Emissions (pounds per day)						
	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC
2026 Land-Based Source Emissions	23.35	10.12	3.58	97.49	0.27	98.59	10.78
2027 Land-Based Source Emissions	23.14	3.11	6.81	93.81	0.27	97.26	10.49
2027 Marine-Based Source Emissions	8.16	7.56	6.74	394.70	15.75	47.22	23.13
2028 Land-Based Source Emissions	4.69	1.86	1.13	37.90	0.12	45.26	4.45
2030 Land-Based Source Emissions	3.80	1.65	1.13	35.58	0.14	42.91	4.32
2031 Land-Based Source Emissions	2.00	0.85	0.54	19.52	0.07	25.34	2.31

Table 5
Construction Emissions Summary (Unmitigated)

Notes:

1. GHGs listed here are CO₂, CH₄, N₂O, and CO₂e.

Abbreviations:

--: not applicable

CH₄: methane

CO: carbon monoxide

CO₂: carbon dioxide

CO₂e: carbon dioxide equivalent

DPM: diesel particulate matter

GHG: greenhouse gas

MT: metric ton

NO₂: nitrogen dioxide

NO_x: oxides of nitrogen

PM₁₀: particulate matter less than 10 micrometers in diameter

PM_{2.5}: particulate matter less than 2.5 micrometers in diameter

SO_x: oxides of sulfur

VOC: volatile organic compound

Table 6
Construction Emissions Summary (Mitigated)

Mitigated Construction Emissions Summary

Year	PM ₁₀ (Total)	PM _{2.5} (Total)	DPM	NO _x	SO _x	CO	VOC	CO ₂ e
Annual (tons per year, MT per year for GHG¹)								
2026	0.46	0.13	0.03	0.99	0.00	2.01	0.13	593.92
2027	1.54	0.64	0.23	7.95	0.06	12.59	0.82	3,252.87
2028	0.32	0.11	0.05	1.79	0.01	3.05	0.25	831.75
2030	0.30	0.11	0.06	2.02	0.01	4.36	0.23	1,072.49
2031	0.10	0.04	0.02	0.70	0.00	1.66	0.08	380.17
Significance Threshold, SJVAPCD	15	15	N/A	10	27	100	10	--
Significant?	No	No	No	No	No	No	No	--
Maximum Daily (pounds per day)								
2026	21.46	8.40	1.68	52.16	0.28	129.51	6.09	--
2027	29.50	15.85	8.30	445.34	16.04	175.98	29.03	--
2028	4.48	1.67	0.93	33.35	0.12	47.52	4.01	--
2030	3.46	1.34	0.79	26.80	0.14	61.86	3.00	--
2031	1.90	0.76	0.44	17.03	0.07	34.08	1.82	--
Screening Threshold, SJVAPCD	100	100	100	100	100	100	100	--
Exceed?	No	No	No	Yes	No	Yes	No	--

Table 6
Construction Emissions Summary (Mitigated)

Mitigated Annual Construction Emissions

Activity/Year	Emissions (tons per year, MT per year for GHG ¹)							
	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂ e
2026 Land-Based Source Emissions	0.46	0.13	0.03	0.99	0.00	2.01	0.13	593.92
2027 Land-Based Source Emissions	1.48	0.58	0.17	5.68	0.03	12.26	0.70	3,080.17
2027 Marine-Based Source Emissions	0.06	0.05	0.05	2.28	0.04	0.33	0.12	172.70
2028 Land-Based Source Emissions	0.32	0.11	0.05	1.79	0.01	3.05	0.25	831.75
2030 Land-Based Source Emissions	0.30	0.11	0.06	2.02	0.01	4.36	0.23	1,072.49
2031 Land-Based Source Emissions	0.10	0.04	0.02	0.70	0.00	1.66	0.08	380.17

Mitigated Daily Construction Emissions

Activity/Year	Emissions (pounds per day)						
	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC
2026 Land-Based Source Emissions	21.46	8.40	1.68	52.16	0.28	129.51	6.09
2027 Land-Based Source Emissions	21.33	8.29	1.56	50.64	0.28	128.76	5.90
2027 Marine-Based Source Emissions	8.16	7.56	6.74	394.70	15.75	47.22	23.13
2028 Land-Based Source Emissions	4.48	1.67	0.93	33.35	0.12	47.52	4.01
2030 Land-Based Source Emissions	3.46	1.34	0.79	26.80	0.14	61.86	3.00
2031 Land-Based Source Emissions	1.90	0.76	0.44	17.03	0.07	34.08	1.82

Table 6

Construction Emissions Summary (Mitigated)

Notes:

1. GHGs listed here are CO₂, CH₄, N₂O, and CO₂e.
2. Mitigation includes Tier 4 engines for equipment above 200 horsepower.

Abbreviations:

--: not applicable

CH₄: methane

CO: carbon monoxide

CO₂: carbon dioxide

CO₂e: carbon dioxide equivalent

DPM: diesel particulate matter

GHG: greenhouse gas

MT: metric ton

NO₂: nitrogen dioxide

NO_x: oxides of nitrogen

PM₁₀: particulate matter less than 10 micrometers in diameter

PM_{2.5}: particulate matter less than 2.5 micrometers in diameter

SO_x: oxides of sulfur

VOC: volatile organic compound

Table 7
Operational Throughput and Activity Summary

Mode	Annual Amount					
	Baseline	Year 1	Year 5	Year 15	Net Change (Year 15 - Baseline)	Units
Employees						
Employees	25	30	39	48	23	Employees
Trucks						
Truck Volume In	0	0	0	0	0	Tons
Truck Volume Out	281,654	426,000	570,500	845,000	563,346	Tons
Trucks	10,833	16,385	21,942	32,500	21,667	Trucks
Rail						
Rail Cars Volume In	0	0	112,500	150,000	150,000	Tons
Rail Cars Volume Out	59,349	195,000	729,000	1,120,000	1,060,651	Tons
Full Rail Cars (Total)	520	1,711	7,466	11,254	10,734	Rail Cars
Full Rail Cars (Inbound)	0	0	1,071	1,429	1,429	Rail Cars
Full Rail Cars (Outbound)	520	1711	6,395	9,825	9,305	Rail Cars
Rail Cars Per Train	10	15	45	45	35	Rail Cars/Train
Trains with Inbound Product	0	0	24	32	32	Trains
Trains with Outbound Product	52	114	142	218	166	Trains
Trains (Total)	52	114	166	250	198	Trains
Vessels						
Vessel Volume In	326,712	743,000	1,309,000	2,202,000	1,875,288	Tons
Vessel Volume Out	0	0	0	0	0	Tons
Vessel Calls	10	18	31	53	43	Vessels
Barges						
Barge Volume In	0	0	0	0	0	Tons
Barge Volume Out	0	0	0	225,000	225,000	Tons
Barge Calls	0	0	0	45	45	Barges
Total Volume in	326,712	743,000	1,421,500	2,352,000	2,025,288	Tons
Total Volume Out	341,003	621,000	1,299,500	2,190,000	1,848,997	Tons

Notes:

1. Throughput information provided by applicant.
2. Current throughput permitted by the SJVAPCD is 18,000 tons per day and 2,628,000 tons per years receiving and 6,000 tons per day and 2,190,000 tons per year shipping out of the terminal.
3. The number of total trains is an overestimate, as there will be efficiencies between inbound and outbound trips.

Table 8
Truck Fugitive Dust Emissions

Road Dust Equation: $E_a = (VMT)[(k)(sL)^{0.91}(W)^{1.02}](Ci)(1 - e)$

Parameter	Inputs PM ₁₀	Inputs PM _{2.5}	Notes
k, lb/VMT	0.0022	0.00054	Default value, AP-42 Table 13.2.1-1
sL (freeway), (g/m ²)	0.015	0.015	
sL (major), (g/m ²)	0.032	0.032	
sL (collector), (g/m ²)	0.032	0.032	
sL (onsite), (g/m ²)	0.6	0.6	AP-42 Table 13.2.1-2 - default for Average Daily Traffic (ADT) <500
sL (local), (g/m ²)	0.32	0.32	
W-full, tons	2.4	2.4	Average weight of vehicles
e	0	0	Assumed no control efficiency (water spray or other controls).

Source:
EPA AP-42 13.2.1 Paved Roads, CARB's Miscellaneous Process Methodology 7.9, Entrained Road Travel, Paved Road Dust. Revised and updated, March 2021

Emission Factor Derivation

Emission Source	(E) Uncontrolled PM ₁₀ Emission Factor (lb/VMT)	(E) Uncontrolled PM _{2.5} Emission Factor (lb/VMT)	Fraction of Travel by Roadway Type in San Joaquin
Onsite Trucks	0.003376	0.00083	Not applicable
Freeway	0.000118	0.00003	0.55
Major	0.000234	0.00006	0.24
Collector	0.000234	0.00006	0.11
Local - Urban	0.001905	0.00047	0.090
Local - Rural			0.020
Composite Factor - Off Site	0.00036	0.000087	--

Source:
CARB's MISCELLANEOUS PROCESS METHODOLOGY 7.9, Entrained Road Travel, Paved Road Dust, Revised and Updated March 2021, Table 2, Table 2. 2017 Roadway Travel Fraction and VMT Estimates for California Entrained Paved Road Dust

Truck Activity and Emissions

Year	Activity					Emissions					
	Annual Truck Trips (1-way)	Distance Traveled (mi/1-way)	Number of Trucks per Day	Total Miles per Year	Total Miles per Day	PM ₁₀ (lb/year)	PM _{2.5} (lb/year)	PM ₁₀ (ton/year)	PM _{2.5} (ton/year)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)
Baseline											
Baseline Transit Shipping On Site	21,666	0.25	83	5,417	21	18.284	4.488	0.009	0.002	0.070	0.017
Baseline Transit and Idling Shipping Off Site	21,666	30	83	649,980	2,500	231.581	56.843	0.116	0.028	0.891	0.219
Year 1											
Year 1 Transit Shipping On Site	32,770	0.25	126	8,193	32	27.655	6.788	0.014	0.003	0.106	0.026
Year 1 Transit and Idling Shipping Off Site	32,770	40	126	1,310,800	5,042	467.024	114.633	0.234	0.057	1.796	0.441

Table 8
Truck Fugitive Dust Emissions

Truck Activity and Emissions

Year	Activity					Emissions					
	Annual Truck Trips (1-way)	Distance Traveled (mi/1-way)	Number of Trucks per Day	Total Miles per Year	Total Miles per Day	PM ₁₀ (lb/year)	PM _{2.5} (lb/year)	PM ₁₀ (ton/year)	PM _{2.5} (ton/year)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)
Year 5											
Year 5 Transit Shipping On Site	43,884	0.25	169	10,971	42	37.034	9.090	0.019	0.005	0.142	0.035
Year 5 Transit and Idling Shipping Off Site	43,884	40	169	1,755,360	6,751	625.416	153.511	0.313	0.077	2.405	0.590
Year 15											
Year 15 Transit Shipping On Site	65,000	0.25	250	16,250	63	54.854	13.464	0.027	0.007	0.211	0.052
Year 15 Transit and Idling Shipping Off Site	65,000	40	250	2,600,000	10,000	926.352	227.377	0.463	0.114	3.563	0.875

Abbreviations:
PM₁₀: particulate matter less than 10 micrometers in diameter
PM_{2.5}: particulate matter less than 2.5 micrometers in diameter
lb:pound
VMT: vehicle miles traveled

Table 9
Truck Emissions

Year	Activity						Annual Non-Idling, Non-Dust Emissions in SJVAPCD (lb/year; MT/year for GHG ¹)											Daily Non-Idling, Non-Dust Emissions in SJVAPCD (lb/day)						
	Annual Truck Trips (1-way)	Distance Traveled (mi/1-way)	Distance Traveled in CA (mi/1- way)	Number of One-way Trips per Day	Total miles per year	Total miles per day	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC
Baseline																								
Baseline Transit Shipping On-Site	21,666	0.25	0.25	83	5,417	21	1.669	0.675	0.221	21.208	0.066	1.260	0.172	9.095	0.002	0.000	9.67	0.006	0.003	0.001	0.082	0.000	0.005	0.001
Baseline Transit and Idling Shipping Off-Site	21,666	30	30	83	649,980	2,500	200.240	81.012	26.513	2544.902	7.903	151.227	20.585	1091.431	0.260	0.000	1160.34	0.770	0.312	0.098	9.788	0.030	0.582	0.079
Year 1																								
Year 1 Transit Shipping On-Site	32,770	0.25	0.25	126	8,193	32	2.479	0.913	0.182	9.683	0.085	1.099	0.173	11.749	0.003	0.000	12.62	0.010	0.004	0.001	0.037	0.000	0.004	0.001
Year 1 Transit and Idling Shipping Off-Site	32,770	40	40	126	1,310,800	5,042	396.591	146.107	29.178	1549.229	13.610	175.860	27.615	1879.908	0.524	0.001	2018.87	1.525	0.562	0.107	5.959	0.052	0.676	0.106
Year 5																								
Year 5 Transit Shipping On-Site	43,884	0.25	0.25	169	10,971	42	3.382	1.242	0.241	10.242	0.110	1.474	0.233	15.254	0.004	0.000	16.42	0.013	0.005	0.001	0.039	0.000	0.006	0.001
Year 5 Transit and Idling Shipping Off-Site	43,884	40	40	169	1,755,360	6,751	541.055	198.791	38.491	1638.729	17.669	235.766	37.256	2440.612	0.702	0.001	2626.70	2.081	0.765	0.142	6.303	0.068	0.907	0.143
Year 15																								
Year 15 Transit Shipping On-Site	65,000	0.25	0.25	250	16,250	63	5.019	1.844	0.356	16.290	0.156	2.200	0.348	21.533	0.006	0.000	23.26	0.019	0.007	0.001	0.063	0.001	0.008	0.001
Year 15 Transit and Idling Shipping Off-Site	65,000	40	40	250	2,600,000	10,000	803.024	294.998	56.983	2606.422	24.942	352.062	55.643	3445.224	1.040	0.001	3720.85	3.089	1.135	0.210	10.025	0.096	1.354	0.214

Non-Idling Emission Rates

Vehicle Classification: EMFAC202Y Categories

Units: g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HOTSOAK and RUNLOSS, g/vehicle/day for IDLEX and DIURN.

Daily truck trips are based on 260 days per year of operation (Reference: email dated Friday, December 12, 2025 from Diwu Zhou, Fehr & Peers, to Anchor.

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	NO _x RUNEX	PM2.5_R UNEX	PM2.5_P MTW	PM2.5_P MBW	PM10_R UNEX	PM10_P MTW	PM10_P MBW	CO2_RU NEX	CH4_RU NEX	N2O_RU NEX	ROG_RU NEX	TOG_RU NEX	NH3_RU NEX	CO_RUN EX	SO _x _RUN EX
San Joaquin Valley Air Pollution Control District	2023	T7 Other Port Class 8	Aggregate	Aggregate	Diesel	1.776004877	0.017702	0.009	0.029834	0.018502	0.036	0.085239	1679.205	0.000667	0.4	0.014366	0.016354	0.22	0.105537	0.005515
San Joaquin Valley Air Pollution Control District	2031	T7 Other Port Class 8	Aggregate	Aggregate	Diesel	0.536108005	0.00966	0.009	0.0319	0.010097	0.036	0.091143	1434.194	0.000444	0.4	0.009556	0.010879	0.22	0.060856	0.00471
San Joaquin Valley Air Pollution Control District	2036	T7 Other Port Class 8	Aggregate	Aggregate	Diesel	0.42346162	0.009516	0.009	0.032853	0.009946	0.036	0.093867	1390.402	0.000447	0.4	0.009627	0.01096	0.22	0.060924	0.004566
San Joaquin Valley Air Pollution Control District	2046	T7 Other Port Class 8	Aggregate	Aggregate	Diesel	0.45472032	0.009511	0.009	0.032954	0.009941	0.036	0.094155	1325.11	0.000451	0.4	0.009708	0.011051	0.22	0.061421	0.004351

Annual Idling Emissions

Year	Annual Truck Trips	Idle Emission Factors for Heavy-Heavy-Duty Trucks (grams/trip)										SJVAPCD (lb/year; MT/year for GHG ¹)										
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline	21,666	0.003	0.003	0.003	4.247	0.008	4.994	0.333	824.450	0.131	0.103	0.143	0.143	0.143	202.856	0.382	238.536	15.906	17.862	0.003	0.002	18.677
Year 1	32,770	0.002	0.002	0.002	3.973	0.006	4.976	0.324	714.982	0.114	0.089	0.144	0.144	0.144	287.026	0.433	359.487	23.407	23.430	0.004	0.003	24.501
Year 5	43,884	0.002	0.002	0.002	3.948	0.006	5.053	0.327	684.961	0.109	0.080	0.193	0.193	0.193	381.953	0.580	488.858	31.636	30.058	0.005	0.004	31.424
Year 15	65,000	0.002	0.001	0.002	4.064	0.006	5.249	0.341	679.096	0.108	0.067	0.287	0.143	0.287	582.363	0.860	752.172	48.865	44.140	0.007	0.004	46.123

Reference: CalEEMod Vehicle EF for each year

Daily Idling Emissions

Year	Daily Truck Trips	Idle Emission Factors for Heavy-Heavy-Duty Trucks (grams/trip)										SJVAPCD (lb/day)										
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline	83	0.0030	0.0030	0.0030	4.2470	0.0080	4.9940	0.3330	824.4500	0.1310	0.1030	0.0006	0.0006	0.0006	0.7802	0.0015	0.9174	0.0612	151.4596	0.0241	0.0189	158.3669
Year 1	126	0.0020	0.0020	0.0020	3.9730	0.0060	4.9760	0.3240	714.9820	0.1140	0.0890	0.0006	0.0006	0.0006	1.1039	0.0017	1.3826	0.0900	131.3492	0.0209	0.0164	137.3569
Year 5	169	0.0020	0.0020	0.0020	3.9480	0.0060	5.0530	0.3270	684.9610	0.1090	0.0800	0.0007	0.0007	0.0007	1.4691	0.0022	1.8802	0.1217	125.8341	0.0200	0.0147	131.5520
Year 15	250	0.0020	0.0010	0.0020	4.0640	0.0060	5.2490	0.3410	679.0960	0.1080	0.0670	0.0011	0.0006	0.0011	2.2399	0.0033	2.8930	0.1879	124.7566	0.0198	0.0123	130.3590

Reference: CalEEMod Vehicle EF for each year

Table 9
Truck Emissions

Total Truck Emissions												
Year	Annual Truck Trips	SJVAPCD (lb/year; MT/year for GHG ¹): Including Dust Generated										
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline	21,666	451.917	143.161	26.877	2,768.966	8.351	391.024	36.662	1,118.388	0.265	0.003	1,188.686
Year 1	32,770	893.893	268.586	29.505	1,845.938	14.128	536.447	51.195	1,915.087	0.531	0.004	2,055.985
Year 5	43,884	1,207.079	362.829	38.925	2,030.925	18.360	726.097	69.125	2,485.924	0.711	0.004	2,674.540
Year 15	65,000	1,789.535	537.826	57.626	3,205.075	25.958	1,106.433	104.856	3,510.897	1.054	0.006	3,790.230

Year	Annual Truck Trips	Total Truck Emissions, SJVAPCD (ton/year; MT/year for GHG ¹): Including Dust Generated										
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline	21,666	0.226	0.072	0.013	1.384	0.004	0.196	0.018	1,118.388	0.265	0.003	1,188.686
Year 1	32,770	0.447	0.134	0.015	0.923	0.007	0.268	0.026	1,915.087	0.531	0.004	2,055.985
Year 5	43,884	0.604	0.181	0.019	1.015	0.009	0.363	0.035	2,485.924	0.711	0.004	2,674.540
Year 15	65,000	0.895	0.269	0.029	1.603	0.013	0.553	0.052	3,510.897	1.054	0.006	3,790.230

Year	Daily Truck Trips	Total Truck Emissions, SJVAPCD (lb/day): Including Dust Generated						
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC
Baseline	83	1.738	0.551	0.099	10.650	0.032	1.504	0.141
Year 1	126	3.438	1.033	0.109	7.100	0.054	2.063	0.197
Year 5	169	4.643	1.395	0.143	7.811	0.071	2.793	0.266
Year 15	250	6.883	2.069	0.212	12.327	0.100	4.256	0.403

Notes:
1. GHGs llisted here are CO₂, CH₄, N₂O, and CO₂e.

