

APPENDIX C

Air Criteria Pollutants Emissions and Greenhouse Gases (GHG) Emissions Analysis

Proposed Project Port San Luis Harbor Operations and Maintenance (O&M) Breakwater Repair Project Air Emissions = Construction O&M Breakwater Repair Work Emissions (Excavation around Breakwater Emissions + O&M Rock Repair) + Rock Delivery Transport

Proposed Project O&M Breakwater Repair Work Emissions = Construction (Excavation around Breakwater Emissions + O&M Breakwater Rock Repair Emissions) + Rock Delivery Transport Emissions; Construction (Excavation around Breakwater Emissions + O&M Breakwater Rock Repair) Air Emissions would only occur in Port San Luis Harbor, San Luis Obispo County.

Rock Delivery Scenario Option 1: Sea Vessel Rock Delivery Transport (All Sea vessels transport of rock, from Catalina Island in Los Angeles County to Port San Luis Harbor in San Luis Obispo County).

Rock Delivery Scenario Option 2: Combination Land Rock Haul Truck Roadway Delivery + Sea Vessels Rock Transport (Combination Land Rock Haul Trucks from Apple Valley/Victorville (San Bernardino County High Desert area) to Port of Hueneme (Ventura County), then off loading on to marine barges, and then departing Port of Hueneme by sea to Port San Luis Harbor (San Luis Obispo County)).

Table NAAQS Attainment Status

Air Basin	MDAB¹	SCAB²	SCCAB³	SCCAB⁴	SCCAB⁵
Air District	MDAQMD¹	SCAQMD²	VCAPCD³	SBCAPCD⁴	SLOAPCD⁵
Pollutant					
Ozone (O3)⁷	Non-attainment (Severe ⁶)	Non-attainment (Extreme ⁶)	Non-Attainment (Serious ⁶)	Unclassifiable/Attainment	Attainment ⁶ (Western portion of San Luis Obispo County); Non-Attainment ⁶ [(Eastern portion of San Luis Obispo County) - Marginal)]
Carbon Monoxide (CO)	Unclassified/Attainment	Attainment (Maintenance)	Attainment	Attainment	Unclassified
Nitrogen Dioxide (NO2)	Unclassified/Attainment	Attainment (Maintenance)	Attainment	Unclassifiable/Attainment	Unclassified
Particulate Matter (PM10)	Non-attainment (Moderate ⁶)	Attainment (Maintenance)	Attainment	Attainment	Unclassified/Attainment
Particulate Matter (PM2.5)	Unclassified/Attainment	Non-attainment (Serious ⁶)	Attainment	Unclassifiable/Attainment	Unclassifiable/Attainment
Sulfur Dioxide (SO2)	Unclassified/Attainment	Unclassifiable/Attainment	Attainment	Unclassifiable/Attainment	Unclassified
Lead (Pb)	Unclassified/Attainment	Non-attainment (Serious ⁶)	Attainment	Attainment	Attainment

Source: ¹ <https://www.mdaqmd.ca.gov/home/showpublisheddocument?id=1267>, Accessed January 28, 2021

² <https://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/naaqs-caaqs-feb2016.pdf?sfvrsn=2>, accessed January 28, 2021, February 2-3, 2021

³ http://www.vcapcd.org/air_quality_standards.htm, Accessed January 28, 2021

⁴ <https://www.ourair.org/air-quality-standards/#data-table>, Accessed January 28, 2021

⁵ <https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/AttainmentStatus29January2019.pdf> (O3 Attainment, Western portion of San Luis Obispo County; O3 Non-Attainment-Marginal, Eastern portion of San Luis Obispo County), accessed 1/28/2021

⁶ <https://www3.epa.gov/airquality/greenbook/ancl2.html>; <https://www3.epa.gov/airquality/greenbook/ancl3.html>, accessed January 28, 2021, February 2-3, 2021

⁷ Ozone O₃ [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NO_x)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). The relation between O₃, NO_x and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O₃ is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Additionally, due to the variability in rates of ozone formation, EMFAC2007 does not provide estimates for ozone. Instead, the emission associated with ozone precursors (VOCs and NO_x) are calculated and used as a surrogate for reporting O₃ emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O₃ formation reaction is variable and reversible, actual O₃ levels are lower than those estimated. NAAQS Ozone (O₃) is for 8-hour. There is no NAAQS 1-hour for Ozone (O₃).