Abbreviations:
CH₄: methane
CO: carbon monoxide
CO₂: carbon dioxide
CO₂e: carbon dioxide equivalent
DPM: diesel particulate matter
GHG: greenhouse gas
lb: pound
MT: metric ton
N/A: not applicable
NO₂: nitrogen dioxide
NO_x: oxides of nitrogen
PM₁₀: particulate matter less than 10 micrometers in diameter
PM_{2.5}: particulate matter less than 2.5 micrometers in diameter
SO_x: oxides of sulfur
VOC: volatile organic compound

Table 10
Employee Fugitive Dust Emissions

Road Dust Equation: $E_a = (VMT)[(k)(sL)^{0.91}(W)^{1.02}](Ci)(1 - e)$

Parameter	Inputs PM ₁₀	Inputs PM _{2.5}	Notes
k, lb/VMT	0.0022	0.00054	Default value, AP-42 Table 13.2.1-1
sL (freeway), (g/m ²)	0.015	0.015	
sL (major), (g/m ²)	0.032	0.032	
sL (collector), (g/m ²)	0.032	0.032	
sL (local), (g/m ²)	0.32	0.32	
W-full, tons	2.4	2.4	Average weight of vehicles
e	0	0	Assumed no control efficiency (water spray or other controls).

Source: EPA AP-42 13.2.1 Paved Roads, CARB's Miscellaneous Process Methodology 7.9, Entrained Road Travel, Paved Road Dust. Revised and updated, March 2021

Emission Factor Derivation

Emission Source	(E) Uncontrolled PM ₁₀ Emission Factor (lb/VMT)	(E) Uncontrolled PM _{2.5} Emission Factor (lb/VMT)	Fraction of Travel by Roadway Type in San Joaquin
Freeway	0.000118	0.00003	0.550
Major	0.000234	0.00006	0.240
Collector	0.000234	0.00006	0.110
Local - Urban	0.001905	0.00047	0.090
Local - Rural			0.020
Composite Factor - Off Site	0.0004	0.0001	--

Source: CARB's MISCELLANEOUS PROCESS METHODOLOGY 7.9, Entrained Road Travel, Paved Road Dust, Revised and Updated March 2021, Table 2, Table 2. 2017 Roadway Travel Fraction and VMT Estimates for California Entrained Paved Road Dust

Employee Activity and Emissions

Year	Activity										Emissions					
	Number of Employees	Distance Traveled ¹	Employee Trips ¹ (weekday)	Employee Trips ¹ (Saturday)	Employee Trips ¹ (Sunday)	VMT per weekday	VMT per Saturday	VMT per Sunday	Annual Employee Trips ¹	Annual Miles	PM ₁₀ (lb/year)	PM _{2.5} (lb/year)	PM ₁₀ (ton/year)	PM _{2.5} (ton/year)	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)
Baseline	25	20.0	50	50	50	1,000	1,000	1,000	18,250	365,000	130	32	0.065	0.01596	0.356	0.087
Year 1	30	20.0	60	60	60	1,200	1,200	1,200	21,900	438,000	156	38	0.078	0.01915	0.428	0.105
Year 5	39	20.0	78	78	78	1,560	1,560	1,560	28,470	569,400	203	50	0.101	0.0249	0.556	0.136
Year 15	48	20.0	96	96	96	1,920	1,920	1,920	35,040	700,800	250	61	0.125	0.03064	0.684	0.168

Notes:
1. Distances and trips are one way. Conservatively assume 365 days/year.

Abbreviations:
lb: pound
PM₁₀: particulate matter less than 10 micrometers in diameter
PM_{2.5}: particulate matter less than 2.5 micrometers in diameter
VMT: vehicle miles traveled

Table 11
Employee Travel Emissions

Year	Total Employee Travel Emissions, SJVAPCD (ton/year; MT/year for GHG ¹): Including Dust Generated										
	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline	0.0657	0.0166	0.0007	0.0323	0.0012	0.4610	0.0271	113.7220	0.0028	0.0028	114.5424
Year 1	0.0785	0.0196	0.0005	0.0192	0.0013	0.3566	0.0202	115.3595	0.0023	0.0019	116.0131
Year 5	0.1019	0.0254	0.0005	0.0202	0.0015	0.4099	0.0221	141.4990	0.0026	0.0019	142.2412
Year 15	0.1252	0.0310	0.0004	0.0209	0.0018	0.4617	0.0215	166.1801	0.0030	0.0019	167.0283

Year	Total Employee Travel Emissions, SJVAPCD (lb/day): Including Dust Generated										
	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline	0.3599	0.0908	0.0036	0.1975	0.0100	3.2338	0.1612	744.0113	0.0184	0.0176	749.3860
Year 1	0.4304	0.1076	0.0029	0.1171	0.0074	2.5152	0.1186	754.1669	0.0148	0.0120	758.4249
Year 5	0.5585	0.1389	0.0027	0.1232	0.0091	2.9077	0.1277	924.9772	0.0173	0.0125	929.9117
Year 15	0.6864	0.1700	0.0023	0.1275	0.0097	3.2979	0.1218	1,086.4302	0.0196	0.0122	1,091.9658

- Notes:
- GHGs llisted here are CO₂, CH₄, N₂O, and CO₂e.
 - For PM and PM 2.5, emissions include exhaust emissions from CalEEMod and the dust emissions calculated in the fugitive dust table.

Abbreviations:

CH₄: methane

CO: carbon monoxide

CO₂ : carbon dioxide

CO₂e: carbon dioxide equivalent

DPM: diesel particulate matter

GHG: greenhouse gas

lb: pound

MT: metric ton

N₂O: oxides of nitrogen

NO_x: oxides of nitrogren

PM₁₀: particulate matter less than 10 micrometers in diameter

PM_{2.5}: particulate matter less than 2.5 micrometers in diameter

SJVAPCD: San Joaquin Valley Air Pollution Control District

SO_x: oxides of sulfur

VOC: volatile organic compound

Table 12
Line-Haul Emission Factors

Line-Haul Emission Factors and Tier Distribution

U.S. EPA Emission Factors (g/gal)						Tier Distribution			
Tier	PM ₁₀	PM _{2.5}	VOC	NO _x	CO	Baseline	Year 1	Year 5	Year 15
Pre-Tier	6.66	6.46	10.51	270.4	26.62	0%	0%	0%	0%
Tier 0	6.66	6.46	10.51	178.88	26.62	4%	0%	0%	0%
Tier 0+	4.16	4.04	6.57	149.76	26.62	5%	1%	0%	0%
Tier 1	6.66	6.46	10.29	139.36	26.62	0%	0%	0%	0%
Tier 1+	4.16	4.04	6.35	139.36	26.62	29%	27%	15%	1%
Tier 2	3.74	3.63	5.69	102.96	26.62	4%	1%	0%	0%
Tier 2+	1.66	1.61	2.85	102.96	26.62	32%	39%	35%	10%
Tier 3	1.66	1.61	2.85	102.96	26.62	20%	22%	20%	11%
Tier 4	0.31	0.30	0.88	20.8	26.62	7%	10%	30%	78%

Source:

Emissions factors from EPA's 2020 National Emissions Inventory Locomotive Methodology, Table 5. Annual tier distribution from CARB's 2021 Line-haul Locomotive Emission Inventory.

Adjusted Line-Haul Emission Factors (g/gal)

Year	PM ₁₀	PM _{2.5}	VOC	NO _x	CO	CO ₂	N ₂ O	CH ₄
Baseline	2.69	2.61	4.32	113.30	26.62	10,210	0.26	0.80
Year 1	2.26	2.20	3.69	105.55	26.62	10,210	0.26	0.80
Year 5	1.64	1.59	2.79	83.70	26.62	10,210	0.26	0.80
Year 15	0.63	0.61	1.34	38.84	26.62	10,210	0.26	0.80

Sources:

CO₂, CH₄, and N₂O emission factors are from EPA's 2025 GHG Emission Factors Hub. (Table 2, Mobile Combustion CO₂ and Table 5, Mobile Combustion CH₄ and N₂O for Non-Road Vehicles)

SO_x Emission Factor is from EPA's 2020 National Emissions Inventory Locomotive Methodology:

$$SO_x = 0.094 \text{ g/gal}$$

Notes:

g/gal: gram per gallon

GHG: greenhouse gas

CH₄: methane

CO: carbon monoxide

CO₂: carbon dioxide

N₂O: oxides of nitrogen

NO_x: oxides of nitrogen

PM₁₀: particulate matter less than 10 micrometers in diameter

PM_{2.5}: particulate matter less than 2.5 micrometers in diameter

VOC: volatile organic compound

Table 13
Line-Haul Operations and Fuel Consumption

Category	Parameter	Value	Units	Reference
Baseline				
Throughput	Product Volume to be Transported	59,349	tons/year	Draft Environmental Impact Report - Project Description
	Rail cars per year	520	rail cars/year	Draft Environmental Impact Report - Project Description
	Rail cars per train	10	rail cars/train	Draft Environmental Impact Report - Project Description
Fuel Consumption Index	Net Aggregated Fuel Consumption Index (Gross Weight - Locomotive Weight) (Line Hauling)	1,004	ton-miles/gallon	CARB Truck vs. Train Methodology, 2020, calculated from the 2019 Union Pacific and BNSF R-1 report values.
Locomotives	Number of locomotives per train	4	locomotives/train	CARB Truck vs. Train Methodology, 2020, Equation 6: Total weight of empty railcars on all trains
	Weight of locomotive	210	tons/locomotive	CARB Truck vs. Train Methodology, 2020, Equation 6: Total weight of empty railcars on all trains
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	1,001	gallons/year (1-way trip)	Calculated
Empty Rail Cars	Weight of empty tank car	26	tons/car	CARB Truck vs. Train Methodology, 2020, Equation 5: Total weight of empty railcars on all trains
	Weight of empty tank cars per year	13,520	tons/year	Calculated
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	310	gallons/year (1-way trip)	Calculated
Product Transported	Weight of product transported in year	59,349	tons/year	Draft Environmental Impact Report - Project Description
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	1,360	gallons/year (1-way trip)	Calculated
Year 1				
Throughput	Product Volume to be Transported	195,000	tons/year	Draft Environmental Impact Report - Project Description
	Rail cars per year	1,711	rail cars/year	Draft Environmental Impact Report - Project Description
	Rail cars per train	15	rail cars/train	Draft Environmental Impact Report - Project Description
Fuel Consumption Index	Net Aggregated Fuel Consumption Index (Gross Weight - Locomotive Weight) (Line Hauling)	1,004	ton-miles/gallon	CARB Truck vs. Train Methodology, 2020, calculated from the 2019 Union Pacific and BNSF R-1 report values.
Locomotives	Number of locomotives per train	4	locomotives/train	CARB Truck vs. Train Methodology, 2020, Equation 6: Total weight of empty railcars on all trains
	Weight of locomotive	210	tons/locomotive	CARB Truck vs. Train Methodology, 2020, Equation 6: Total weight of empty railcars on all trains
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	2,195	gallons/year (1-way trip)	Calculated
Empty Rail Cars	Weight of empty tank car	26	tons/car	CARB Truck vs. Train Methodology, 2020, Equation 5: Total weight of empty railcars on all trains
	Weight of empty tank cars per year	44,486	tons/year	Calculated
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	1,019	gallons/year (1-way trip)	Calculated
Product Transported	Weight of product transported in year	195,000	tons/year	Draft Environmental Impact Report - Project Description
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	4,467	gallons/year (1-way trip)	Calculated

Table 13
Line-Haul Operations and Fuel Consumption

Category	Parameter	Value	Units	Reference
Year 5 - Incoming				
Throughput	Volume of Materials Arriving	112,500	tons/year	Draft Environmental Impact Report - Project Description
	Number of full rail cars entering the facility	1,071	rail cars/year	Calculated
	Rail cars per train	45	rail cars/train	Draft Environmental Impact Report - Project Description
Fuel Consumption Index	Net Aggregated Fuel Consumption Index (Gross Weight - Locomotive Weight) (Line Hauling)	1,004	ton-miles/gallon	CARB Truck vs. Train Methodology, 2020, calculated from the 2019 Union Pacific and BNSF R-1 report values.
Locomotives	Number of locomotives per train	4	locomotives/train	CARB Truck vs. Train Methodology, 2020, Equation 6: Total weight of empty railcars on all trains
	Weight of locomotive	210	tons/locomotive	CARB Truck vs. Train Methodology, 2020, Equation 6: Total weight of empty railcars on all trains
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	458	gallons/year (1-way trip)	Calculated
Empty Rail Cars	Weight of empty tank car	26	tons/car	CARB Truck vs. Train Methodology, 2020, Equation 5: Total weight of empty railcars on all trains
	Weight of empty tank cars per year	27,857	tons/year	Calculated
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	638	gallons/year (1-way trip)	Calculated
Product Transported	Weight of product transported in year	112,500	tons/year	Draft Environmental Impact Report - Project Description
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	2,577	gallons/year (1-way trip)	Calculated
Year 5 - Outgoing				
Throughput	Product Volume to be Transported (volume out)	729,000	tons/year	Draft Environmental Impact Report - Project Description
	Full Railcars Out per year	6,395	rail cars/year	Calculated
	Rail cars per train	45	rail cars/train	Draft Environmental Impact Report - Project Description
Fuel Consumption Index	Net Aggregated Fuel Consumption Index (Gross Weight - Locomotive Weight) (Line Hauling)	1,004	ton-miles/gallon	CARB Truck vs. Train Methodology, 2020, calculated from the 2019 Union Pacific and BNSF R-1 report values.
Locomotives	Number of locomotives per train	4	locomotives/train	CARB Truck vs. Train Methodology, 2020, Equation 6: Total weight of empty railcars on all trains
	Weight of locomotive	210	tons/locomotive	CARB Truck vs. Train Methodology, 2020, Equation 6: Total weight of empty railcars on all trains
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	2,735	gallons/year (1-way trip)	Calculated
Empty Rail Cars	Weight of empty tank car	26	tons/car	CARB Truck vs. Train Methodology, 2020, Equation 5: Total weight of empty railcars on all trains
	Weight of empty tank cars entering the facility per year	138,406	tons/year	Calculated
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	3,171	gallons/year (1-way trip)	Calculated
Product Transported	Weight of product transported in year	729,000	tons/year	Draft Environmental Impact Report - Project Description
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	16,700	gallons/year (1-way trip)	Calculated

Table 13
Line-Haul Operations and Fuel Consumption

Category	Parameter	Value	Units	Reference
Year 15 - Incoming				
Throughput	Volume of Materials Arriving	150,000	tons/year	Draft Environmental Impact Report - Project Description
	Number of full rail cars entering the facility	1,429	rail cars/year	Calculated
	Rail cars per train	45	rail cars/train	Draft Environmental Impact Report - Project Description
Fuel Consumption Index	Net Aggregated Fuel Consumption Index (Gross Weight - Locomotive Weight) (Line Hauling)	1,004	ton-miles/gal	CARB Truck vs. Train Methodology, 2020, calculated from the 2019 Union Pacific and BNSF R-1 report values.
Locomotives	Number of locomotives per train	4	locomotives/train	CARB Truck vs. Train Methodology, 2020, Equation 6: Total weight of empty railcars on all trains
	Weight of locomotive	210	tons/locomotive	CARB Truck vs. Train Methodology, 2020, Equation 6: Total weight of empty railcars on all trains
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	611	gallons/year (1-way trip)	Calculated
Empty Rail Cars	Weight of empty tank car	26	tons/car	CARB Truck vs. Train Methodology, 2020, Equation 5: Total weight of empty railcars on all trains
	Weight of empty tank cars per year	37,143	tons/year	Calculated
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	851	gallons/year (1-way trip)	Calculated
Product Transported	Weight of product transported in year	150,000	tons/year	Draft Environmental Impact Report - Project Description
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	3,436	gallons/year (1-way trip)	Calculated
Year 15 - Outgoing				
Throughput	Product Volume to be Transported (volume out)	1,120,000	tons/year	Draft Environmental Impact Report - Project Description
	Rail cars per year	9,825	rail cars/year	Calculated
	Rail cars per train	45	rail cars/train	Draft Environmental Impact Report - Project Description
Fuel Consumption Index	Net Aggregated Fuel Consumption Index (Gross Weight - Locomotive Weight) (Line Hauling)	1,004	ton-miles/gallon	CARB Truck vs. Train Methodology, 2020, calculated from the 2019 Union Pacific and BNSF R-1 report values.
Locomotives	Number of locomotives per train	4	locomotives/train	CARB Truck vs. Train Methodology, 2020, Equation 6: Total weight of empty railcars on all trains
	Weight of locomotive	210	tons/locomotive	CARB Truck vs. Train Methodology, 2020, Equation 6: Total weight of empty railcars on all trains
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	4,201	gallons/year (1-way trip)	Calculated
Empty Rail Cars	Weight of empty tank car	26	tons/car	CARB Truck vs. Train Methodology, 2020, Equation 5: Total weight of empty railcars on all trains
	Weight of empty tank cars entering the facility per year	218,296	tons/year	Calculated
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	5,001	gallons/year (1-way trip)	Calculated
Product Transported	Weight of product transported in year	1,120,000	tons/year	Draft Environmental Impact Report - Project Description
	Miles traveled	23	miles/1-way	Google Earth
	Fuel consumption	25,657	gallons/year (1-way trip)	Calculated