Table Applicable General Conformity Rates (Tons/Year)¹

Air Basin	MDAB	SCAB	SCCAB	SCCAB	SCCAB
Air District	MDAQMD	SCAQMD	VCAPCD	SBCAPCD	SLOAPCD
Pollutant					
Ozone (O3)³	25	10	50	100	100 ²
Volatile Organic Compound (VOC)³	25	10	50	100	100
Nitrogen Oxide (NOx)³	25	10	50	100	100
Carbon Monoxide (CO)	100	100	100	100	100
Nitrogen Dioxide (NO2)	100	100	100	100	100
Particulate Matter (PM10)	100	100	100	100	100
Particulate Matter (PM2.5)	100	70	100	100	100
Sulfur Dioxide (SO2)	100	100	100	100	100
Lead (Pb)	25	25	25	25	25

Source: ¹ 40 CFR 93.153(b)(1) and 40 CFR 93.153(b)(2); <https://www.epa.gov/general-conformity/de-minimis-tables>, accessed February 2 - 3, 2021

² Port San Luis Harbor is located in Western San Luis Obispo County that is in attainment for Ozone (O3); <https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/AttainmentStatus29January2019.pdf> (O3 Non-Attainment-Marginal, Eastern portion of San Luis Obispo County; O3 Attainment, Western portion of San Luis Obispo County, accessed 1/28/2021)

³ Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). The relation between O3, NOx and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Additionally, due to the variability in rates of ozone formation, EMFAC2007 does not provide estimates for ozone. Instead, the emission associated with ozone precursors (VOCs and NOx) are calculated and used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

Table Rock Delivery Scenario Option 1: Sea Vessels Rock Delivery Transport Air Emissions from Catalina Island (Pebble Beach Quarry) located in Los Angeles County to Port San Luis Harbor located in San Luis Obispo County

SCAB SCAQMD Air Emission Estimates (Tons/year) - Option 1 : Los Angeles County Sea Vessels Rock Transport Air Emissions

Work Activity Emissions (Tons/Year)	Pollutant	VOC ¹	CO	NO2	PM10	PM2.5	SO2	Pb ²	GHG ³	GHG ⁴ MT/Year CO2eq.
Construction										
Sea Based Rock Delivery		0.039	0.2459	1.2089	0.036	0.033	0.087	Not Calculated (n.c.)	75.4199	68.471
Total		0.039	0.2459	1.2089	0.036	0.033	0.087	Not Calculated (n.c.)	75.4199	68.471
General Conformity Applicable Rates		10	100	100	100	70	100	25	³	³

Note(s): ¹ Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOx, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG emissions Metric Tons (MT)/Year calculator. Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Table Rock Delivery Scenario Option 1: Sea Vessels Rock Delivery Transport Air Emissions from Catalina Island (Pebbly Beach Quarry) located in Los Angeles County to Port San Luis Harbor located in San Luis Obispo County

SCCAB VCAPCD Air Emissions Estimates (Tons/year) - Option 1: Ventura County Sea Vessels Rock Delivery Transport Air Emissions

Work Activity Emissions (Tons/Year)	Pollutant	VOC ¹	CO	NO2	PM10	PM2.5	SO2	Pb ²	GHG ³	GHG ⁴ MT/Year CO2eq.
Construction										
Sea Based Rock Delivery		0.04212	0.26568	1.30572	0.03888	0.03564	0.09396	Not Calculated (n.c.)	81.4536	74.196
Total		0.04212	0.26568	1.30572	0.03888	0.03564	0.09396	Not Calculated (n.c.)	81.4536	74.196
General Conformity Applicable Rates		50	100	100	100	100	100	25	³	³

Note(s): ¹ Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOx, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG emissions Metric Tons (MT)/Year calculator. Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Table Rock Delivery Scenario Option 1: Sea Vessels Rock Delivery Transport Air Emissions from Catalina Island (Pebbly Beach Quarry) located in Los Angeles County to Port San Luis Harbor located in San Luis Obispo County

SCCAB SBCAPCD Air Emissions Estimates (Tons/year) - Option 1: Santa Barbara County Sea Vessels Rock Delivery Transport Air Emissions

Work Activity Emissions (Tons/Year)	Pollutant	VOC ¹	CO	NO2	PM10	PM2.5	SO2	Pb ²	GHG ³	GHG ⁴ MT/Year CO2eq.
Construction										
Sea Based Rock Delivery		0.03042	0.19188	0.94302	0.02808	0.02574	0.06786	Not Calculated (n.c.)	58.8276	53.586
Total		0.03042	0.19188	0.94302	0.02808	0.02574	0.06786	Not Calculated (n.c.)	58.8276	53.586
General Conformity Applicable Rates		100	100	100	100	100	100	25	³	³

Note(s): ¹ Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOx, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n.c.)- Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Table Rock Delivery Scenario Option 1: Construction O&M Breakwater Repair Work Air Emissions + Sea Vessels Rock Delivery Transport Air Emissions from Catalina Island (Pebble Beach Quarry) located in Los Angeles County to Port San Luis Harbor located in San Luis Obispo County

SCCAB SLOCAPCD Air Emissions Estimates (Tons/year) - Option 1 : San Luis Obispo County Construction O&M Breakwater Repair Work Emissions + San Luis Obispo County Sea Vessels Rock Delivery Transport Air Emissions

Work Activity Emissions (Tons/Year)	Pollutant	VOC ¹	CO	NO2	PM10	PM2.5	SO2	Pb ²	GHG ³	GHG ⁴ MT/Year CO2eq.
Construction		0.46	2.92	14.26	0.42	0.4	1.01	Not Calculated (n.c.)	897.01	819
Sea Based Rock Delivery		0.01859	0.11726	0.57629	0.01716	0.01573	0.04147	Not Calculated (n.c.)	35.95026	32.8
Total		0.47859	3.03726	14.83629	0.43716	0.41573	1.05147	Not Calculated (n.c.)	932.9603	851.8
General Conformity Applicable Rates		100	100	100	100	100	100	25	³	³

Note(s):¹ Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOx, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG emissions Metric Tons (MT)/Year calculator. Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Table Rock Delivery Scenario Option 2: Combination Land Rock Truck Haul Roadway Delivery Transport + Sea Vessels Rock Transport Emissions (Combined Land Rock Haul Trucks from Inland Quarry in Apple Valley/Victorville (in San Bernardino County) to Port of Hueneme (in Ventura County), then off loading rock onto sea vessels barges, and then departing Port of Hueneme to Port San Luis Harbor in San Luis Obispo County

MDAB MDAQMD Air Emissions (Tons/Year) – Option 2: San Bernardino County Land Truck Transport on Roadway Air Emissions

Work Activity Emissions (Tons/Year)	Pollutant	VOC ¹	CO	NO2	PM10	PM2.5	SO2	Pb ²	GHG ³	GHG ⁴ MT/Year CO2eq.
Construction										
Rock Delivery		0.433668 8	2.245608 7	4.4215552 6	0.21885 9	0.17207 2	0.01553 3	Not Calculate d (n.c.)	1596.08 5	1448.6666 7
Total		0.433668 8	2.245608 7	4.4215552 6	0.21885 9	0.17207 2	0.01553 3	Not Calculate d (n.c.)	1596.08 5	1448.6666 7
General Conformity Applicable Rates		25	100	100	100	100	100	25	³	³

Note(s): ¹ Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOx, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG emissions Metric Tons (MT)/Year calculator. Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Table Rock Delivery Scenario Option 2: Combination Land Rock Truck Haul Delivery on Roadway Transport + Sea Vessels Rock Delivery Transport Emissions (Combined Land Rock Haul Trucks from Inland Quarry in Apple Valley/Victorville (in San Bernardino County) to Port of Hueneme (in Ventura County), then off loading rock onto sea vessels barges, and then departing Port of Hueneme to Port San Luis Harbor in San Luis Obispo County

SCAB SCAQMD Air Emissions Estimates (Tons/year) Option 2: Los Angeles County Land Truck Transport on Roadways Air Emissions

Work Activity Emissions (Tons/Year)	Pollutant	VOC ¹	CO	NO2	PM10	PM2.5	SO2	Pb ²	GHG ³	GHG ⁴ MT/Year CO2eq.
Construction										
Rock Delivery		0.370205 1	1.916983 1	3.7744983 9	0.18683 1	0.1468 9	0.01359 6	Not Calculated (n.c.)	1362.51 2	1236.6666 7
Total		0.370205 1	1.916983 1	3.7744983 9	0.18683 1	0.1468 9	0.01359 6	Not Calculated (n.c.)	1362.51 2	1236.6666 7
General Conformity Applicable Rates		10	100	100	100	70	100	25	³	³

Note(s): ¹ Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOx, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated

by any of the alternatives.