Note:
CARB Truck vs. Train Methodology, 2020, https://ww2.arb.ca.gov/sites/default/files/2024-02/Truck%20vs%20Train%20Methodology%209-23-2020_0.pdf

Table 14
Line-Haul Emissions

Pollutant	Line-Haul Locomotive Emission Factor (g/gal)	Empty Train Arriving				Filled Train Arriving				Filled Train Leaving				SJVAPCD		Sacramento Metro		California	
		Daily Fuel Usage (gal/day)	Annual Fuel Usage (gal/year)	Daily Emissions (lb/day)	Annual Emissions (ton/year; MT/year for GHG ¹)	Daily Fuel Usage (gal/day)	Annual Fuel Usage (gal/year)	Daily Emissions (lb/day)	Annual Emissions (ton/year; MT/year for GHG ¹)	Daily Fuel Usage (gal/day)	Annual Fuel Usage (gal/year)	Daily Emissions (lb/day)	Annual Emissions (ton/year; MT/year for GHG ¹)	Total Line-Haul Emissions (lb/day)	Total Annual Line-Haul Emissions (ton/year)	Total Line-Haul Emissions (lb/day)	Total Annual Line-Haul Emissions (ton/year)	Total Line-Haul Emissions (lb/day)	Total Annual Line-Haul Emissions (ton/year)
Baseline																			
NO _x	113.30	25.20	1,310.36	6.29	0.16	0.00	0.00	0.00	0.00	51.35	2,669.95	12.82	0.33	19.12	0.50	33.25	0.86	--	--
PM ₁₀	2.69	25.20	1,310.36	0.15	0.00	0.00	0.00	0.00	0.00	51.35	2,669.95	0.30	0.01	0.45	0.01	0.79	0.02	--	--
PM _{2.5}	2.61	25.20	1,310.36	0.14	0.00	0.00	0.00	0.00	0.00	51.35	2,669.95	0.30	0.01	0.44	0.01	0.77	0.02	--	--
VOC	4.32	25.20	1,310.36	0.24	0.01	0.00	0.00	0.00	0.00	51.35	2,669.95	0.49	0.01	0.73	0.02	1.27	0.03	--	--
CO	26.62	25.20	1,310.36	1.48	0.04	0.00	0.00	0.00	0.00	51.35	2,669.95	3.01	0.08	4.49	0.12	7.81	0.20	--	--
SO _x	0.09	25.20	1,310.36	0.01	0.00	0.00	0.00	0.00	0.00	51.35	2,669.95	0.01	0.00	0.02	0.00	0.03	0.00	--	--
CO ₂	10,210.00	25.20	1,310.36	567.20	13.38	0.00	0.00	0.00	0.00	51.35	2,669.95	1,155.72	27.26	1,722.92	40.64	2,996.39	70.68	9,213.89	217.33
CH ₄	0.80	25.20	1,310.36	0.04	0.00	0.00	0.00	0.00	0.00	51.35	2,669.95	0.09	0.00	0.13	0.00	0.23	0.01	0.72	0.02
N ₂ O	0.26	25.20	1,310.36	0.01	0.00	0.00	0.00	0.00	0.00	51.35	2,669.95	0.03	0.00	0.04	0.00	0.08	0.00	0.23	0.01
CO ₂ e	--	--	--	--	13.50	--	--	--	0.00	--	--	--	27.50	--	41.00	--	71.31	--	219.27
Year 1																			
NO _x	105.55	28.18	3,214.09	6.56	0.37	0.00	0.00	0.00	0.00	67.34	7,681.22	15.67	0.89	22.23	1.27	38.66	2.20	--	--
PM ₁₀	2.26	28.18	3,214.09	0.14	0.01	0.00	0.00	0.00	0.00	67.34	7,681.22	0.34	0.02	0.48	0.03	0.83	0.05	--	--
PM _{2.5}	2.20	28.18	3,214.09	0.14	0.01	0.00	0.00	0.00	0.00	67.34	7,681.22	0.33	0.02	0.46	0.03	0.81	0.05	--	--
VOC	3.69	28.18	3,214.09	0.23	0.01	0.00	0.00	0.00	0.00	67.34	7,681.22	0.55	0.03	0.78	0.04	1.35	0.08	--	--
CO	26.62	28.18	3,214.09	1.65	0.09	0.00	0.00	0.00	0.00	67.34	7,681.22	3.95	0.23	5.61	0.32	9.75	0.56	--	--
SO _x	0.09	28.18	3,214.09	0.01	0.00	0.00	0.00	0.00	0.00	67.34	7,681.22	0.01	0.00	0.02	0.00	0.03	0.00	--	--
CO ₂	10,210.00	28.18	3,214.09	634.24	32.82	0.00	0.00	0.00	0.00	67.34	7,681.22	1,515.74	78.42	2,149.98	111.24	3,739.09	193.46	11,497.70	594.89
CH ₄	0.80	28.18	3,214.09	0.05	0.00	0.00	0.00	0.00	0.00	67.34	7,681.22	0.12	0.01	0.17	0.01	0.29	0.02	0.90	0.05
N ₂ O	0.26	28.18	3,214.09	0.02	0.00	0.00	0.00	0.00	0.00	67.34	7,681.22	0.04	0.00	0.05	0.00	0.10	0.00	0.29	0.02
CO ₂ e	--	--	--	--	33.11	--	--	--	0.00	--	--	--	79.13	--	112.23	--	195.19	--	600.21
Year 5																			
NO _x	83.70	35.59	5,905.19	6.57	0.54	154.35	3,673.52	28.48	0.34	61.93	22,605.39	11.43	2.09	46.48	2.97	80.83	5.16	--	--
PM ₁₀	1.64	35.59	5,905.19	0.13	0.01	154.35	3,673.52	0.56	0.01	61.93	22,605.39	0.22	0.04	0.91	0.06	1.58	0.10	--	--
PM _{2.5}	2.20	35.59	5,905.19	0.17	0.01	154.35	3,673.52	0.75	0.01	61.93	22,605.39	0.30	0.05	1.22	0.08	2.12	0.14	--	--
VOC	2.79	35.59	5,905.19	0.22	0.02	154.35	3,673.52	0.95	0.01	61.93	22,605.39	0.38	0.07	1.55	0.10	2.69	0.17	--	--
CO	26.62	35.59	5,905.19	2.09	0.17	154.35	3,673.52	9.06	0.11	61.93	22,605.39	3.63	0.66	14.78	0.94	25.71	1.64	--	--
SO _x	0.09	35.59	5,905.19	0.01	0.00	154.35	3,673.52	0.03	0.00	61.93	22,605.39	0.01	0.00	0.05	0.00	0.09	0.01	--	--
CO ₂	10,210.00	35.59	5,905.19	801.15	60.29	154.35	3,673.52	3,474.23	37.51	61.93	22,605.39	1,394.03	230.80	5,669.40	328.59	9,859.83	571.47	30,318.97	1,757.27
CH ₄	0.80	35.59	5,905.19	0.06	0.00	154.35	3,673.52	0.27	0.00	61.93	22,605.39	0.11	0.02	0.44	0.03	0.77	0.05	2.38	0.14
N ₂ O	0.26	35.59	5,905.19	0.02	0.00	154.35	3,673.52	0.09	0.00	61.93	22,605.39	0.04	0.01	0.14	0.01	0.25	0.01	0.77	0.05
CO ₂ e	--	--	--	--	60.83	--	--	--	37.88	--	--	--	232.86	--	293.69	--	576.64	--	1,773.16
Year 15																			
NO _x	38.84	36.79	9,202.01	3.15	0.39	154.24	4,898.03	13.21	0.21	139.39	34,859.38	11.94	1.49	28.29	2.10	49.21	3.65	--	--
PM ₁₀	0.63	36.79	9,202.01	0.05	0.01	154.24	4,898.03	0.21	0.00	139.39	34,859.38	0.19	0.02	0.46	0.03	0.79	0.06	--	--
PM _{2.5}	0.61	36.79	9,202.01	0.05	0.01	154.24	4,898.03	0.21	0.00	139.39	34,859.38	0.19	0.02	0.44	0.03	0.77	0.06	--	--
VOC	1.34	36.79	9,202.01	0.11	0.01	154.24	4,898.03	0.45	0.01	139.39	34,859.38	0.41	0.05	0.97	0.07	1.69	0.13	--	--

Table 14
Line-Haul Emissions

Pollutant	Line-Haul Locomotive Emission Factor (g/gal)	Empty Train Arriving				Filled Train Arriving				Filled Train Leaving				SJVAPCD		Sacramento Metro		California	
		Daily Fuel Usage (gal/day)	Annual Fuel Usage (gal/year)	Daily Emissions (lb/day)	Annual Emissions (ton/year; MT/year for GHG ¹)	Daily Fuel Usage (gal/day)	Annual Fuel Usage (gal/year)	Daily Emissions (lb/day)	Annual Emissions (ton/year; MT/year for GHG ¹)	Daily Fuel Usage (gal/day)	Annual Fuel Usage (gal/year)	Daily Emissions (lb/day)	Annual Emissions (ton/year; MT/year for GHG ¹)	Total Line-Haul Emissions (lb/day)	Total Annual Line-Haul Emissions (ton/year)	Total Line-Haul Emissions (lb/day)	Total Annual Line-Haul Emissions (ton/year)	Total Line-Haul Emissions (lb/day)	Total Annual Line-Haul Emissions (ton/year)
CO	26.62	36.79	9,202.01	2.16	0.27	154.24	4,898.03	9.05	0.14	139.39	34,859.38	8.18	1.02	19.39	1.44	33.72	2.50	--	--
SO _x	0.09	36.79	9,202.01	0.01	0.00	154.24	4,898.03	0.03	0.00	139.39	34,859.38	0.03	0.00	0.07	0.01	0.12	0.01	--	--
CO ₂	10,210.00	36.79	9,202.01	828.21	93.95	154.24	4,898.03	3,471.80	50.01	139.39	34,859.38	3,137.46	355.91	7,437.46	499.87	12,934.72	869.34	39,774.26	2,673.21
CH ₄	0.80	36.79	9,202.01	0.06	0.01	154.24	4,898.03	0.27	0.00	139.39	34,859.38	0.25	0.03	0.58	0.04	1.01	0.07	3.12	0.21
N ₂ O	0.26	36.79	9,202.01	0.02	0.00	154.24	4,898.03	0.09	0.00	139.39	34,859.38	0.08	0.01	0.19	0.01	0.33	0.02	1.01	0.07
CO ₂ e	--	--	--	--	94.79	--	--	--	50.50	--	--	--	359.09	--	453.88	--	877.19	--	2,697.35

Notes:
1. GHGs llisted here are CO2, CH4, N2O, and CO2e.

Abbreviations:
--: not applicable
CH₄: methane
CO: carbon monoxide
CO₂: carbon dioxide
CO₂e: carbon dioxide equivalent
gal: gallon
GHG: greenhouse gas
lb: pound
MT: metric ton
N₂O: nitrous oxide
NO_x: oxides of nitrogen
PM10: particulate matter less than 10 micrometers in diameter
PM2.5: particulate matter less than 2.5 micrometers in diameter
SJVAPCD: San Joaquin Valley Air Pollution Control District
SO_x: oxides of sulfur
VOC: volatile organic compound

Table 15
Switcher Emission Factors

Tier	Tier Distribution	Switcher Emission Factors (g/bhp-hr)						Switcher Emission Factors (g/gal)					
		PM ₁₀	PM _{2.5}	HC	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	HC	VOC	NO _x	CO
Pre-Tier	0%	0.44	0.4048	1.01	1.2221	17.40	1.83	6.69	6.15	15.35	18.58	264.48	27.82
Tier 0	67%	0.44	0.4048	1.01	1.2221	12.60	1.83	6.69	6.15	15.35	18.58	191.52	27.82
Tier 0+	0%	0.23	0.2116	0.57	0.6897	10.60	1.83	3.50	3.22	8.66	10.48	161.12	27.82
Tier 1	0%	0.43	0.3956	1.01	1.2221	9.90	1.83	6.54	6.01	15.35	18.58	150.48	27.82
Tier 1+	0%	0.23	0.2116	0.57	0.6897	9.90	1.83	3.50	3.22	8.66	10.48	150.48	27.82
Tier 2	0%	0.19	0.1748	0.51	0.6171	7.30	1.83	2.89	2.66	7.75	9.38	110.96	27.82
Tier 2+	0%	0.11	0.1012	0.26	0.3146	7.30	1.83	1.67	1.54	3.95	4.78	110.96	27.82
Tier 3	0%	0.08	0.0736	0.26	0.3146	4.50	1.83	1.22	1.12	3.95	4.78	68.40	27.82
Tier 4	33%	0.015	0.0138	0.08	0.0968	1.00	1.83	0.23	0.21	1.22	1.47	15.20	27.82
Fleet Average								4.53	4.17	10.64	12.87	132.75	27.82

Notes:

CO: carbon monoxide

g/bhp-hr: gram per brake horse-power hour

g/gal: gram per gallon

HC: hydrocarbons

NO_x: oxides of nitrogen

PM₁₀: particulate matter less than 10 micrometers in diameter

PM_{2.5}: particulate matter less than 2.5 micrometers in diameter

VOC: volatile organic compound

Emission factors are from CARB's 2022 Class I Switcher Rail Yard Emission Inventory, Table 2: Switcher Emission Factors (g/bhp-hr). A fleet average emission factor was calculated using the switcher fleet at the Port of Stockton.

According to the Port of Stockton DRAFT Inventory of Air Emissions for CY 2022, nine switching locomotives were operated within the Port in 2022. Six were Tier 0 SW 1500s and three were Tier 4 locomotives.

Conversion Factor 15.2 bhp-hr/gal

SO_x Emission Factor 0.006 g SO₂/bhp Reference: Port of Stockton DRAFT Inventory of Air Emissions for 2022

0.0912 g SO₂/gal

Table 16
Switcher Operations and Fuel Consumption

Parameter	Value	Units	Reference
Locomotives required per switch at the Terminal	1	per train	
Switching events at the Terminal	1	per train	Assumes one switching event on property and one elsewhere within the Port.
Switching time at the Terminal	1	hours per train	
Locomotives required per switch at the Port staging yard	2	per train	
Switching events at the Port staging yard	1	per train	Assumes one switching event on property and one elsewhere within the Port.
Switching time at the Port staging yard	2	hours per train	Assumed.
Fuel used per hour per locomotive	12	gal/hr/locomotive	
Fuel used	60	gallons per train	Calculated
Baseline			
Rail cars per year	520	rail cars per year	Draft Environmental Impact Report
Rail cars per train	10	rail cars per train	Draft Environmental Impact Report
Manifest trains per year	52	trains per year	Calculated
Year 1			
Rail cars per year	1,711	rail cars per year	Draft Environmental Impact Report
Rail cars per train	15	rail cars per train	Draft Environmental Impact Report
Manifest trains per year	114	trains per year	Calculated
Year 5			
Rail cars per year	7,466	rail cars per year	Draft Environmental Impact Report
Rail cars per train	45	rail cars per train	Draft Environmental Impact Report
Manifest trains per year	166	trains per year	Calculated
Year 15			
Rail cars per year	11,254	rail cars per year	Draft Environmental Impact Report
Rail cars per train	45	rail cars per train	Draft Environmental Impact Report
Manifest trains per year	250	trains per year	Calculated

Notes:

1. Proposed project emissions do not include any efficiency improvements related to switching events on property.
2. Rail cars in years 5 and 15 include both full rail cars to the Terminal and from the Terminal.

Abbreviations:

gal: gallons

hr: hour

Table 17
Switching Emissions

Pollutant	Switching Emission Factor (g/gal)	Daily Fuel Usage (gal/day)	Annual Fuel Usage (gal/year)	Daily Emissions (lb/day)	Annual Emissions (ton/year; MT/year for GHG ¹)
Baseline					
NO _x	132.75	60.00	3,120.00	17.56	0.46
PM ₁₀	4.53	60.00	3,120.00	0.60	0.02
PM _{2.5}	4.17	60.00	3,120.00	0.55	0.01
VOC	12.87	60.00	3,120.00	1.70	0.04
CO	27.82	60.00	3,120.00	3.68	0.10
SO _x	0.09	60.00	3,120.00	0.01	0.00
CO ₂	10,210.00	60.00	3,120.00	1,350.53	31.85
CH ₄	0.80	60.00	3,120.00	0.11	0.00
N ₂ O	0.26	60.00	3,120.00	0.03	0.00
CO ₂ e	--	--	--	--	32.14
Year 1					
NO _x	132.75	114.07	6,844.00	33.38	1.00
PM ₁₀	4.53	114.07	6,844.00	1.14	0.03
PM _{2.5}	4.17	114.07	6,844.00	1.05	0.03
VOC	12.87	114.07	6,844.00	3.24	0.10
CO	27.82	114.07	6,844.00	6.99	0.21
SO _x	0.09	114.07	6,844.00	0.02	0.00
CO ₂	10,210.00	114.07	6,844.00	2,567.51	69.88
CH ₄	0.80	114.07	6,844.00	0.20	0.01
N ₂ O	0.26	114.07	6,844.00	0.07	0.00
CO ₂ e	--	--	--	--	70.50
Year 5					
NO _x	132.75	165.91	9,954.67	48.55	1.46
PM ₁₀	4.53	165.91	9,954.67	1.66	0.05
PM _{2.5}	4.17	165.91	9,954.67	1.53	0.05
VOC	12.87	165.91	9,954.67	4.71	0.14
CO	27.82	165.91	9,954.67	10.17	0.31
SO _x	0.09	165.91	9,954.67	0.03	0.00
CO ₂	10,210.00	165.91	9,954.67	3,734.46	101.64
CH ₄	0.80	165.91	9,954.67	0.29	0.01
N ₂ O	0.26	165.91	9,954.67	0.10	0.00
CO ₂ e	--	--	--	--	102.54

Table 17
Switching Emissions

Pollutant	Switching Emission Factor (g/gal)	Daily Fuel Usage (gal/day)	Annual Fuel Usage (gal/year)	Daily Emissions (lb/day)	Annual Emissions (ton/year; MT/year for GHG ¹)
Year 15					
NO _x	132.75	250.09	15,005.33	73.19	2.20
PM ₁₀	4.53	250.09	15,005.33	2.50	0.08
PM _{2.5}	4.17	250.09	15,005.33	2.30	0.07
VOC	12.87	250.09	15,005.33	7.10	0.21
CO	27.82	250.09	15,005.33	15.34	0.46
SO _x	0.09	250.09	15,005.33	0.05	0.00
CO ₂	10,210.00	250.09	15,005.33	5,629.21	153.20
CH ₄	0.80	250.09	15,005.33	0.44	0.01
N ₂ O	0.26	250.09	15,005.33	0.14	0.00
CO ₂ e	--	--	--	--	154.57

Notes:

1. GHGs listed here are CO₂, CH₄, N₂O, and CO₂e.

Abbreviations:

--: not applicable

CH₄: methane

CO: carbon monoxide

CO₂: carbon dioxide

CO₂e: carbon dioxide equivalent

g: gram

gal: gallon

GHG: greenhouse gas

lb: pound

MT: metric ton

N₂O: nitrous oxide

NO_x: oxides of nitrogen

PM₁₀: particulate matter less than 10 micrometers in diameter

PM_{2.5}: particulate matter less than 2.5 micrometers in diameter

SO_x: oxides of sulfur

VOC: volatile organic compound

Table 18
Total Rail Emissions

Parameter	Average Day Emissions lb/day)						Annual Emissions (tons/year)									
	PM ₁₀	PM _{2.5}	VOC	NO _x	SO _x	CO	PM ₁₀	PM _{2.5}	VOC	NO _x	SO _x	CO	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline																
Switching																
Switching on Site	0.12	0.11	0.34	3.51	0.00	0.74	0.00	0.00	0.01	0.09	0.00	0.02	6.37	0.00	0.00	6.43
Switching in SJVAPCD	0.60	0.55	1.70	17.56	0.01	3.68	0.02	0.01	0.04	0.46	0.00	0.10	31.85	0.00	0.00	32.14
Line Haul																
In SJVAPCD	0.45	0.44	0.73	19.12	0.02	4.49	0.01	0.01	0.02	0.50	0.00	0.12	40.64	0.00	0.00	41.51
In Sacramento Metro	0.79	0.77	1.27	33.25	0.03	7.81	0.02	0.02	0.03	0.86	0.00	0.20	70.68	0.00	0.01	71.31
In California													217.33	0.23	0.02	279.98
Total																
In SJVAPCD	1.05	0.99	2.43	36.68	0.03	8.17	0.03	0.03	0.06	0.95	0.00	0.21	72.49	0.00	0.00	73.65
In Sacramento Metro	0.79	0.77	1.27	33.25	0.03	7.81	0.02	0.02	0.03	0.86	0.00	0.20	70.68	0.00	0.01	71.31
In California													360.49	0.24	0.03	424.94
Year 1																
Switching																
Switching on Site	0.23	0.21	0.65	6.68	0.00	1.40	0.01	0.01	0.02	0.20	0.00	0.04	13.98	0.00	0.00	14.10
Switching in SJVAPCD	1.14	1.05	3.24	33.38	0.02	6.99	0.03	0.03	0.10	1.00	0.00	0.21	69.88	0.00	0.01	70.50
Line Haul																
In SJVAPCD	0.48	0.46	0.78	22.23	0.02	5.61	0.03	0.03	0.04	1.27	0.00	0.32	111.24	0.01	0.00	113.63
In Sacramento Metro	0.83	0.81	1.35	38.66	0.03	9.75	0.05	0.05	0.08	2.20	0.00	0.56	193.46	0.02	0.02	197.90
In California													594.89	0.29	0.05	673.78
Total																
In SJVAPCD	1.62	1.51	4.01	55.61	0.04	12.60	0.06	0.06	0.14	2.27	0.00	0.53	181.12	0.01	0.01	184.13
In Sacramento Metro	0.83	0.81	1.35	38.66	0.03	9.75	0.05	0.05	0.08	2.20	0.00	0.56	193.46	0.02	0.02	197.90
In California													969.46	0.32	0.07	1,055.81
Year 5																
Switching																
Switching on Site	0.33	0.31	0.94	9.71	0.01	2.03	0.01	0.01	0.03	0.29	0.00	0.06	20.33	0.00	0.00	20.51
Switching in SJVAPCD	1.66	1.53	4.71	48.55	0.03	10.17	0.05	0.05	0.14	1.46	0.00	0.31	101.64	0.00	0.01	102.54
Line Haul																
In SJVAPCD	0.91	1.22	1.55	46.48	0.05	14.78	0.06	0.08	0.10	2.97	0.00	0.94	328.59	0.03	0.01	335.73
In Sacramento Metro	1.58	2.12	2.69	80.83	0.09	25.71	0.10	0.14	0.17	5.16	0.01	1.64	571.47	0.05	0.01	583.89
In California													1,757.27	0.77	0.14	1,965.77
Total																
In SJVAPCD	2.57	2.75	6.26	95.03	0.09	24.96	0.11	0.12	0.24	4.43	0.00	1.25	430.23	0.03	0.02	438.28
In Sacramento Metro	1.58	2.12	2.69	80.83	0.09	25.71	0.10	0.14	0.17	5.16	0.01	1.64	571.47	0.05	0.01	583.89
In California													2,758.97	0.85	0.17	2,987.93

Table 18
Total Rail Emissions

Parameter	Average Day Emissions lb/day)						Annual Emissions (tons/year)									
	PM ₁₀	PM _{2.5}	VOC	NO _x	SO _x	CO	PM ₁₀	PM _{2.5}	VOC	NO _x	SO _x	CO	CO ₂	N ₂ O	CH ₄	CO ₂ e
Year 15																
Switching																
Switching on Site	0.50	0.46	1.42	14.64	0.01	3.07	0.02	0.01	0.04	0.44	0.00	0.09	30.64	0.00	0.00	30.91
Switching in SJVAPCD	2.50	2.30	7.10	73.19	0.05	15.34	0.08	0.07	0.21	2.20	0.00	0.46	153.20	0.00	0.01	154.57
Line Haul																
In SJVAPCD	0.46	0.44	0.97	28.29	0.07	19.39	0.03	0.03	0.07	2.10	0.01	0.01	499.87	0.04	0.01	510.71
In Sacramento Metro	0.79	0.77	1.69	49.21	0.12	33.72	0.06	0.06	0.13	3.65	0.02	0.01	869.34	0.07	0.02	888.20
In California													2,673.21	1.01	0.21	2,947.54
Total																
In SJVAPCD	2.96	2.74	8.07	101.48	0.12	34.73	0.11	0.10	0.29	4.29	0.01	0.47	653.07	0.04	0.02	665.29
In Sacramento Metro	0.79	0.77	1.69	49.21	0.12	33.72	0.06	0.06	0.13	3.65	0.02	0.01	869.34	0.07	0.02	888.20
In California													4,195.61	1.13	0.26	4,501.02

Notes:
CH₄: methane
CO: carbon monoxide
CO₂: carbon dioxide
CO₂e: carbon dioxide equivalent
lb: pound
N₂O: nitrous oxide
NO_x: oxides of nitrogen
PM₁₀: particulate matter less than 10 micrometers in diameter
PM_{2.5}: particulate matter less than 2.5 micrometers in diameter
SJVAPCD: San Joaquin Valley Air Pollution Control District
SO_x: oxides of sulfur
VOC: volatile organic compound

Table 19
Ocean-Going Vessel Parameters and Travel Information

Vessel Paramters																						
Scenario	Engine/Source Type	Engine Rating (kW)	Max Rated Speed (knots)	Berth Time (hr/call)	Annual Calls	Annual Transits (1-way)	Average Auxiliary Loads (kW)			Berth, Energy Demand (kWh/call)	Maneuvering in SJVAPCD (pilot to berth)			Transit in SJVAPCD (San Joaquin River transit from Port to SJVAPCD Boundary)			Transit in BAAQMD (San Joaquin River transit from SJVAPCD boundary through SF Bay)			Ocean Transit (SF Bay to State Boundary)		
							Berth	Maneuvering	Transit		Maneuvering Time (hr/trip: one way)	Propulsion Engine Load Factor	Energy Demand (kWh/trip)	Transit Time (hr/trip)	Propulsion Engine Load Factor	Energy Demand (kWh/trip)	Transit Time (hr/trip)	Propulsion Engine Load Factor	Energy Demand (kWh/trip)	Transit Time (hr/trip)	Propulsion Engine Load Factor	Energy Demand (kWh/trip)
Baseline	Propulsion Engine	8,500	15.3	144	10	20					1.48	2%	250.75	1.63	15%	2,071.875	11.17	6%	5,695.00	0.22	80%	1,467.63
	Auxiliary Engine	8,500	15.3	144	10	20	369	377	222	53,136	1.48		556.075	1.63		360.750	11.17		2,479.00	0.22		47.91
	Auxiliary Boiler	8,500	15.3	144	10	20	123	92	63	17,712	1.48		135.7	1.63		102.375	11.17		703.50	0.22		13.60
Year 1	Propulsion Engine	8,500	15.3	72	18	36					1.48	2%	250.75	1.63	15%	2,071.875	11.17	6%	5,695.00	0.22	80%	1,467.63
	Auxiliary Engine	8,500	15.3	72	18	36	369	377	222	26,568	1.48		556.075	1.63		360.750	11.17		2,479.00	0.22		47.91
	Auxiliary Boiler	8,500	15.3	72	18	36	123	92	63	8,856	1.48		135.7	1.63		102.375	11.17		703.50	0.22		13.60
Year 5	Propulsion Engine	8,500	15.3	72	31	62					1.48	2%	250.75	1.63	15%	2,071.875	11.17	6%	5,695.00	0.22	80%	1,467.63
	Auxiliary Engine	8,500	15.3	72	31	62	369	377	222	26,568	1.48		556.075	1.63		360.750	11.17		2,479.00	0.22		47.91
	Auxiliary Boiler	8,500	15.3	72	31	62	123	92	63	8,856	1.48		135.7	1.63		102.375	11.17		703.50	0.22		13.60
Year 15	Propulsion Engine	8,500	15.3	72	53	106					1.48	2%	250.75	1.63	15%	2,071.875	11.17	6%	5,695.00	0.22	80%	1,467.63
	Auxiliary Engine	8,500	15.3	72	53	106	369	377	222	26,568	1.48		556.075	1.63		360.750	11.17		2,479.00	0.22		47.91
	Auxiliary Boiler	8,500	15.3	72	53	106	123	92	63	8,856	1.48		135.7	1.63		102.375	11.17		703.50	0.22		13.60

Vessel Type: Handymax
Engine rating and max speed are from Table C.1. Average OGV Installed Power, Maximum Speed, and Maximum Draft by Ship Type, Subtype, Engine Category, and Engine Type, EPA Ports Emissions Inventory Guidance, April 2022
Fuel Sulfur 0.1%

Berth Operations			
Parameter	Value	Units	Source
Baseline Berth Time	6	days/call	DEIR Project Description
	24	hours/day	DEIR Project Description
Proposed Project Berth Time	3	days/call	Confirmed by Edward Williams, Eagle Materials, in email dated January 20, 2026.
	24	hours/day	DEIR Project Description

Table 19
Ocean-Going Vessel Parameters and Travel Information

Travel Information					
Parameter	Maneuvering (Pilot to Berth)	Transit in SJVAPCD (San Joaquin River transit from Port to SJVAPCD Boundary)	Transit in BAAQMD (San Joaquin River transit from SJVAPCD boundary through SF Bay)	Ocean Transit (SF Bay to State Boundary)	Total Project
Ocean-Going Vessel					
Distance (nautical miles/1-way trip)	2.95	13	67	3	85.95
Allowed Speed (knots)	2	8	6	13.9	
Transit Time (hr/call)	1.48	1.63	11.17	0.22	14.48
Barge					
Distance (nautical miles/1-way trip)	2.95	13	55	0	70.95
Allowed Speed (knots)	2	8	6	13.9	
Transit Time (hr/call)	1.48	1.63	9.17	0.00	12.27

Notes:
SF: San Francisco
BAAQMD: Bay Area Air Quality Management District
DEIR: Draft Environmental Impact Report
hr/call: hour per call
hr: hour
kWh: kilowatt-hour
SJVAPCD: San Joaquin Valley Air Pollution Control District

Table 20
Ocean-Going Vessel Emission Factors

Pollutant Emission Factors for Diesel Propulsion Engines Using 0.1% Sulfur (g/kWh)

Engine Category	Tier	Model Year Range	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	2022 Tier Distribution
Slow speed propulsion	Tier 0	1999 and older	0.184	0.169	0.184	17	0.362	1.4	0.63	593	0.029	0.012	3.20%
Slow speed propulsion	Tier I	2000 to 2011	0.184	0.169	0.184	16	0.362	1.4	0.63	593	0.029	0.012	45%
Slow speed propulsion	Tier II	2011 to 2016	0.184	0.169	0.184	14.4	0.362	1.4	0.63	593	0.029	0.012	45.90%
Slow speed propulsion	Tier III	2016 and newer	0.184	0.169	0.184	3.4	0.362	1.4	0.63	593	0.029	0.012	5.90%
Slow speed propulsion	Composite EFs		0.184	0.169	0.184	14.55	0.362	1.4	0.6318	593	0.029	0.012	

Source: Port of Stockton, DRAFT INVENTORY OF AIR EMISSIONS FOR CALENDAR YEAR 2022, September 2024, Tables 3.4 and 3.5

Pollutant Emission Factors for Auxiliary Engines Using 0.1% Sulfur (g/kWh)

Engine Category	Tier	Model Year Range	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	2022 Tier Distribution
Medium Auxiliary	Tier 0	1999 and older	0.189	0.174	0.189	13.8	0.424	1.1	0.42	696	0.029	0.008	3.20%
Medium Auxiliary	Tier I	2000 to 2011	0.189	0.174	0.189	12.2	0.424	1.1	0.42	696	0.029	0.008	45%
Medium Auxiliary	Tier II	2011 to 2016	0.189	0.174	0.189	10.5	0.424	1.1	0.42	696	0.029	0.008	45.90%
Medium Auxiliary	Tier III	2016 and newer	0.189	0.174	0.189	2.6	0.424	1.1	0.42	696	0.029	0.008	5.90%
Medium Auxiliary	Composite EFs		0.189	0.174	0.189	10.90	0.424	1.1	0.4212	696	0.029	0.008	

Source: Port of Stockton, DRAFT INVENTORY OF AIR EMISSIONS FOR CALENDAR YEAR 2022, September 2024, Tables 3.10 and 3.11

https://www.portofstockton.com/wp-content/uploads/2025/02/DRAFT-Port-of-Stockton-2022-EI-Report_26Nov24_scg.pdf

Emission Factors for Auxiliary Boilers Using 0.1% Sulfur (g/kWh)

Engine Category	Tier	Model Year Range	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄
Steam Boilers			0.202	0.186	0	2.0	0.587	0.2	0.11	962	0.075	0.002

Source: Port of Stockton, DRAFT INVENTORY OF AIR EMISSIONS FOR CALENDAR YEAR 2022, September 2024, Tables 3.13 and 3.14

Notes:

1. Assume Handymax Bulk Carrier, medium-sized dry bulk vessel designed to carry approximately 35,000 to 50,000 metric tons of cargo
2. Composite EF based on 2022 engine tier distribution - Port of Stockton
3. VOC emission factors are based on HC emission factors multiplied by 1.053 (EPA Conversion Factors for Hydrocarbon Exhaust Emission Results for diesel engines)

Abbreviations:

CH₄: methane
CO: carbon monoxide
CO₂: carbon dioxide
DPM: diesel particulate matter
EF: emissions factor
g: gram
HC: hydrocarbon
kWh: kilowatt-hour
N₂O: nitrous oxide
NO_x: oxides of nitrogen
PM₁₀: particulate matter less than 10 micrometers in diameter
PM_{2.5}: particulate matter less than 2.5 micrometers in diameter
SO_x: oxides of sulfur
VOC: volatile organic compound

Table 21
Annual Ocean Going Vessel Emissions, San Joaquin Valley Air Pollution Control District

Annual OGV Berth Emissions																						
		Exhaust Emission Factors (g/kWh): Annual Fleet Mix										Berth in SJVAPCD (lb/year; MT/year for GHG ¹)										
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline																						
Baseline	Propulsion Engine	0.184	0.169	0.184	14.554	0.362	1.400	0.632	593.000	0.029	0.012	--	--	--	--	--	--	--	--	--	--	--
Baseline	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	221.400	203.829	221.400	12,773.843	496.686	1,288.571	493.406	369.821	0.015	0.004	374.023
Baseline	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	78.876	72.629	0.000	780.952	229.210	78.095	41.117	170.387	0.013	0.000	173.917
Baseline Total												300.276	276.457	221.400	13,554.795	725.895	1,366.667	534.523	540.208	0.029	0.005	547.940
Proposed Project																						
Year 1	Propulsion Engine	0.184	0.169	0.184	14.554	0.362	1.400	0.632	593.000	0.029	0.012	--	--	--	--	--	--	--	--	--	--	--
Year 1	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	199.260	183.446	199.260	11,496.459	447.017	1,159.714	444.065	332.839	0.014	0.004	336.621
Year 1	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	70.989	65.366	0.000	702.857	206.289	70.286	37.005	153.348	0.012	0.000	156.525
Year 1 Total												270.249	248.811	199.260	12,199.316	653.306	1,230.000	481.071	486.187	0.026	0.004	493.146
Year 5	Propulsion Engine	0.184	0.169	0.184	14.554	0.362	1.400	0.632	593.000	0.029	0.012	--	--	--	--	--	--	--	--	--	--	--
Year 5	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	343.170	315.934	343.170	19,799.456	769.863	1,997.286	764.779	573.222	0.024	0.007	579.736
Year 5	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	122.258	112.574	0.000	1,210.476	355.275	121.048	63.732	264.100	0.021	0.001	269.571
Year 5 Total												465.428	428.509	343.170	21,009.933	1,125.138	2,118.333	828.510	837.322	0.044	0.007	849.307
Year 15	Propulsion Engine	0.184	0.169	0.184	14.554	0.362	1.400	0.632	593.000	0.029	0.012	--	--	--	--	--	--	--	--	--	--	--
Year 15	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	586.710	540.146	586.710	33,850.684	1,316.217	3,414.714	1,307.525	980.025	0.041	0.011	991.162
Year 15	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	209.022	192.466	0.000	2,069.524	607.405	206.952	108.960	451.525	0.035	0.001	460.880
Year 15 Total												795.732	732.611	586.710	35,920.207	1,923.622	3,621.667	1,416.486	1,431.550	0.076	0.012	1,452.041