³ There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG emissions Metric Tons (MT)/Year calculator. Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Table Rock Delivery Scenario Option 2: Combination Land Rock Truck Haul Delivery on Roadway Transport + Sea Vessels Rock Delivery Transport Emissions Combined Land Rock Haul Trucks from Inland Quarry in Apple Valley/Victorville (in San Bernardino County) to Port of Hueneme (in Ventura County), then off loading rock onto sea vessels barges, and then departing Port of Hueneme to Port San Luis Harbor in San Luis Obispo County

SCCAB VCAPCD Air Emissions Estimates (Tons/year) - Option 2: Ventura County Land Truck Transport on Roadways Air Emissions

Work Activity Emissions (Tons/Year)	Pollutant	VOC ¹	CO	NO ₂	PM ₁₀	PM _{2.5}	SO ₂	Pb ²	GHG ³	GHG ⁴ MT/Year CO ₂ eq.
Construction										
Rock Delivery		0.14808 2	0.766793 2	1.5097993 6	0.07473 2	0.05875 6	0.00530 4	Not Calculated (n.c.)	545.004 6	494.66666 7
Total		0.14808 2	0.766793 2	1.5097993 6	0.07473 2	0.05875 6	0.00530 4	Not Calculated (n.c.)	545.004 6	494.66666 7
General Conformity Applicable Rates		50	100	100	100	100	100	25	³	³

Note(s): ¹ Ozone O₃ [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NO_x)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O₃) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NO_x) and VOC. The relation between O₃, NO_x, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O₃ is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O₃ emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O₃ formation reaction is variable and reversible, actual O₃ levels are lower than those estimated. NAAQS Ozone (O₃) is for 8-hour. There is no NAAQS 1-hour for Ozone (O₃).

² Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants

were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG emissions Metric Tons (MT)/Year calculator. Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

**Table Rock Delivery Scenario Option 2: Combination Land Rock Truck Haul Delivery on Roadway Transport + Sea Vessels Rock Delivery ⁵
Transport Emissions Combined Land Rock Haul Trucks from Inland Quarry in Apple Valley/Victorville (in San Bernardino County) to Port of Hueneme (in Ventura County), then off loading rock onto sea vessels barges, and then departing Port of Hueneme to Port San Luis Harbor in San Luis Obispo County**

SCCAB VCAPCD Air Emissions Estimates (Tons/year) - Option 2: Ventura County Sea Vessels Rock Transport Air Emissions

Work Activity Emissions (Tons/Year)	Pollutant	VOC ¹	CO	NO2	PM10	PM2.5	SO2	Pb ²	GHG ³	GHG ⁴ MT/Year CO2eq.
Construction										
Rock Delivery		0.02106	0.13284	0.65286	0.01944	0.01782	0.04698	Not Calculated (n.c.)	40.7268	37.098
Total		0.02106	0.13284	0.65286	0.01944	0.01782	0.04698	Not Calculated (n.c.)	40.7268	37.098
General Conformity Applicable Rates		50	100	100	100	100	100	25	³	³

Note(s): ¹ Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOx, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated

by any of the alternatives.

³ There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG emissions Metric Tons (MT)/Year calculator. Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

⁵ SCCAB VCAPCD Sea Vessels Rock Delivery Transport Emissions for Option 2: Combination Land + Sea Rock Delivery are estimated at approximately half (50% or 0.5), as Port Hueneme is located approximately in the middle of the Ventura County coastline, compared to Sea Vessels Rock Delivery Transport Emissions of the Option 1 SCAAB VCAPCD Sea Rock Delivery Transport Emissions for Ventura County that are for the entire Ventura County coastline.

Table Rock Delivery Scenario Option 2: Combination Land Rock Truck Haul Delivery on Roadway Transport + Sea Vessels Rock Delivery Transport Emissions Combined Land Rock Haul Trucks from Inland Quarry in Apple Valley/Victorville (in San Bernardino County) to Port of Hueneme (in Ventura County), then off loading rock onto sea vessels barges, and then departing Port of Hueneme to Port San Luis Harbor in San Luis Obispo County

SCCAB SBCAPCD Air Emissions Estimates (Tons/year) - Option 2: Santa Barbara County Sea Vessels Rock Transport Air Emissions

Work Activity Emissions (Tons/Year)	Pollutant	VOC ¹	CO	NO2	PM10	PM2.5	SO2	Pb ²	GHG ³	GHG ⁴ MT/Year CO2eq.
Construction										
Rock Delivery		0.03042	0.19188	0.94302	0.02808	0.02574	0.06786	Not Calculated (n.c.)	58.8276	53.586
Total		0.03042	0.19188	0.94302	0.02808	0.02574	0.06786	Not Calculated (n.c.)	58.8276	53.586
General Conformity Applicable Rates		100	100	100	100	100	100	25	³	³

Note(s): ¹ Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOx, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated

by any of the alternatives.