Annual OGV Maneuvering Emissions																						
		Exhaust Emission Factors (g/kWh): Annual Fleet Mix										Maneuvering in SJVAPCD, Pilot to Berth (lb/year; MT/year for GHG ¹)										
	Engine/Source Type	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline																						
Baseline	Propulsion Engine	1.341	1.232	1.341	67.386	1.195	13.552	13.382	1,945.040	0.614	0.056	14.830	13.621	14.830	745.019	13.207	149.831	147.946	9.754	0.003	0.000	10.578
Baseline	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	4.634	4.266	4.634	267.360	10.396	26.970	10.327	7.740	0.000	0.000	7.828
Baseline	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	1.209	1.113	0.000	11.966	3.512	1.197	0.630	2.611	0.000	0.000	2.665
Baseline Total												20.673	19.000	19.464	1,024.345	27.115	177.998	158.903	20.105	0.004	0.000	21.072
Proposed Project																						
Year 1	Propulsion Engine	1.341	1.232	1.341	67.386	1.195	13.552	13.382	1,945.040	0.614	0.056	26.694	24.518	26.694	1,341.034	23.773	269.696	266.303	17.558	0.006	0.001	19.041
Year 1	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	8.341	7.679	8.341	481.248	18.712	48.546	18.589	13.933	0.001	0.000	14.091
Year 1	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	2.176	2.003	0.000	21.540	6.322	2.154	1.134	4.699	0.000	0.000	4.797
Year 1 Total												37.211	34.200	35.035	1,843.821	48.808	320.396	286.026	36.190	0.006	0.001	37.929
Year 5	Propulsion Engine	1.341	1.232	1.341	67.386	1.195	13.552	13.382	1,945.040	0.614	0.056	45.973	42.225	45.973	2,309.558	40.943	464.476	458.633	30.238	0.010	0.001	32.793
Year 5	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	14.365	13.225	14.365	828.815	32.227	83.607	32.014	23.995	0.001	0.000	24.268
Year 5	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	3.747	3.450	0.000	37.096	10.888	3.710	1.953	8.094	0.001	0.000	8.261
Year 5 Total												64.085	58.901	60.338	3,175.470	84.058	551.793	492.600	62.327	0.011	0.001	65.322
Year 15	Propulsion Engine	1.341	1.232	1.341	67.386	1.195	13.552	13.382	1,945.040	0.614	0.056	78.599	72.192	78.599	3,948.600	70.000	794.104	784.114	51.697	0.016	0.001	56.065
Year 15	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	24.560	22.611	24.560	1,417.007	55.098	142.942	54.734	41.024	0.002	0.000	41.491
Year 15	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	6.406	5.898	0.000	63.422	18.614	6.342	3.339	13.837	0.001	0.000	14.124
Year 15 Total												109.565	100.701	103.159	5,429.029	143.712	943.387	842.187	106.559	0.019	0.002	111.680

Table 21
Annual Ocean Going Vessel Emissions, San Joaquin Valley Air Pollution Control District

Annual OGV Transit Emissions																						
		Exhaust Emission Factors (g/kWh): Annual Fleet Mix										Transit in SJVAPCD(San Joaquin River Transit from Port to SJVAPCD Boundary) (lb/year; MT/year for GHG ¹)										
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline																						
Baseline	Propulsion Engine	0.204	0.188	0.204	15.427	0.391	1.848	0.859	640.440	0.039	0.013	18.658	17.137	18.658	1,409.337	35.715	168.819	78.494	26.538	0.002	0.001	26.986
Baseline	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	3.006	2.768	3.006	173.448	6.744	17.497	6.700	5.022	0.000	0.000	5.079
Baseline	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	0.912	0.840	0.000	9.028	2.650	0.903	0.475	1.970	0.000	0.000	2.010
Baseline Total												22.576	20.744	21.664	1,591.812	45.109	187.219	85.669	33.529	0.002	0.001	34.075
Proposed Project																						
Year 1	Propulsion Engine	0.204	0.188	0.204	15.427	0.391	1.848	0.859	640.440	0.039	0.013	33.584	30.846	33.584	2,536.806	64.287	303.875	141.290	47.768	0.003	0.001	48.574
Year 1	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	5.411	4.982	5.411	312.206	12.140	31.494	12.059	9.039	0.000	0.000	9.142
Year 1	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	1.641	1.511	0.000	16.250	4.769	1.625	0.856	3.545	0.000	0.000	3.619
Year 1 Total												40.637	37.339	38.995	2,865.262	81.196	336.994	154.205	60.352	0.004	0.001	61.335
Year 5	Propulsion Engine	0.204	0.188	0.204	15.427	0.391	1.848	0.859	640.440	0.039	0.013	57.839	53.124	57.839	4,368.943	110.717	523.340	243.333	82.267	0.005	0.002	83.656
Year 5	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	9.319	8.580	9.319	537.688	20.907	54.240	20.769	15.567	0.001	0.000	15.744
Year 5	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	2.827	2.603	0.000	27.986	8.214	2.799	1.473	6.106	0.000	0.000	6.232
Year 5 Total												69.985	64.307	67.159	4,934.618	139.838	580.379	265.575	103.940	0.006	0.002	105.632
Year 15	Propulsion Engine	0.204	0.188	0.204	15.427	0.391	1.848	0.859	640.440	0.039	0.013	98.887	90.825	98.887	7,469.484	189.290	894.743	416.021	140.650	0.009	0.003	143.024
Year 15	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	15.933	14.669	15.933	919.274	35.744	92.732	35.508	26.614	0.001	0.000	26.917
Year 15	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	4.833	4.450	0.000	47.847	14.043	4.785	2.519	10.439	0.001	0.000	10.656
Year 15 Total												119.652	109.944	114.820	8,436.605	239.078	992.260	454.048	177.704	0.011	0.003	180.596

Notes:
1. GHGs llisted here are CO₂, CH₄, N₂O, and CO₂e.

Abbreviations:
--: not applicable
CH₄: methane
CO: carbon monoxide
CO₂ : carbon dioxide
CO₂e: carbon dioxide equivalent
DPM: diesel particulate matter
g: gram
GHG: greenhouse gas
kWh: kilowatt-hour
lb: pound
MT: metric ton
N₂O: nitrous oxide
NO_x: oxides of nitrogen
OGV: ocean-going vessel
PM₁₀: particulate matter less than 10 micrometers in diameter
PM_{2.5}: particulate matter less than 2.5 micrometers in diameter
SO_x: oxides of sulfur
VOC: volatile organic compound

Table 22

Maximum Daily Ocean Going Vessel Emissions, San Joaquin Valley Air Pollution Control District

Maximum Daily OGV Berth Emissions, SJVAPCD

Scenario	Engine/Source Type	Annual Number of Calls	Number of Days per Call ¹	Maximum Number of Ships at Berth	Berth in SJVAPCD							
					Total Number of Days per Year	PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	DPM (lb/day)	NO _x (lb/day)	SO _x (lb/day)	CO (lb/day)	VOC (lb/day)
Baseline												
Baseline	Propulsion Engine	10	6	1	60	--	--	--	--	--	--	--
Baseline	Auxiliary Engine	10	6	1	60	3.69	3.40	3.69	212.90	8.28	21.48	8.22
Baseline	Auxiliary Boiler	10	6	1	60	1.31	1.21	0.00	13.02	3.82	1.30	0.69
Baseline Total						5.00	4.61	3.69	225.91	12.10	22.78	8.91
Proposed Project												
Year 1	Propulsion Engine	18	3	2	54	--	--	--	--	--	--	--
Year 1	Auxiliary Engine	18	3	2	54	7.38	6.79	7.38	425.79	16.56	42.95	16.45
Year 1	Auxiliary Boiler	18	3	2	54	2.63	2.42	0.00	26.03	7.64	2.60	1.37
Year 1 Total						10.01	9.22	7.38	451.83	24.20	45.56	17.82
Year 5	Propulsion Engine	31	3	2	93	--	--	--	--	--	--	--
Year 5	Auxiliary Engine	31	3	2	93	7.38	6.79	7.38	425.79	16.56	42.95	16.45
Year 5	Auxiliary Boiler	31	3	2	93	2.63	2.42	0.00	26.03	7.64	2.60	1.37
Year 5 Total						10.01	9.22	7.38	451.83	24.20	45.56	17.82
Year 15	Propulsion Engine	53	3	2	159	--	--	--	--	--	--	--
Year 15	Auxiliary Engine	53	3	2	159	7.38	6.79	7.38	425.79	16.56	42.95	16.45
Year 15	Auxiliary Boiler	53	3	2	159	2.63	2.42	0.00	26.03	7.64	2.60	1.37
Year 15 Total						10.01	9.22	7.38	451.83	24.20	45.56	17.82

Table 22

Maximum Daily Ocean Going Vessel Emissions, San Joaquin Valley Air Pollution Control District

Maximum Daily OGV Maneuvering Emissions, SJVAPCD

Scenario	Engine/Source Type	Annual Number of Calls	Maneuvering Days per Call ³	Total Number of Days per Year	Maneuvering in SJVAPCD (pilot to berth)						
					PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	DPM (lb/day)	NO _x (lb/day)	SO _x (lb/day)	CO (lb/day)	VOC (lb/day)
Baseline											
Baseline	Propulsion Engine	10	2	20	0.74	0.68	0.74	37.25	0.66	7.49	7.40
Baseline	Auxiliary Engine	10	2	20	0.23	0.21	0.23	13.37	0.52	1.35	0.52
Baseline	Auxiliary Boiler	10	2	20	0.06	0.06	0.00	0.60	0.18	0.06	0.03
Baseline Total					1.03	0.95	0.97	51.22	1.36	8.90	7.95
Proposed Project											
Year 1	Propulsion Engine	18	2	36	0.74	0.68	0.74	37.25	0.66	7.49	7.40
Year 1	Auxiliary Engine	18	2	36	0.23	0.21	0.23	13.37	0.52	1.35	0.52
Year 1	Auxiliary Boiler	18	2	36	0.06	0.06	0.00	0.60	0.18	0.06	0.03
Year 1 Total					1.03	0.95	0.97	51.22	1.36	8.90	7.95
Year 5	Propulsion Engine	31	2	62	0.74	0.68	0.74	37.25	0.66	7.49	7.40
Year 5	Auxiliary Engine	31	2	62	0.23	0.21	0.23	13.37	0.52	1.35	0.52
Year 5	Auxiliary Boiler	31	2	62	0.06	0.06	0.00	0.60	0.18	0.06	0.03
Year 5 Total					1.03	0.95	0.97	51.22	1.36	8.90	7.95
Year 15	Propulsion Engine	53	2	106	0.74	0.68	0.74	37.25	0.66	7.49	7.40
Year 15	Auxiliary Engine	53	2	106	0.23	0.21	0.23	13.37	0.52	1.35	0.52
Year 15	Auxiliary Boiler	53	2	106	0.06	0.06	0.00	0.60	0.18	0.06	0.03
Year 15 Total					1.03	0.95	0.97	51.22	1.36	8.90	7.95

Table 22

Maximum Daily Ocean Going Vessel Emissions, San Joaquin Valley Air Pollution Control District

Maximum Daily OGV Transit Emissions, SJVAPCD

Scenario	Engine/Source Type	Annual Number of Calls	Number of Days per Call ⁴	Total Number of days per year	Transit in SJVAPCD (San Joaquin River transit from Port to SJVAPCD Boundary)						
					PM ₁₀ (lb/day)	PM _{2.5} (lb/day)	DPM (lb/day)	NO _x (lb/day)	SO _x (lb/day)	CO (lb/day)	VOC (lb/day)
Baseline											
Baseline	Propulsion Engine	10	2	20	0.93	0.86	0.93	70.47	1.79	8.44	3.92
Baseline	Auxiliary Engine	10	2	20	0.15	0.14	0.15	8.67	0.34	0.87	0.33
Baseline	Auxiliary Boiler	10	2	20	0.05	0.04	0.00	0.45	0.13	0.05	0.02
Baseline Total					1.13	1.04	1.08	79.59	2.26	9.36	4.28
Proposed Project											
Year 1	Propulsion Engine	18	2	36	0.93	0.86	0.93	70.47	1.79	8.44	3.92
Year 1	Auxiliary Engine	18	2	36	0.15	0.14	0.15	8.67	0.34	0.87	0.33
Year 1	Auxiliary Boiler	18	2	36	0.05	0.04	0.00	0.45	0.13	0.05	0.02
Year 1 Total					1.13	1.04	1.08	79.59	2.26	9.36	4.28
Year 5	Propulsion Engine	31	2	62	0.93	0.86	0.93	70.47	1.79	8.44	3.92
Year 5	Auxiliary Engine	31	2	62	0.15	0.14	0.15	8.67	0.34	0.87	0.33
Year 5	Auxiliary Boiler	31	2	62	0.05	0.04	0.00	0.45	0.13	0.05	0.02
Year 5 Total					1.13	1.04	1.08	79.59	2.26	9.36	4.28
Year 15	Propulsion Engine	53	2	106	0.93	0.86	0.93	70.47	1.79	8.44	3.92
Year 15	Auxiliary Engine	53	2	106	0.15	0.14	0.15	8.67	0.34	0.87	0.33
Year 15	Auxiliary Boiler	53	2	106	0.05	0.04	0.00	0.45	0.13	0.05	0.02
Year 15 Total					1.13	1.04	1.08	79.59	2.26	9.36	4.28

Table 22

Maximum Daily Ocean Going Vessel Emissions, San Joaquin Valley Air Pollution Control District

Notes:

1. Number of days per call are based on DEIR Section 1.3.2.3. Used 6 days per call for baseline and 3 days per call for Year 1 and beyond (Confirmed by Edward Williams, Eagle Materials, in email dated January 20, 2026).
2. For the peak day, assumed two vessels simultaneously at berth for the proposed project and one vessel at berth for the baseline condition.
3. Assume total emissions occur over two days, one day to maneuver in, one day to maneuver out.
4. Assume total emissions occur over two days, one day to transit in, one day to transit out

Abbreviations:

CO: carbon monoxide

DPM: diesel particulate matter

NO_x: oxides of nitrogen

OGV: ocean-going vessel

PM₁₀: particulate matter less than 10 micrometers in diameter

PM_{2.5}: particulate matter less than 2.5 micrometers in diameter

SO_x: oxides of sulfur

VOC: volatile organic compound

Table 23
Commercial Harbor Craft Emission Factors and Operations

Commercial Harbor Craft Parameters and Energy Demand																				
Scenario	HC Classification		Engine/Source Type	Engine Count	Engine HP	Engine kW	Load Factor	HC Count per OGV	Berth Time (hr/call)	Maneuvering (hr/one-way trip)	Transit in SJVAPCD (hr/one-way trip)	Transit in BAAQMD (hr/one-way trip)	Ocean Transit in CA (hr/one-way trip)	Annual OGV Transit (one-way trips/yr)	Annual Calls	Annual SJVAPCD Berth Energy Demand (kWh)	Annual SJVAPCD Maneuvering Energy Demand (kWh)	Annual Transit in SJVAPCD Energy Demand (kWh)	Annual Transit in BAAQMD Energy Demand (kWh)	Annual Ocean Transit in CA Energy Demand (kWh)
Baseline	OGV Assist	Assist Tugboat	Propulsion Engine	2	1300	969	0.16	2	0.33	1.48	0	0	0	20	10	2,047	18,302	0	0	0
			Auxiliary Engine	1	120	89	0.34	2	0.33	1.48	0	0	0	20	10	201	1,795	0	0	0
Proposed Project																				
Year 1	OGV Assist	Assist Tugboat	Propulsion Engine	2	1300	969	0.16	2	0.33	1.48	0	0	0	36	18	3,685	32,944	0	0	0
			Auxiliary Engine	1	120	89	0.34	2	0.33	1.48	0	0	0	36	18	361	3,231	0	0	0
Year 5	OGV Assist	Assist Tugboat	Propulsion Engine	2	1300	969	0.16	2	0.33	1.48	0	0	0	62	31	6,347	56,738	0	0	0
			Auxiliary Engine	1	120	89	0.34	2	0.33	1.48	0	0	0	62	31	622	5,565	0	0	0
Year 15	OGV Assist	Assist Tugboat	Propulsion Engine	2	1300	969	0.16	2	0.33	1.48	0	0	0	106	53	10,851	97,003	0	0	0
			Auxiliary Engine	1	120	89	0.34	2	0.33	1.48	0	0	0	106	53	1,064	9,514	0	0	0
Year 15	Barge Assist	Assist Tugboat	Propulsion Engine	2	1300	969	0.16	1	0.33	1.48	1.63	9.17	0	90	45	4,607	41,181	45,368	255,924	0
			Auxiliary Engine	1	120	89	0.34	1	0.33	1.48	1.63	9.17	0	90	45	452	4,039	4,450	25,100	0
		Barge	Auxiliary Engine	1	224	167	0.31	1	24	1.48	1.63	9.17	0	90	45	55,924	6,874	7,573	42,720	0

Notes:

Tugboats are used to assist OGVs from Port Harbor to berth (maneuvering) and to assist barges during river transit and maneuvering. Two tugboats used to assist each OGV; one tugboat used to push each barge. Tugboats assumed to have two propulsion and two auxiliary engines. One auxiliary engine operates at a time.

Tugboat propulsion and auxiliary engine hp are from Port of Stockton, DRAFT INVENTORY OF AIR EMISSIONS FOR CALENDAR YEAR 2022, September 2024, Table 4.1, max hp.

Tugboat load factors are from 2021 Update to the Emission Inventory for Commercial Harbor Craft: Methodology and Results, Table H-9, for Tugboat-Escort/Ship Assist.

Barge auxiliary engine horsepower (224 bhp) is based on Table H-1. Summary of Engine Profile Data from CARB Reporting Data, 2021 Update to the Emission Inventory for Commercial Harbor Craft: Methodology and Results

A barge is assumed to be at berth for 24 hours/call. The barge tug would operates similarly to OGV assist tugboat for berth time (i.e., 0.33 hr/call).

Commercial Harbor Craft Activity						
Parameter	Berth	Maneuvering (Pilot to Berth)	Transit in SJVAPCD (San Joaquin River transit from Port to SJVAPCD Boundary)	Transit in BAAQMD (San Joaquin River transit from SJVAPCD boundary through SF Bay)	Ocean Transit (SF Bay to State Boundary)	Total Project
HC Assisting OGVs/Barges						
Distance (nautical miles/1-way trip)		2.95				2.95
Speed (knots)		2				
Time (hr/call)	0.33	1.48				1.48
Barges						
Distance (nautical miles/1-way trip)		2.95	13	55	0	70.95
Speed (knots)		2	8	6	13.9	
Time (hr/call)	24	1.48	1.63	9.17	0.00	12.27

Table 23
Commercial Harbor Craft Emission Factors and Operations

Emission Factors (g/kWh)											
Year	Engine Tier	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄
Baseline											
Propulsion Engine	2	0.201	0.201	0.201	6.879	0.416	4.962	0.362	697.47	0.0332	0.0053
Auxiliary Engine	2	0.295	0.295	0.295	6.879	0.416	4.962	0.362	697.47	0.0332	0.0057
Proposed Project											
Year 1											
Propulsion Engine	4	0.0402	0.040	0.040	1.7433	0.4164	5.00	0.18774	697.47	0.0332	0.0008
Auxiliary Engine	3	0.1207	0.12069	0.1207	5.0958	0.4164	5.00	0.2682	697.47	0.0332	0.0025
Year 5											
Propulsion Engine	4	0.0402	0.0402	0.0402	1.7433	0.4164	5.00	0.1877	697.47	0.0332	0.0008
Auxiliary Engine	3	0.1207	0.1207	0.1207	5.0958	0.4164	5.00	0.2682	697.47	0.0332	0.0025
Year 15											
Propulsion Engine	4	0.0402	0.0402	0.0402	1.7433	0.4164	5.00	0.1877	697.47	0.0332	0.0008
Auxiliary Engine	3	0.1207	0.1207	0.1207	5.0958	0.4164	5.00	0.2682	697.47	0.0332	0.0025

Sources:
Table 2: U.S. EPA Tier 2 Marine Engine Emission Standards for NO_x+ HC, PM, and CO, CARB Final Regulation Order Commercial Harbor Craft Regulation (<https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/chc2021/chcfro.pdf>)
CO₂ EF is from Table H.7, EPA Port Emissions Inventory Guidance

Notes:
Under the CARB CHC regulations, all tugs must be tier 2 by 2023, and tier 4 by end of 2029. All barges must be tier 4 by end of 2031.

Abbreviations:
BAAQMD: Bay Area Air Quality Management District
bhp: brake horsepower
CH₄: methane
CO: carbon monoxide
CO₂ : carbon dioxide
DPM: diesel particulate matter
EF: emissions factor
g/bhp-hr: grm per break horsepower hour
g/kWh: grm per kilowatt-hour
HC: Hydrocarbon
hr/call: hour per call
kWh: kilowatt hour
N₂O: nitrous oxide
NO_x: oxides of nitrogen
OGV: ocean-going vessel
PM: particulate matter
PM₁₀: particulate matter less than 10 micrometers in diameter
PM_{2.5}: particulate matter less than 2.5 micrometers in diameter
SJVAPCD: San Joaquin Valley Air Pollution Control District
SO_x: oxides of sulfur
VOC: volatile organic compound

Conversions:

1.341 hp/kW

Table 24
Commercial Harbor Craft Emissions, SJVAPCD

Annual CHC Berth Emissions, SJVAPCD																							
Scenario	Engine/Source Type	Exhaust Emission Factors (g/kWh): Annual Fleet Mix										Berth in SJVAPCD (lb/year, MT/year for GHG ¹)											
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e	
Baseline																							
Baseline	Propulsion Engine	0.20115	0.20115	0.20115	6.87933	0.41643	4.96170	0.36207	697.47000	0.03323	0.00530	0.91	0.91	0.91	31.05	1.88	22.40	1.63	1.43	0.00	0.00	1.45	
Baseline	Auxiliary Engine	0.29502	0.29502	0.29502	6.87933	0.41643	4.96170	0.36207	697.47000	0.03323	0.00570	0.13	0.13	0.13	3.05	0.18	2.20	0.16	0.14	0.00	0.00	0.14	
Baseline Total												1.04	1.04	1.04	34.10	2.06	24.59	1.79	1.57	0.00	0.00	1.59	
Proposed Project																							
Year 1	Propulsion Engine	0.040	0.040	0.040	1.74	0.416	5.000	0.18774	697.47	0.033228	0.0008	0.33	0.33	0.33	14.16	3.38	40.62	1.53	2.57	0.00	0.00	2.60	
Year 1	Auxiliary Engine	0.121	0.121	0.121	5.10	0.416	5.000	0.2682	697.47	0.033228	0.0025	0.10	0.10	0.10	4.06	0.33	3.98	0.21	0.25	0.00	0.00	0.26	
Year 1 Total												0.42	0.42	0.42	18.22	3.72	44.61	1.74	2.82	0.00	0.00	2.86	
Year 5	Propulsion Engine	0.04023	0.04023	0.04023	1.74	0.416	5	0.18774	697.47	0.033228	0.0008	0.56	0.56	0.56	24.39	5.83	69.96	2.63	4.43	0.00	0.00	4.48	
Year 5	Auxiliary Engine	0.12069	0.12069	0.12069	5.10	0.416	5	0.2682	697.47	0.033228	0.0025	0.17	0.17	0.17	6.99	0.57	6.86	0.37	0.43	0.00	0.00	0.44	
Year 5 Total												0.73	0.73	0.73	31.39	6.40	76.82	2.99	4.86	0.00	0.00	4.92	
Year 15 - OGV Assist	Propulsion Engine	0.04023	0.04023	0.04023	1.74	0.416	5	0.18774	697.47	0.033228	0.0008	0.96	0.96	0.96	41.70	9.96	119.61	4.49	7.57	0.00	0.00	7.66	
Year 15 - OGV Assist	Auxiliary Engine	0.12069	0.12069	0.12069	5.10	0.416	5	0.2682	697.47	0.033228	0.0025	0.28	0.28	0.28	11.96	0.98	11.73	0.63	0.74	0.00	0.00	0.75	
Year 15 - Barge Assist	Propulsion Engine	0.04023	0.04023	0.04023	1.74	0.416	5	0.18774	697.47	0.033228	0.0008	0.41	0.41	0.41	17.70	4.23	50.78	1.91	3.21	0.00	0.00	3.25	
Year 15 -Barge Assist	Auxiliary Engine	0.12069	0.12069	0.12069	5.10	0.416	5	0.2682	697.47	0.033228	0.0025	0.12	0.12	0.12	5.08	0.41	4.98	0.27	0.32	0.00	0.00	0.32	
Year 15 -Barge	Auxiliary Engine	0.12069	0.12069	0.12069	5.10	0.416	5	0.2682	697.47	0.033228	0.0025	14.88	14.88	14.88	628.26	51.34	616.45	33.07	39.00	0.00	0.00	39.50	
Year 15 Total												16.65	16.65	16.65	704.70	66.92	803.55	40.36	50.84	0.00	0.00	51.49	

Annual CHC Maneuvering Emissions, SJVAPCD																						
Scenario	Engine/Source Type	Exhaust Emission Factors (g/kWh): Annual Fleet Mix										Maneuvering in SJVAPCD (pilot to berth) (lb/year, MT/year for GHG ¹)										
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline																						
Baseline	Propulsion Engine	0.20	0.20	0.20	6.88	0.42	4.96	0.36	697.47	0.03	0.01	8.12	8.12	8.12	277.58	16.80	200.20	14.61	12.77	0.00	0.00	12.93
Baseline	Auxiliary Engine	0.30	0.30	0.30	6.88	0.42	4.96	0.36	697.47	0.03	0.01	1.17	1.17	1.17	27.22	1.65	19.64	1.43	1.25	0.00	0.00	1.27
Baseline Total												9.28	9.28	9.28	304.80	18.45	219.84	16.04	14.02	0.00	0.00	14.20
Proposed Project																						
Year 1	Propulsion Engine	0.04	0.04	0.04	1.74	0.416	5.00	0.19	697.47	0.03	0.00	2.92	2.92	2.92	126.61	30.24	363.14	13.64	22.98	0.00	0.00	23.27
Year 1	Auxiliary Engine	0.121	0.121	0.121	5.10	0.416	5.000	0.268	697.470	0.033	0.003	0.86	0.86	0.86	36.30	2.97	35.62	1.91	2.25	0.00	0.00	2.28
Year 1 Total												3.78	3.78	3.78	162.91	33.21	398.76	15.55	25.23	0.00	0.00	25.55
Year 5	Propulsion Engine	0.04	0.04	0.04	1.74	0.416	5.00	0.19	697.47	0.03	0.00	5.03	5.03	5.03	218.06	52.09	625.41	23.48	39.57	0.00	0.00	40.07
Year 5	Auxiliary Engine	0.12069	0.12069	0.12069	5.10	0.416	5	0.2682	697.47	0.033228	0.0025	1.48	1.48	1.48	62.51	5.11	61.34	3.29	3.88	0.00	0.00	3.93
Year 5 Total												6.51	6.51	6.51	280.57	57.20	686.75	26.77	43.45	0.00	0.00	44.00
Year 15 - OGV Assist	Propulsion Engine	0.04023	0.04023	0.04023	1.74330	0.41643	5.00000	0.18774	697.47000	0.03323	0.00080	8.60	8.60	8.60	372.81	89.05	1,069.26	40.15	67.66	0.00	0.00	68.51
Year 15 - OGV Assist	Auxiliary Engine	0.12069	0.12069	0.12069	5.09580	0.41643	5.00000	0.26820	697.47000	0.03323	0.00250	2.53	2.53	2.53	106.88	8.73	104.87	5.63	6.64	0.00	0.00	6.72
Year 15 - Barge Assist	Propulsion Engine	0.04023	0.04023	0.04023	1.74330	0.41643	5.00000	0.18774	697.47000	0.03323	0.00080	3.65	3.65	3.65	158.27	37.81	453.93	17.04	28.72	0.00	0.00	29.09
Year 15 -Barge Assist	Auxiliary Engine	0.12069	0.12069	0.12069	5.09580	0.41643	5.00000	0.26820	697.47000	0.03323	0.00250	1.07	1.07	1.07	45.37	3.71	44.52	2.39	2.82	0.00	0.00	2.85
Year 15 -Barge	Auxiliary Engine	0.12069	0.12069	0.12069	5.09580	0.41643	5.00000	0.26820	697.47000	0.03323	0.00250	1.83	1.83	1.83	77.22	6.31	75.77	4.06	4.79	0.00	0.00	4.86
Year 15 Total												17.69	17.69	17.69	760.55	145.61	1,748.35	69.27	110.62	0.01	0.00	112.03

Table 24
Commercial Harbor Craft Emissions, SJVAPCD

Annual CHC Transit Emissions, SJVAPCD																						
Scenario	Engine/Source Type	Exhaust Emission Factors (g/kWh): Annual Fleet Mix										Transit in SJVAPCD (San Joaquin River transit from Port to SJVAPCD Boundary) (lb/year; MT/year for GHG ¹)										
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Year 15 - Barge Assist	Propulsion Engine	0.04023	0.04023	0.04023	1.74330	0.41643	5.00000	0.18774	697.47000	0.03323	0.00080	4.02	4.02	4.02	174.36	41.65	500.09	18.78	31.64	0.00	0.00	32.04
Year 15 -Barge Assist	Auxiliary Engine	0.12069	0.12069	0.12069	5.09580	0.41643	5.00000	0.26820	697.47000	0.03323	0.00250	1.18	1.18	1.18	49.99	4.08	49.05	2.63	3.10	0.00	0.00	3.14
Year 15 -Barge	Auxiliary Engine	0.12069	0.12069	0.12069	5.09580	0.41643	5.00000	0.26820	697.47000	0.03323	0.00250	2.01	2.01	2.01	85.08	6.95	83.48	4.48	5.28	0.00	0.00	5.35
Year 15 Total												5.21	5.21	5.21	224.35	45.74	549.14	21.41	34.75	0.00	0.00	35.19

Maximum Daily CHC Emissions, SJVAPCD																	
Scenario	Engine/Source Type	Vessels at Berth	Calls per Year	Berth in SJVAPCD (lb/day)							Maneuvering in SJVAPCD (pilot to berth) (lb/day)						
				PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC
Baseline																	
Baseline	Propulsion Engine	1	10	0.09	0.09	0.09	3.11	0.19	2.24	0.16	0.41	0.41	0.41	13.88	0.84	10.01	0.73
Baseline	Auxiliary Engine	1	10	0.01	0.01	0.01	0.30	0.02	0.22	0.02	0.06	0.06	0.06	1.36	0.08	0.98	0.07
Baseline Total				0.10	0.10	0.10	3.41	0.21	2.46	0.18	0.46	0.46	0.46	15.24	0.92	10.99	0.80
Proposed Project																	
Year 1	Propulsion Engine	2	18	0.04	0.04	0.04	1.57	0.38	4.51	0.17	0.08	0.08	0.08	3.52	0.84	10.09	0.38
Year 1	Auxiliary Engine	2	18	0.01	0.01	0.01	0.45	0.04	0.44	0.02	0.02	0.02	0.02	1.01	0.08	0.99	0.05
Year 1 Total				0.05	0.05	0.05	2.02	0.41	4.96	0.19	0.11	0.11	0.11	4.53	0.92	11.08	0.43
Year 5	Propulsion Engine	2	31	0.01	0.01	0.01	0.45	0.04	0.44	0.02	0.08	0.08	0.08	3.52	0.84	10.09	0.38
Year 5	Auxiliary Engine	2	31	0.05	0.05	0.05	2.02	0.41	4.96	0.19	0.02	0.02	0.02	1.01	0.08	0.99	0.05
Year 5 Total				0.06	0.06	0.06	2.48	0.45	5.40	0.22	0.11	0.11	0.11	4.53	0.92	11.08	0.43
Year 15 - OGV Assist	Propulsion Engine	2	53	0.02	0.02	0.02	0.67	0.16	1.92	0.07	0.08	0.08	0.08	3.52	0.84	10.09	0.38
Year 15 - OGV Assist	Auxiliary Engine	2	53	0.00	0.00	0.00	0.19	0.02	0.19	0.01	0.02	0.02	0.02	1.01	0.08	0.99	0.05
Year 15 - Barge Assist	Propulsion Engine	0	45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Year 15 -Barge Assist	Auxiliary Engine	0	45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Year 15 -Barge	Auxiliary Engine	0	45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Year 15 Total				0.02	0.02	0.02	0.86	0.18	2.10	0.08	0.11	0.11	0.11	4.53	0.92	11.08	0.43

Notes:
For the peak day, assumed two vessels simultaneously at berth for the proposed project and one vessel at berth for the baseline condition. Conservatively including maneuvering and berth time. Zero barges are assumed on the peak day.
Assume total emissions occur over two days, one day to maneuver in, one day to maneuver out. Peak day assumes one movement.
1. GHGs llisted here are CO₂, CH₄, N₂O, and CO₂e.

Abbreviations:
CH₄: methane
CO: carbon monoxide
CO₂ : carbon dioxide
CO₂e: carbon dioxide equivalent
DPM: diesel particulate matter
g: gram
GHG: greenhouse gas
kWh: kilowatt-hour
lb: pound
MT: metric ton
N₂O: nitrous oxide
NO_x: oxides of nitrogen
OGV: ocean-going vessel
PM₁₀: particulate matter less than 10 micrometers in diameter
PM_{2.5}: particulate matter less than 2.5 micrometers in diameter
SJVAPCD: San Joaquin Valley Air Pollution Control District
SO_x: oxides of sulfur
VOC: volatile organic compound

Table 24
Commercial Harbor Craft Emissions, SJVAPCD

Table 25
Ocean-Going Vessel and Commercial Harbor Craft Emissions, Bay Area Air District

OGV Emission Factors											
Scenario	Engine/Source Type	Exhaust Emission Factors (g/kWh): Annual Fleet Mix									
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄
Baseline											
Baseline	Propulsion Engine	0.184	0.169	0.184	14.554	0.362	1.400	0.632	593.000	0.029	0.012
Baseline	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008
Baseline	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002
Baseline Total											
Proposed Project											
Year 1	Propulsion Engine	0.184	0.169	0.184	14.554	0.362	1.400	0.632	593.000	0.029	0.012
Year 1	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008
Year 1	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002
Year 1 Total											
Year 5	Propulsion Engine	0.184	0.169	0.184	14.554	0.362	1.400	0.632	593.000	0.029	0.012
Year 5	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008
Year 5	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002
Year 5 Total											
Year 15	Propulsion Engine	0.184	0.169	0.184	14.554	0.362	1.400	0.632	593.000	0.029	0.012
Year 15	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008
Year 15	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002
Year 15 Total											

Annual OGV Transit Emissions																						
Scenario	Engine/Source Type	Exhaust Emission Factors (g/kWh): Annual Fleet Mix										Transit in BAAD (San Joaquin River transit from SJVAPCD boundary through SF Bay) (lb/year; MT/year for GHG ¹)										
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline																						
Baseline	Propulsion Engine	0.375	0.345	0.375	23.287	0.579	4.550	2.748	2,579.550	0.046	0.052	94.254	86.570	94.254	5,847.349	145.438	1,142.515	690.112	293.806	0.005	0.006	295.364
Baseline	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	20.658	19.019	20.658	1,191.898	46.345	120.234	46.039	34.507	0.001	0.000	34.899
Baseline	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	6.266	5.769	0.000	62.037	18.208	6.204	3.266	13.535	0.001	0.000	13.816
Baseline Total												121.178	111.358	114.912	7,101.284	209.991	1,268.953	739.417	341.848	0.008	0.006	344.079
Proposed Project																						
Year 1	Propulsion Engine	0.375	0.345	0.375	23.287	0.579	4.550	2.748	2,579.550	0.046	0.052	169.657	155.826	169.657	10,525.228	261.789	2,056.528	1,242.202	528.851	0.009	0.011	531.656
Year 1	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	37.185	34.234	37.185	2,145.417	83.420	216.421	82.869	62.113	0.003	0.001	62.819
Year 1	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	11.278	10.385	0.000	111.667	32.774	11.167	5.879	24.363	0.002	0.000	24.868
Year 1 Total												218.120	200.445	206.842	12,782.312	377.984	2,284.115	1,330.950	615.327	0.014	0.011	619.343
Year 5	Propulsion Engine	0.375	0.345	0.375	23.287	0.579	4.550	2.748	2,579.550	0.046	0.052	292.187	268.367	292.187	18,126.781	450.859	3,541.798	2,139.347	910.799	0.016	0.018	915.630
Year 5	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	64.041	58.958	64.041	3,694.885	143.668	372.724	142.720	106.972	0.004	0.001	108.188
Year 5	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	19.424	17.885	0.000	192.315	56.444	19.231	10.125	41.959	0.003	0.000	42.828
Year 5 Total												375.651	345.211	356.227	22,013.981	650.972	3,933.754	2,292.192	1,059.730	0.024	0.020	1,066.645
Year 15	Propulsion Engine	0.375	0.345	0.375	23.287	0.579	4.550	2.748	2,579.550	0.046	0.052	499.545	458.821	499.545	30,990.949	770.824	6,055.332	3,657.593	1,557.173	0.028	0.032	1,565.431
Year 15	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	109.489	100.800	109.489	6,317.061	245.626	637.239	244.004	182.888	0.008	0.002	184.966
Year 15	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	33.208	30.578	0.000	328.796	96.502	32.880	17.311	71.736	0.006	0.000	73.222
Year 15 Total												642.243	590.199	609.034	37,636.806	1,112.952	6,725.450	3,918.909	1,811.797	0.041	0.034	1,823.620

Table 25
Ocean-Going Vessel and Commercial Harbor Craft Emissions, Bay Area Air District

Annual CHC Transit Emissions																						
Scenario	Engine/Source Type	Exhaust Emission Factors (g/kWh): Annual Fleet Mix										Transit in BAAD (San Joaquin River transit from SJVAPCD boundary through SF Bay) (lb/year; MT/year for GHG ¹)										
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Year 15 - Barge Assist	Propulsion Engine	0.040	0.040	0.040	1.743	0.416	5.000	0.188	697.470	0.033	0.001	22.698	22.698	22.698	983.582	234.951	2,821.034	105.924	178.497	0.009	0.000	180.756
Year 15 - Barge Assist	Auxiliary Engine	0.121	0.121	0.121	5.096	0.416	5.000	0.268	697.470	0.033	0.003	6.678	6.678	6.678	281.980	23.043	276.678	14.841	17.506	0.001	0.000	17.729
Year 15 - Barge	Auxiliary Engine	0.121	0.121	0.121	5.096	0.416	5.000	0.268	697.470	0.033	0.003	11.366	11.366	11.366	479.918	39.219	470.896	25.259	29.795	0.001	0.000	30.174
Year 15 Total												40.743	40.743	40.743	1,745.479	297.214	3,568.609	146.024	225.798	0.011	0.000	228.659

Total OGV and CHC Transit Daily Emissions								
Scenario	Number of Days per year	Transit in BAAD (lb/day) - Average Daily						
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC
Baseline	260	0.47	0.43	0.44	27.31	0.81	4.88	2.84
Proposed Project								
Year 1	260	0.84	0.77	0.80	49.16	1.45	8.79	5.12
Year 5	260	1.44	1.33	1.37	84.67	2.50	15.13	8.82
Year 15	260	2.63	2.43	2.50	151.47	5.42	39.59	15.63

Notes:
1. GHGs listed here are CO₂, CH₄, N₂O, and CO₂e.