³ There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG emissions Metric Tons (MT)/Year calculator. Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Table Rock Delivery Scenario Option 2: Combination Land Rock Truck Haul Delivery on Roadway Transport + Sea Vessels Rock Delivery Transport (Combined Land Rock Haul Trucks Delivery Transport from Inland Quarry in Apple Valley/Victorville in San Bernardino County to Port of Hueneme in Ventura County, then off loading rock onto sea vessels barges, and then departing Port of Hueneme with rock on sea vessels delivery transport to Port San Luis Harbor in San Luis Obispo County

SCCAB SLOCAPCD Air Emissions Estimates (Tons/year) for - Option 2: San Luis Obispo County Construction O&M Breakwater Repair Work Emissions + San Luis Obispo County Sea Vessels Rock Transport Air Emissions

Work Activity Emissions (Tons/Year)	Pollutant	VOC ¹	CO	NO2	PM10	PM2.5	SO2	Pb ²	GHG ³	GHG ⁴ MT/Year CO2eq.
Construction		0.46	2.92	14.26	0.42	0.4	1.01	Not Calculated (n.c.)	897.01	819
Rock Delivery		0.01859	0.11726	0.57629	0.01716	0.01573	0.04147	Not Calculated (n.c.)	35.95026	32.8
Total		0.47859	3.03726	14.83629	0.43716	0.41573	1.05147	Not Calculated (n.c.)	932.9603	851.8
General Conformity Applicable Rates		100	100	100	100	100	100	25	³	³

Note(s): ¹ Ozone O3 [precursors: Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx)]. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus,

EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG emissions Metric Tons (MT)/Year calculator. Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Proposed Project Port San Luis Harbor Sea Vessel Rock Delivery (from Catalina Island in Los Angeles County to Port San Luis Harbor in San Luis Obispo County) Air Emission Calculations

Project Data

- (1) Equipment: 1 rock barge, tug boats, crew boat, a crane-equipped barge, a small craft support vessel, a crew boat vessel, a work boat, a survey boat.
- (2) Approximate production rate: Approximately 60,000 tons of new stone is required to perform operations and maintenance (O&M) repair on the breakwater. Individual stone size range is anticipated to be from 5 to 20 tons.
- (3) A rock barge capacity is approximately 2,000 to 4,000 tons per barge
- (4) A workday is approximately 11 hours a day (daylight hours); 6 days a week. Rock barge transport by sea is expected to be completed in approximately 60 days, approximately 11 hours a day workday, 6 days a week.
- (5) Approximate distance from Pebbly Beach quarry (Catalina Island) to Port San Luis Harbor by sea; approximately 400 miles one way (800 miles round trip).
- (6) 10 to 12 laborers for crew/construction work
- (7) Proposed Project area (breakwater) is located in Port San Luis Harbor, San Luis Obispo County

Engine Data									
Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hours Per Day	Daily Hp-Hrs	Work Days	Annual Hp-Hrs	Ref. Notes
Barge (rock/storage)	195	0.20	1	39	11	429	60	25,740	(1)(2)
Tug Boat	800	0.25	2	400	11	4,400	60	264,000	(1) (2)
Crew Boat	400	0.20	1	80	11	880	60	52,800	(1) (2)
Crane equipped barge	180	0.50	1	90	11	990	60	59,400	(2) (2)
Small Craft Support Vessel	250	0.20	1	50	11	550	60	33,000	(1) (2)
Work Boat	250	0.20	1	50	11	550	60	33,000	(1) (2)
Survey Boat	250	0.20	1	50	11	550	60	33,000	(1) (2)

Ref. Notes: (1) Horsepower (Hp) and Load Factor data from Port of Los Angeles (POLA) 2009 Channel Deepening Project AQ Appendix, EIS/EIR

Ref. Notes: (2) Hp from engine data matched to Emission Factors below which are categorized by Hp

Emission Factors

Emission Factors (Gm/Hp-Hr)	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Ref. Notes
Off-Road Equipment - 25-50 Hp	2.06	5.92	5.94	0.18	0.70	0.64	568	0.11	0.01	
Off-Road Equipment - 51-120 Hp	1.11	3.77	7.56	0.18	0.77	0.71	568	0.1	0.01	
Off-Road Equipment - 121-175 Hp	0.71	3.04	6.94	0.18	0.42	0.38	568	0.09	0.01	
Off-Road Equipment - 176-250 Hp	0.46	1.48	6.66	0.18	0.23	0.21	568	0.09	0.01	
Off-Road Equipment - 251-500 Hp	0.37	1.73	5.51	0.18	0.20	0.18	568	0.08	0.01	
Off-Road Equipment - 501-750 Hp	0.46	1.99	6.66	0.18	0.24	0.22	568	0.08	0.01	
Off-Road Equipment >750 Hp	0.47	2.02	6.48	0.18	0.20	0.18	568	0.08	0.01	
Crew/Small Craft/Work/Survey Boat	0.16	1.27	7.46	0.47	0.30	0.28	481.34	0.07	0.00	
Tugboat	0.20	1.87	8.94	0.81	0.22	0.21	481.34	0.07	0.01	

Annual Emissions (Tons/year)							GHG = CO2 + CH4 + N2O				
Activity/Equipment Type	ROG ¹	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Pb (Lead) ²	Ref. Notes
Barge (rock/storage)	0.01	0.04	0.17	0.00	0.01	0.01	14.62	0.00	0.00	Not Calculated (n.c.)	
Tug Boat	0.05	0.49	2.36	0.21	0.06	0.06	127.07	0.02	0.00	n.c.	
Crew Boat	0.01	0.07	0.39	0.02	0.02	0.01	25.41	0.00	0.00	n.c.	
Crane equipped barge	0.03	0.09	0.40	0.01	0.01	0.01	33.74	0.01	0.00	n.c.	
Small Craft Support Vessel	0.02	0.05	0.22	0.01	0.01	0.01	18.74	0.00	0.00	n.c.	
Work Boat	0.01	0.04	0.25	0.02	0.01	0.01	15.88	0.00	0.00	n.c.	
Survey Boat	0.01	0.04	0.25	0.02	0.01	0.01	15.88	0.00	0.00	n.c.	
Sea Vessels Rock Delivery Emission(Tons/year)	0.13	0.82	4.03	0.29	0.12	0.11	251.36	0.04	0.00	n.c.	

Sea Vessel Rock Delivery GHG emissions = 229 Metric Tons (MT)/Year CO2 equivalent (CO2 eq). Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Total Emissions (Tons/year)

$$\text{GHG} = \text{CO}_2 + \text{CH}_4 + \text{N}_2\text{O}$$

	ROG₁	CO	NO_x	SO_x	PM10	PM2.5	CO₂	CH₄	N₂O	Pb (Lead)₂
Est. Emissions	0.13	0.82	4.03	0.29	0.12	0.11	251.36	0.04	0.00	n.c.
Applicability Rates	100	100	100	100	100	100	n/a	n/a	n/a	25

Daily Emissions (lbs/day)								GHG = CO2 + CH4 + N2O				
Activity/Equipment Type		ROG ¹	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Pb (Lead) ²	Ref. Note
Barge (carrying rock)		0.44	1.40	6.30	0.17	0.22	0.20	537.20	0.09	0.01	n.c.	(3)
Tug Boat		1.94	18.14	86.72	7.86	2.13	2.04	4669.08	0.68	0.05	n.c.	(3)
Crew Boat		0.31	2.46	14.47	0.91	0.58	0.54	933.82	0.14	0.00	n.c.	(3)
Crane Equipped Barge		1.00	3.23	14.54	0.39	0.50	0.46	1239.68	0.20	0.02	n.c.	(3)
Small Craft Support Vessel		0.56	1.79	8.08	0.22	0.28	0.25	688.71	0.11	0.01	n.c.	(3)
Work Boat		0.19	1.54	9.05	0.57	0.36	0.34	583.64	0.08	0.00	n.c.	(3)
Survey Boat		0.24	2.27	10.84	0.98	0.27	0.25	583.64	0.08	0.01	n.c.	(3)
Total Daily Emissions (lbs/day)		4.68	30.83	149.99	11.10	4.34	4.09	9235.76	1.38	0.10	n.c.	