Abbreviations:
CHC: commercial harbor craft
CO: carbon monoxide
CO₂ : carbon dioxide
CO₂e: carbon dioxide equivalent
DPM: diesel particulate matter
g: gram
GHG: greenhouse gas
kWh: kilowatt-hour
lb: pound
MT: metric ton
N₂O: nitrous oxide
NO_x: oxides of nitrogen
OGV: ocean-going vessel
PM₁₀: particulate matter less than 10 micrometers in diameter
PM_{2.5}: particulate matter less than 2.5 micrometers in diameter
SF: San Francisco
SJVAPCD: San Joaquin Valley Air Pollution Control District
SO_x: oxides of sulfur
VOC: volatile organic compound

Table 26
Ocean-Going Vessel Emissions, California Waters

OGV Emission Factors

Scenario	Engine/Source Type	Exhaust Emission Factors (g/kWh): Annual Fleet Mix									
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄
Baseline											
Baseline	Propulsion Engine	0.1840	0.1690	0.1840	14.5542	0.3620	1.4000	0.6318	593.0000	0.0290	0.0120
Baseline	Auxiliary Engine	0.1890	0.1740	0.1890	10.9045	0.4240	1.1000	0.4212	696.0000	0.0290	0.0080
Baseline	Auxiliary Boiler	0.2020	0.1860	0.0000	2.0000	0.5870	0.2000	0.1053	962.0000	0.0750	0.0020
Baseline Total											
Proposed Project											
Year 1	Propulsion Engine	0.1840	0.1690	0.1840	14.5542	0.3620	1.4000	0.6318	593.0000	0.0290	0.0120
Year 1	Auxiliary Engine	0.1890	0.1740	0.1890	10.9045	0.4240	1.1000	0.4212	696.0000	0.0290	0.0080
Year 1	Auxiliary Boiler	0.2020	0.1860	0.0000	2.0000	0.5870	0.2000	0.1053	962.0000	0.0750	0.0020
Year 1 Total											
Year 5	Propulsion Engine	0.1840	0.1690	0.1840	14.5542	0.3620	1.4000	0.6318	593.0000	0.0290	0.0120
Year 5	Auxiliary Engine	0.1890	0.1740	0.1890	10.9045	0.4240	1.1000	0.4212	696.0000	0.0290	0.0080
Year 5	Auxiliary Boiler	0.2020	0.1860	0.0000	2.0000	0.5870	0.2000	0.1053	962.0000	0.0750	0.0020
Year 5 Total											
Year 15	Propulsion Engine	0.1840	0.1690	0.1840	14.5542	0.3620	1.4000	0.6318	593.0000	0.0290	0.0120
Year 15	Auxiliary Engine	0.1890	0.1740	0.1890	10.9045	0.4240	1.1000	0.4212	696.0000	0.0290	0.0080
Year 15	Auxiliary Boiler	0.2020	0.1860	0.0000	2.0000	0.5870	0.2000	0.1053	962.0000	0.0750	0.0020
Year 15 Total											

Annual OGV Transit Emissions, California Waters

Scenario	Engine/Source Type	Exhaust Emission Factors (g/kWh): Annual Fleet Mix										Ocean Transit (SF Bay to State Boundary) (lb/year; MT/year for GHG ¹)										
		PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline																						
Baseline	Propulsion Engine	0.184	0.169	0.184	14.554	0.362	1.400	0.632	593.000	0.029	0.012	11.907	10.936	11.907	941.804	23.425	90.594	40.884	17.406	0.001	0.000	17.641
Baseline	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	0.399	0.368	0.399	23.037	0.896	2.324	0.890	0.667	0.000	0.000	0.675
Baseline	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	0.121	0.112	0.000	1.199	0.352	0.120	0.063	0.262	0.000	0.000	0.267
Baseline Total												12.427	11.415	12.306	966.040	24.673	93.038	41.837	18.334	0.001	0.000	18.583
Proposed Project																						
Year 1	Propulsion Engine	0.184	0.169	0.184	14.554	0.362	1.400	0.632	593.000	0.029	0.012	21.432	19.685	21.432	1,695.248	42.165	163.070	73.591	31.330	0.002	0.001	31.754
Year 1	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	0.719	0.662	0.719	41.466	1.612	4.183	1.602	1.201	0.000	0.000	1.214
Year 1	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	0.218	0.201	0.000	2.158	0.633	0.216	0.114	0.471	0.000	0.000	0.481
Year 1 Total												22.369	20.547	22.151	1,738.872	33.449	167.468	75.306	33.449	0.002	0.001	33.449
Year 5	Propulsion Engine	0.184	0.169	0.184	14.554	0.362	1.400	0.632	593.000	0.029	0.012	36.911	33.902	36.911	2,919.593	72.618	280.842	126.740	53.958	0.003	0.001	54.688
Year 5	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	1.238	1.140	1.238	71.414	2.777	7.204	2.758	2.068	0.000	0.000	2.091
Year 5	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	0.375	0.346	0.000	3.717	1.091	0.372	0.196	0.811	0.000	0.000	0.828
Year 5 Total												38.524	35.387	38.148	2,994.724	57.607	288.418	129.694	57.607	0.003	0.001	57.607
Year 15	Propulsion Engine	0.184	0.169	0.184	14.554	0.362	1.400	0.632	593.000	0.029	0.012	63.105	57.961	63.105	4,991.563	124.153	480.149	216.684	92.251	0.005	0.002	93.498
Year 15	Auxiliary Engine	0.189	0.174	0.189	10.905	0.424	1.100	0.421	696.000	0.029	0.008	2.116	1.948	2.116	122.095	4.747	12.316	4.716	3.535	0.000	0.000	3.575
Year 15	Auxiliary Boiler	0.202	0.186	0.000	2.000	0.587	0.200	0.105	962.000	0.075	0.002	0.642	0.591	0.000	6.355	1.865	0.635	0.335	1.387	0.000	0.000	1.415
Year 15 Total												65.863	60.500	65.222	5,120.013	98.489	493.101	221.735	98.489	0.005	0.002	98.489

Table 26
Ocean-Going Vessel Emissions, California Waters

Notes:

1. GHGs llisted here are CO₂, CH₄, N₂O, and CO₂e.

Abbreviations:

CH₄: methane

CO: carbon monoxide

CO₂: carbon dioxide

CO₂e: carbon dioxide equivalent

DPM: diesel particulate matter

g: gram

GHG: greenhouse gas

kWh: kilowatt-hour

lb: pound

MT: metric ton

N₂O: nitrous oxide

NO_x: oxides of nitrogen

OGV: ocean-going vessel

PM₁₀: particulate matter less than 10 micrometers in diameter

PM_{2.5}: particulate matter less than 2.5 micrometers in diameter

SF: San Francisco

SJVAPCD: San Joaquin Valley Air Pollution Control District

SO_x: oxides of sulfur

VOC: volatile organic compound

Table 27
Conveying and Loading Dust Emissions

Activity	Annual Activity (tons/year)	Maximum Daily Activity (tons/day)	Emission Factor ¹ (lb/ton of product)	Annual Emissions ² (tons/year)		Maximum Day Emissions ² (lb/day)	
			PM	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
Baseline							
Loading	341,003	6,000	0.00278	0.47	0.47	16.68	16.68
Conveying	326,712	5,445	0.00034	0.06	0.06	1.85	1.85
Baseline Total				0.53	0.53	18.53	18.53
Year 1							
Loading	621,000	6,000	0.00278	0.86	0.86	16.68	16.68
Conveying	743,000	13,759	0.00034	0.13	0.13	4.68	4.68
Year 1 Total				0.99	0.99	21.36	21.36
Year 5							
Loading	1,299,500	6,000	0.00278	1.81	1.81	16.68	16.68
Conveying	1,421,500	15,285	0.00034	0.24	0.24	5.20	5.20
Year 5 Total				2.05	2.05	21.88	21.88
Year 15							
Loading	2,190,000	6,000	0.00278	3.04	3.04	16.68	16.68
Conveying	2,352,000	14,792	0.00034	0.40	0.40	5.03	5.03
Year 15 Total				3.44	3.44	21.71	21.71

Notes:

Loading = Shipping out of facility (Volume Out)

Conveying = Receiving into facility (Volume In)

1. Emission factors are from SJVAPCD permits for conveying and loading materials.

2. PM_{2.5} emissions are conservatively assumed to equal PM₁₀ emissions.

Abbreviations:

PM: particulate matter

PM₁₀: particulate matter less than 10 micrometers in diameter

PM_{2.5}: particulate matter less than 2.5 micrometers in diameter

SJVAPCD: San Joaquin Valley Air Pollution Control District

Table 28
On-Site Mobile Equipment Emissions

On-Site Mobile Equipment Activity

Equipment ¹	CalEEMod Equipment Matching	Fuel	Engine Tier	Equipment Quantity (Number)	Horsepower	Load Factor	Daily Runtime (Hours/Unit)	Operational Days				Modeled Assumptions
								Baseline: 2023	Year 1: 2031	Year 5: 2036	Year 15: 2046	
Front End Loader	Tractors/Loaders/ Backhoes	Diesel	Tier 4 Final	2	152	37%	21	70	54	93	159	524 P-Tier Mid-Size Wheel Loader: 152 hp. Assumed 21 hours per day based on vessel offloading activity. Assumed number of days per year would be equal to annual vessel activity
Forklift	Forklifts	Baseline: Diesel Future: Electric	Average	1	82	20%	8	260	260	260	260	New forklift is zero-emissions/Li-Ion battery.
Manlift	Aerial Lifts	Diesel	Tier 4 Final	1	74	31%	8	260	260	260	260	Skyjack SJ86T with a 74HP Deutz Tier4F diesel
Elgin Waterless Pelican	Sweepers/Scrubbers	Diesel	Tier 4 Final	1	36	46%	8	260	260	260	260	Elgin Waterless Pelican Tier IV Final
Welders	Welders	Diesel	Average	1	46	45%	8	260	260	260	260	CalEEMod defaults were used for 8 hours/day and 260 days/year
Air compressor	Air Compressors	Diesel	Average	1	37	48%	8	260	260	260	260	CalEEMod defaults were used for 8 hours/day and 260 days/year
Terminal Pickup	Off-Highway Tractors	Diesel	Average	1	376	44%	8	260	260	260	260	CalEEMod defaults were used for 8 hours/day and 260 days/year
Shuttlewagon	Other General Industrial Equipment	Diesel	Tier 4 Final	1	195	34%	9	52	114	142	218	Modeled Shuttle Wagon as a 195-hp "Other General Industrial Equipment". Assumed 9 hours per day based on rail loading activity. Assumed number of days per year would be equal to annual train trips.
Kabota Mule	Off-Highway Tractors	Baseline: 2 diesel Future: 2 electric	Average	2	38	44%	8	260	260	260	260	Replacing two yard mules with two new Waev Fusion Li-Ion zero-emission carts.
Skidsteer	Skid-Steer Loaders	Diesel	Average	1	71	37%	8	260	260	260	260	CalEEMod defaults were used for 8 hours/day and 260 days/year

Annual On-Site Mobile Source Emissions²

Year	Total On-Site Mobile Source Emissions, SJVAPCD (ton/year; MT/year for GHG ³)										
	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline	0.0554	0.0512	0.0554	1.5493	0.0049	2.6368	0.1929	463.0577	0.0188	0.0038	464.6468
Year 1	0.0145	0.0136	0.0145	0.8587	0.0043	2.0609	0.1026	404.2443	0.0164	0.0033	405.6316
Year 5	0.0124	0.0118	0.0124	0.8313	0.0049	2.4817	0.1030	461.5149	0.0187	0.0037	463.0987
Year 15	0.0129	0.0124	0.0129	0.8659	0.0060	3.2349	0.1124	567.4516	0.0230	0.0046	569.3990

Table 28
On-Site Mobile Equipment Emissions

Daily On-Site Mobile Source Emissions²

Year	Total On-Site Mobile Source Emissions, SJVAPCD (lb/day)										
	PM ₁₀	PM _{2.5}	DPM	NO _x	SO _x	CO	VOC	CO ₂	N ₂ O	CH ₄	CO ₂ e
Baseline	0.4748	0.4426	0.4748	13.1804	0.0613	37.0994	1.7267	6,484.5425	0.2630	0.0526	6,506.7958
Year 1	0.1602	0.1532	0.1602	7.8706	0.0567	33.0398	1.0325	5,987.6404	0.2429	0.0486	6,008.1884
Year 5	0.1349	0.1299	0.1349	7.4191	0.0567	33.0184	0.9896	5,987.6487	0.2429	0.0486	6,008.1968
Year 15	0.1216	0.1176	0.1216	7.2419	0.0567	32.9209	0.9764	5,987.6391	0.2429	0.0486	6,008.1871

- Notes:
- Equipment list provided by NCC (Ref: Port of Stockton_Nevada Questions NCC_IM Responses 07_18_2025, email from NCC 1/9/26).
 - Emissions modeled in CalEEMod for 2023, 2031, 2036, and 2046.
 - GHGs listed here are CO₂, CH₄, N₂O, and CO₂e.

Abbreviations:

CH₄: methane

CO: carbon monoxide

CO₂ : carbon dioxide

CO₂e: carbon dioxide equivalent

DPM: diesel particulate matter

GHG: greenhouse gas

hp: horsepower

lb: pound

MT: metric ton

N₂O: nitrous oxide

NO_x: oxides of nitrogen

PM₁₀: particulate matter less than 10 micrometers in diameter

PM_{2.5}: particulate matter less than 2.5 micrometers in diameter

SF: San Francisco

SJVAPCD: San Joaquin Valley Air Pollution Control District

SO_x: oxides of sulfur

VOC: volatile organic compound

Table 29**Operational Criteria Air Pollutant Emissions, San Joaquin Valley Air Pollution Control District****Annual Operational Emissions (tons/year)**

Source Category	PM₁₀	PM_{2.5}	NO_x	SO_x	CO	VOC
Baseline						
Trucks	0.23	0.07	1.38	0.004	0.20	0.02
Ships at Berth	0.15	0.14	6.78	0.36	0.68	0.27
Ships Maneuvering	0.01	0.01	0.51	0.01	0.09	0.08
Ships Transit	0.01	0.01	0.80	0.02	0.09	0.04
Harbor Craft at Berth	0.0005	0.0005	0.0170	0.0010	0.0123	0.0009
Harbor Craft Maneuvering and Transit	0.005	0.005	0.152	0.009	0.110	0.008
Rail	0.03	0.03	0.95	0.00	0.21	0.06
Employee Vehicles	0.07	0.02	0.03	0.00	0.46	0.03
Conveying/Loading	0.53	0.53	0.00	0.00	0.00	0.00
Mobile on Site	0.06	0.05	1.55	0.00	2.64	0.19
Baseline Total	1.08	0.86	12.17	0.42	4.49	0.70
Proposed Project Year 1						
Trucks	0.45	0.13	0.92	0.01	0.27	0.03
Ships at Berth	0.14	0.12	6.10	0.33	0.62	0.24
Ships Maneuvering	0.02	0.02	0.92	0.02	0.16	0.14
Ships Transit	0.02	0.02	1.43	0.04	0.17	0.08
Harbor Craft at Berth	0.0002	0.0002	0.009	0.002	0.022	0.001
Harbor Craft Maneuvering and Transit	0.002	0.002	0.08	0.02	0.20	0.01
Rail	0.06	0.06	2.27	0.00	0.53	0.14
Employee Vehicles	0.08	0.02	0.02	0.00	0.36	0.02
Conveying/Loading	0.99	0.99	0.00	0.00	0.00	0.00
Mobile on Site	0.01	0.01	0.86	0.00	2.06	0.10
Year 1 Total	1.77	1.38	12.61	0.42	4.38	0.76
Proposed Project Year 5						
Trucks	0.60	0.18	1.02	0.01	0.36	0.03

Table 29**Operational Criteria Air Pollutant Emissions, San Joaquin Valley Air Pollution Control District**