Ref. Notes: (3) grams to lbs conversion 1lb = 453.6 g

Proposed Project San Luis Obispo (SLO) County (SLOC) Sea Vessels Rock Delivery Emissions Compared to SLOCAPCD Thresholds (lbs/day); Tons/Quarter (QTR); Tons/Year; GHG MT/year CO₂eq
 GHG = CO₂ + CH₄ + N₂O

County	Pollutant	ROG	CO	NOx	SOx	PM10	PM2.5	CO ₂	CH ₄	N ₂ O	GHG	Pb(Lead)
SLO Sea Vessels Rock	lb/day	0.67	4.41	21.45	1.59	0.62	0.58	1320.71	0.20	0.01	1320.92	n.c.
SLO Sea Vessel Rock	Tons/QTR	0.01859	0.11726	0.57629	0.04147	0.01716	0.01573	35.94455	0.005352	0.000358	35.95026	n.c.
SLO Sea Vessel Rock	Tons/Year	0.01859	0.11726	0.57629	0.04147	0.01716	0.01573	35.94455	0.005352	0.000358	35.95026	n.c.
SLO Sea Vessels Rock Delivery	GHG MT/year CO ₂ eq										32.8	
SLOCAPCD Thresholds		137 L/D ^a		137 L/D ^a		2.5 T/Q ^c	7 lbs/day ^b	GHG = CO ₂ +CH ₄ +N ₂ O = 10,000 MT/Year CO ₂ eq				

Notes: ^a ROG+ NOx (combined) = 137 lbs per day (L/D); Quarterly Tier 1 = 2.5 tons; Quarterly Tier 2 = 6.3 tons.

^b Diesel Particulate Matter (DPM) Emissions - 7 lbs/day (L/D); Quarterly Tier 1 = 0.13 tons; Quarterly Tier 2 = 0.32 tons. Assume PM_{2.5} emission is similar to DPM emission.

^c Fugitive Particulate Matter (PM₁₀), Dust Emissions Quarterly 1= 2.5 ton/qtr (T/Q).

Proposed Project Sea Vessels Rock Delivery Emissions (Tons/year) compared to General Conformity Applicability Rates (Tons/Year)

Sea Vessels Rock Delivery Emissions (Tons/year)											
Air Basin Air District Emissions General Conformity Applicability Rates (Tons/Year)		RO G¹	CO	NOx	SOx	PM10	PM2.5	CO₂³	CH₄³	N₂O³	Pb (Lead)
SCAB SCAQMD General Conformity Thresholds (Tons/Year)		10	100	100	100	100	70	n/a	n/a	n/a	25
SCCAB Ventura CO. APCD Gen. Con. Thresholds (Tons/Year)		50	100	100	100	100	100	n/a	n/a	n/a	25
SCCAB Santa Barbara CO. APCD Gen. Con. Thresholds (Tons/Year)		100	100	100	100	100	100	n/a	n/a	n/a	25
SCCAB SLOCAPCD General Conformity Thresholds (Tons/Year)		100	100	100	100	100	100	n/a	n/a	n/a	25

Note(s): ¹ Ozone (O₃) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NO_x) and VOC. The relation between O₃, NO_x, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O₃ is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O₃ emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O₃ formation reaction is variable and reversible, actual O₃ levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O₃) is for 8-hour. There is no NAAQS 1-hour for Ozone (O₃).

² Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance. GHG can be comprised of CO₂, CH₄, N₂O.

Proposed Project Sea Vessels Rock Delivery Emissions in San Luis Obispo (SLO) County; Air Basin/APCD Thresholds (Lbs/day), Tons/Quarter (QTR); Tons/Year; MT/year CO2eq

GHG = CO2 + CH4 + N2O

Air Basin Air District Emissions Thresholds (lbs/day)	ROG ¹	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Pb (Lead)
SCAB SCAQMD Emission Thresholds (lbs/day)	55 lb/day	550 lb/day	55 lb/day	150 lb/day	150 lb/day	55 lb/day	GHG: 10,000 MT/yr CO2eq			3 lbs/day
SCCAB Ventura CO.APCD Emissions Thresholds (lbs/day)	25 lb/day		25 lb/day				GHG: 10,000 MT/yr CO2eq			
SCCAB Santa Barbara CO. APCD Thresholds (lbs/day)	240 lb/day		240 lb/day	240 lb/day	80 lb/day		GHG: 10,000 MT/yr CO2eq			
SCCAB SLOCAPCD Emission Thresholds (lbs)	137 L/D ^a		137 L/D ^a		2.5 T/Q ^c	7 L/D ^b	GHG: 10,000 MT/yr CO2eq			
SLO County Sea Barge Delivery lb/day	0.67	4.41	21.45	1.59	0.62	0.58	GHG = 1320.92			n.c.
SLO Sea Vessel Rock Tons/QTR	0.01859	0.11726	0.57629	0.04147	0.01716	0.01573	35.94455	0.00535	0.00036	n.c.
SLO Sea Vessel Rock Tons/Year	0.01859	0.11726	0.57629	0.04147	0.01716	0.01573	35.94455	0.00535	0.00036	n.c.
SLO Sea Vessels Rock Delivery GHG MT/year CO2eq							GHG = 32.8 MT/year CO2eq ⁴			

Notes: ^a ROG+ NOx (combined) = 137 lbs per day (L/D); Quarterly (QTR.) Tier 1 = 2.5 tons; Quarterly Tier 2 = 6.3 tons.