Source Category	PM₁₀	PM_{2.5}	NO_x	SO_x	CO	VOC
Ships at Berth	0.23	0.21	10.50	0.56	1.06	0.41
Ships Maneuvering	0.03	0.03	1.59	0.04	0.28	0.25
Ships Transit	0.03	0.03	2.47	0.07	0.29	0.13
Harbor Craft at Berth	0.000	0.000	0.016	0.003	0.038	0.001
Harbor Craft Maneuvering and Transit	0.00	0.00	0.14	0.03	0.34	0.01
Rail	0.11	0.12	4.43	0.00	1.25	0.24
Employee Vehicles	0.10	0.03	0.02	0.00	0.41	0.02
Conveying/Loading	2.05	2.05	0.00	0.00	0.00	0.00
Mobile on Site	0.01	0.01	0.83	0.00	2.48	0.10
Year 5 Total	3.18	2.67	21.01	0.73	6.51	1.21
Proposed Project Year 15						
Trucks	0.89	0.27	1.60	0.01	0.55	0.05
Ships at Berth	0.40	0.37	17.96	0.96	1.81	0.71
Ships Maneuvering	0.05	0.05	2.71	0.07	0.47	0.42
Ships Transit	0.06	0.05	4.22	0.12	0.50	0.23
Harbor Craft at Berth	0.01	0.01	0.35	0.03	0.40	0.02
Harbor Craft Maneuvering and Transit	0.01	0.01	0.49	0.10	1.15	0.05
Rail	0.11	0.10	4.29	0.01	0.47	0.29
Employee Vehicles	0.13	0.03	0.02	0.00	0.46	0.02
Conveying/Loading	3.44	3.44	0.00	0.00	0.00	0.00
Mobile on Site	0.01	0.01	0.87	0.01	3.23	0.11
Year 15 Total	5.12	4.35	32.52	1.32	9.04	1.89
CEQA Impacts						
Significance Threshold	15	15	10	27	100	10
Permitted Equipment and Activities						
Proposed Project Year 1 Increment	0.46	0.46	--	--	--	--
Proposed Project Year 5 Increment	1.52	1.52	--	--	--	--

Table 29

Operational Criteria Air Pollutant Emissions, San Joaquin Valley Air Pollution Control District

Source Category	PM ₁₀	PM _{2.5}	NO _x	SO _x	CO	VOC
Proposed Project Year 15 Increment	2.91	2.91	--	--	--	--
Significant?	No	No	No	No	No	No
Non-Permitted Equipment and Activities						
Proposed Project Year 1 Increment	0.23	0.06	0.44	0.00	-0.11	0.06
Proposed Project Year 5 Increment	0.58	0.29	8.83	0.31	2.02	0.51
Proposed Project Year 15 Increment	1.12	0.58	20.34	0.90	4.55	1.19
Significant?	No	No	Yes	No	No	No

Maximum Daily Operational Emissions (lb/day)

Source Category	PM ₁₀	PM _{2.5}	NO _x	SO _x	CO	VOC
Baseline						
Trucks	1.74	0.55	10.65	0.03	1.50	0.14
Ships at Berth	5.00	4.61	225.91	12.10	22.78	8.91
Ships Maneuvering	1.03	0.95	51.22	1.36	8.90	7.95
Ships Transit	1.13	1.04	79.59	2.26	9.36	4.28
Harbor Craft at Berth	0.10	0.10	3.41	0.21	2.46	0.18
Harbor Craft Maneuvering and Transit	0.46	0.46	15.24	0.92	10.99	0.80
Rail on Site	1.05	0.99	36.68	0.03	8.17	2.43
Employee Vehicles	0.36	0.09	0.20	0.01	3.23	0.16
Conveying/Loading	18.53	18.53	0.00	0.00	0.00	0.00
Mobile on Site	0.47	0.44	13.18	0.06	37.10	1.73
Baseline Total	29.89	27.77	436.08	16.97	104.50	26.58
Proposed Project Year 1						
Trucks	3.44	1.03	7.10	0.05	2.06	0.20
Ships at Berth	10.01	9.22	451.83	24.20	45.56	17.82
Ships Maneuvering	1.03	0.95	51.22	1.36	8.90	7.95
Ships Transit	1.13	1.04	79.59	2.26	9.36	4.28

Table 29**Operational Criteria Air Pollutant Emissions, San Joaquin Valley Air Pollution Control District**

Source Category	PM₁₀	PM_{2.5}	NO_x	SO_x	CO	VOC
Harbor Craft at Berth	0.05	0.05	2.02	0.41	4.96	0.19
Harbor Craft Maneuvering and Transit	0.11	0.11	4.53	0.92	11.08	0.43
Rail on Site	1.62	1.51	55.61	0.04	12.60	4.01
Employee Vehicles	0.43	0.11	0.12	0.01	2.52	0.12
Conveying/Loading	21.36	21.36	0.00	0.00	0.00	0.00
Mobile on Site	0.16	0.15	7.87	0.06	33.04	1.03
Year 1 Total	39.33	35.52	659.88	29.30	130.07	36.03
Proposed Project Year 5						
Trucks	4.64	1.40	7.81	0.07	2.79	0.27
Ships at Berth	10.01	9.22	451.83	24.20	45.56	17.82
Ships Maneuvering	1.03	0.95	51.22	1.36	8.90	7.95
Ships Transit	1.13	1.04	79.59	2.26	9.36	4.28
Harbor Craft at Berth	0.06	0.06	2.48	0.45	5.40	0.22
Harbor Craft Maneuvering and Transit	0.11	0.11	4.53	0.92	11.08	0.43
Rail on Site	2.57	2.75	95.03	0.09	24.96	6.26
Employee Vehicles	0.56	0.14	0.12	0.01	2.91	0.13
Conveying/Loading	21.88	21.88	0.00	0.00	0.00	0.00
Mobile on Site	0.13	0.13	7.42	0.06	33.02	0.99
Year 5 Total	42.11	37.65	700.02	29.40	143.97	38.34
Proposed Project Year 15						
Trucks	6.88	2.07	12.33	0.10	4.26	0.40
Ships at Berth	10.01	9.22	451.83	24.20	45.56	17.82
Ships Maneuvering	1.03	0.95	51.22	1.36	8.90	7.95
Ships Transit	1.13	1.04	79.59	2.26	9.36	4.28
Harbor Craft at Berth	0.02	0.02	0.86	0.18	2.10	0.08
Harbor Craft Maneuvering and Transit	0.11	0.11	4.53	0.92	11.08	0.43
Rail on Site	2.96	2.74	101.48	0.12	34.73	8.07

Table 29**Operational Criteria Air Pollutant Emissions, San Joaquin Valley Air Pollution Control District**

Source Category	PM₁₀	PM_{2.5}	NO_x	SO_x	CO	VOC
Employee Vehicles	0.69	0.17	0.13	0.01	3.30	0.12
Conveying/Loading	21.71	21.71	0.00	0.00	0.00	0.00
Mobile on Site	0.12	0.12	7.24	0.06	32.92	0.98
Year 15 Total	44.65	38.14	709.20	29.19	152.20	40.13
CEQA Impacts						
Air Quality Analysis Applicability Screening Threshold	100	100	100	100	100	100
Permitted Equipment and Activities						
Proposed Project Year 1 Increment	2.83	2.83	0	0	0	0
Proposed Project Year 5 Increment	3.35	3.35	0	0	0	0
Proposed Project Year 15 Increment	3.18	3.18	0	0	0	0
Significant?	No	No	No	No	No	No
Non-Permitted Equipment and Activities						
Proposed Project Year 1 Increment	6.61	4.92	223.80	12.33	25.57	9.45
Proposed Project Year 5 Increment	8.88	6.54	263.94	12.43	39.47	11.76
Proposed Project Year 15 Increment	11.58	7.19	273.12	12.22	47.70	13.55
Exceeds Air Quality Analysis Applicability Screening Threshold?	No	No	Yes	No	No	No

Abbreviations:

--: not applicable

CO: carbon monoxide

DPM: diesel particulate matter

lb: pound

NO_x: oxides of nitrogenPM₁₀: particulate matter less than 10 micrometers in diameterPM_{2.5}: particulate matter less than 2.5 micrometers in diameterSO_x: oxides of sulfur

VOC: volatile organic compound

Table 30
Operational Criteria Air Pollutant Emissions, Bay Area Air District

Annual Operational Emissions (tons/year)

Source Category	PM ₁₀	PM _{2.5}	NO _x	SO _x	CO	VOC
Baseline						
Ships Transit	0.061	0.056	3.6	0.10	0.63	0.37
Baseline Total	0.061	0.056	3.6	0.10	0.63	0.37
Proposed Project Year 1						
Ships Transit	0.11	0.10	6.4	0.19	1.1	0.67
Year 1 Total	0.11	0.10	6.4	0.19	1.1	0.67
Proposed Project Year 5						
Ships Transit	0.19	0.17	11	0.33	2.0	1.1
Year 5 Total	0.19	0.17	11	0.33	2.0	1.1
Proposed Project Year 15						
Ships Transit	0.32	0.30	19	0.56	3.4	2.0
Tugboats, Barge	0.020	0.020	0.87	0.15	1.8	0.073
Year 15 Total	0.34	0.32	20	0.71	5.1	2.0
CEQA Impacts						
Significance Threshold	15	10	10	--	--	10
Proposed Project Year 1 Increment	0.048	0.045	2.8	0.084	0.51	0.30
Proposed Project Year 5 Increment	0.13	0.12	7.5	0.22	1.3	0.78
Proposed Project Year 15 Increment	0.28	0.26	16	0.60	4.5	1.7
Significant?	No	No	Yes	--	--	No

Average Daily Operational Emissions (lb/day)

Source Category	PM ₁₀	PM _{2.5}	NO _x	SO _x	CO	VOC
Baseline						
Ships Transit	0.47	0.43	27.31	0.81	4.88	2.84
Baseline Total	0.47	0.43	27.31	0.81	4.88	2.84

Table 30
Operational Criteria Air Pollutant Emissions, Bay Area Air District

Source Category	PM ₁₀	PM _{2.5}	NO _x	SO _x	CO	VOC
Proposed Project Year 1						
Ships Transit	0.84	0.77	49.16	1.45	8.79	5.12
Year 1 Total	0.84	0.77	49.16	1.45	8.79	5.12
Proposed Project Year 5						
Ships Transit	1.44	1.33	84.67	2.50	15.13	8.82
Year 5 Total	1.44	1.33	84.67	2.50	15.13	8.82
Proposed Project Year 15						
Ships Transit	2.47	2.27	144.76	4.28	25.87	15.07
Tugboats, Barge	0.16	0.16	6.71	1.14	13.73	0.56
Year 15 Total	2.63	2.43	151.47	5.42	39.59	15.63
CEQA Impacts						
Significance Threshold	82	54	54	--	--	54
Proposed Project Year 1 Increment	0.37	0.34	21.85	0.65	3.90	2.28
Proposed Project Year 5 Increment	0.98	0.90	57.36	1.70	10.25	5.97
Proposed Project Year 15 Increment	2.16	2.00	124.16	4.62	34.71	12.79
Significant?	No	No	Yes	--	--	No

Notes:

Calculated average daily emissions assuming 260 days/year of operation.

Abbreviations:

--: not applicable

CEQA: California Environmental Quality Act

CO: carbon monoxide

DPM: diesel particulate matter

lb: pound

NO_x: oxides of nitrogen

PM₁₀: particulate matter less than 10 micrometers in diameter

PM_{2.5}: particulate matter less than 2.5 micrometers in diameter

SO_x: oxides of sulfur

VOC: volatile organic compound

Table 31**Operational Criteria Air Pollutant Emissions, Sacramento Metropolitan Air Quality Management District****Annual Operational Emissions (tons/year)**

Source Category	PM ₁₀	PM _{2.5}	NO _x	SO _x	CO	VOC
Baseline						
Rail Transit	0.021	0.020	0.86	7.2E-04	0.20	0.033
Baseline Total	0.021	0.020	0.86	7.2E-04	0.20	0.033
Proposed Project Year 1						
Rail Transit	0.047	0.046	2.2	0.0020	0.56	0.077
Year 1 Total	0.047	0.046	2.2	0.0020	0.56	0.077
Proposed Project Year 5						
Rail Transit	0.10	0.14	5.2	0.0058	1.6	0.17
Year 5 Total	0.10	0.14	5.2	0.0058	1.6	0.17
Proposed Project Year 15						
Rail Transit	0.059	0.057	3.6	0.022	0.0088	0.13
Year 15 Total	0.059	0.057	3.6	0.022	0.0088	0.13
CEQA Impacts						
Significance Threshold	15	15	--	--	--	--
Proposed Project Year 1 Increment	0.027	0.026	1.3	0.0012	0.35	0.044
Proposed Project Year 5 Increment	0.080	0.12	4.3	0.0051	1.4	0.14
Proposed Project Year 15 Increment	0.038	0.037	2.8	0.022	-0.19	0.093
Significant?	No	No	--	--	--	--

Average Daily Operational Emissions (lb/day)

Source Category	PM ₁₀	PM _{2.5}	NO _x	SO _x	CO	VOC
Baseline						
Rail Transit	0.79	0.77	33	0.028	7.8	1.3
Baseline Total	0.79	0.77	33	0.028	7.8	1.3
Proposed Project Year 1						
Rail Transit	0.83	0.81	39	0.034	10	1.4
Year 1 Total	0.83	0.81	39	0.034	10	1.4

Table 31**Operational Criteria Air Pollutant Emissions, Sacramento Metropolitan Air Quality Management District**

Source Category	PM ₁₀	PM _{2.5}	NO _x	SO _x	CO	VOC
Proposed Project Year 5						
Rail Transit	1.6	2.1	81	0.091	26	2.7
Year 5 Total	1.6	2.1	81	0.091	26	2.7
Proposed Project Year 15						
Rail Transit	0.79	0.77	49	0.12	34	1.7
Year 15 Total	0.79	0.77	49	0.12	34	1.7
CEQA Impacts						
Significance Threshold	80	82	65	--	--	65
Proposed Project Year 1 Increment	0.041	0.040	5.4	0.0068	1.9	0.085
Proposed Project Year 5 Increment	0.79	1.4	48	0.063	18	1.4
Proposed Project Year 15 Increment	0.0060	0.0082	16	0.091	26	0.43
Significant?	No	No	No	--	--	No

Abbreviations:

--: not applicable

CO: carbon monoxide

CEQA: California Environmental Quality Act

DPM: diesel particulate matter

lb: pound

NO_x: oxides of nitrogenPM₁₀: particulate matter less than 10 micrometers in diameterPM_{2.5}: particulate matter less than 2.5 micrometers in diameterSO_x: oxides of sulfur

VOC: volatile organic compound

Table 32
Operational Electricity Consumption

Source Category	Electricity Consumption (kWh)	Emission Factor			Annual Emissions			
		CO ₂ (lb/MWh)	CH ₄ (lb/MWh)	N ₂ O (lb/MWh)	CO ₂ (MT/year)	CH ₄ (MT/year)	N ₂ O (MT/year)	CO ₂ e (MT/year)
On-Site Electricity Consumption: Baseline	3,600,000	203.98	0.03	0.004	333.09	0.05	0.01	336.33
On-Site Electricity Consumption: with Project	7,000,000	203.98	0.03	0.004	647.68	0.10	0.01	653.98

Notes:

Emission factors are from CalEEMod Appendix G, table G-3, for the Pacific Gas & Electric Company in years 2023 and 2046.

NCC has indicated there would be no change in natural gas or water usage from baseline to project. Water is only for bathrooms; natural gas is used for limited heating of one building.

Abbreviations:

CH₄: methane

CO₂ : carbon dioxide

CO₂e: carbon dioxide equivalent

kWh: kilowatt-hour

lb: pound

MT: metric ton

MWh: megawatt-hour

N₂O: nitrous oxide

NCC: Nevada Cement Company

Table 33
Operational Greenhouse Gas Emissions, California

Source Category	CO ₂	N ₂ O	CH ₄	CO ₂ e
	(metric tons/year)			
Baseline				
Trucks	1,118	0.26	0.00	1,189
Ships at Berth	540	0.03	0.00	548
Ships Maneuvering and Transit	414	0.01	0.01	418
Tugboats	16	0.00	0.00	16
Rail	360	0.24	0.03	425
Employee Vehicles	114	0.00	0.00	115
On-Site Electricity Consumption	333	0.01	0.05	336
Mobile on Site	463	0.02	0.00	465
Baseline Total	3,358	0.58	0.10	3,511
Proposed Project Year 1				
Trucks	1,915	0.53	0.00	2,056
Ships at Berth	486	0.03	0.00	493
Ships Maneuvering and Transit	745	0.03	0.01	752
Tugboats	28	0.00	0.00	28
Rail	969	0.32	0.07	1,056
Employee Vehicles	115	0.00	0.00	116
On-Site Electricity Consumption	648	0.01	0.10	654
Mobile on Site	404	0.02	0.00	406
Year 1 Total	5,311	0.93	0.20	5,561
Proposed Project Year 5				
Trucks	2,486	0.71	0.00	2,675
Ships at Berth	837	0.04	0.01	849
Ships Maneuvering and Transit	1,284	0.04	0.02	1,295
Tugboats	48	0.00	0.00	49
Rail	2,759	0.85	0.17	2,988
Employee Vehicles	141	0.00	0.00	142
On-Site Electricity Consumption	648	0.01	0.10	654
Mobile on Site	462	0.02	0.00	463
Year 5 Total	8,665	1.68	0.32	9,115
Proposed Project Year 15				
Trucks	3,511	1.05	0.01	3,790
Ships at Berth	1,432	0.08	0.01	1,452
Ships Maneuvering and Transit	2,195	0.08	0.04	2,214
Tugboats	422	0.02	0.00	427
Rail	4,196	1.13	0.26	4,501
Employee Vehicles	166	0.00	0.00	167

Table 33
Operational Greenhouse Gas Emissions, California

Source Category	CO ₂	N ₂ O	CH ₄	CO ₂ e
	(metric tons/year)			
On-Site Electricity Consumption	648	0.01	0.10	654
Mobile on Site	567	0.02	0.00	569
Year 15 Total	13,136	2.39	0.43	13,775
Proposed Project Year 1 Increment	1,953	0.36	0.10	2,050
Proposed Project Year 5 Increment	5,306	1.11	0.21	5,605
Proposed Project Year 15 Increment	9,778	1.81	0.33	10,265

Abbreviations:

CH₄: methane

CO₂ : carbon dioxide

CO₂e: carbon dioxide equivalent

N₂O: nitrous oxide