^b Diesel Particulate Matter (DPM) Emissions - 7 lbs/day (L/D); Quarterly Tier 1 = 0.13 tons; Quarterly Tier 2 = 0.32 tons. Assume PM2.5 emission is similar to DPM emission.

^c Fugitive Particulate Matter (PM10), Dust Emissions Quarterly 1= 2.5 Tons/QTR. (T/Q).

Note(s): ¹ Ozone (O₃) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NO_x) and VOC. The relation between O₃, NO_x, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O₃ is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O₃ emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O₃ formation reaction is variable and reversible, actual O₃ levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O₃) is for 8-hour. There is no NAAQS 1-hour for Ozone (O₃).

² Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG emissions Metric Tons (MT)/Year calculator. Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO₂ equivalent (MT/Year CO₂eq).

Proposed Project Port San Luis Harbor Breakwater O&M Repair - Inland Quarry Rock Delivery Truck Hauling on Roadways Air Emissions. Inland Quarry in Apple Valley/Victorville (San Bernardino County High Desert) to Port of Hueneme (Ventura County). Maximum emission is work done in 26 weeks @ 6 work days a week, approx. 174 workdays (approx. 7 months) (year 2021). Emissions factors from EMFAC2007.

OFF ROAD EMISSION FACTORS

				H.P.	VOC	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	Pb (Lead_
					lb/hr								
Crane				250	0.0667	0.2407	0.4404	0.0013	0.0152	0.0135	112	0.0060	Not Calculated (n.c.)
Crawler Loader				250	0.0769	0.3430	0.3814	0.0019	0.0131	0.0116	172	0.0069	n.c.
Water Truck ^a				175	0.0491	0.5858	0.2972	0.0012	0.0142	0.0127	107	0.0044	n.c.
OFF ROAD EMISSIONS					VOC	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	Pb (Lead)
	Qty	Hrs/Day	Total Day		Total lbs.								
Crane	1	11	174		127.5994	460.6208	842.9429	2.41543	29.11383	25.91131	214672.1	11.51309	n.c.
Crawler Loader	1	11	174		147.1011	656.4657	729.9875	3.698491	25.02728	22.27428	328704.6	13.2727	n.c.
Water Truck ^a	1	11	174		93.90437	1121.262	568.9079	2.293902	27.25281	24.255	203871.3	8.472841	n.c.
Total Off Road Emissions					368.6049	2238.349	2141.838	8.407822	81.39392	72.44059	747248	33.25862	n.c.

ON ROAD EMISSION FACTORS

				VOC	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	Pb (Lead)
				lb/mile	lb/mile							
Flatbed trailer/Dump Trucks ^b	26	11	174	0.00103095	0.00503726	0.01179977	0.00004033	0.00059437	0.00046287	4.21495573	0.00004734	n.c.
Passenger Vehicles	29	2	174	0.00050573	0.00421218	0.00037757	0.00001073	0.00009640	0.00006364	1.11009559	0.00004322	n.c.

ON ROAD EMISSIONS

				VOC	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	Pb (Lead)
				Total lbs.								
Flatbed trailer/Dump Trucks ^b	26	360	174	1679.04	8203.88	19217.58	65.67672	968.0178	753.8546	6864645	77.09876	n.c.
Passenger Vehicles	29	20	174	51.03826	425.0928	38.10394	1.082678	9.728331	6.422485	112030.8	4.362244	n.c.
Total On Road Emissions				1730.078	8628.972	19255.68	66.7594	977.7461	760.2771	6976676	81.46101	n.c.

Rock Delivery Trucks on Roadways												
EMISSIONS Per YEAR												
Total on & off-road emissions(lbs) POUNDS				2098.683	10867.32	21397.52	75.16722	1059.14	832.7177	7723924	114.7196	n.c.
Total on & off-road emissions (tns) TONS				0.951956	4.929385	9.705853	0.034096	0.480423	0.377718	3503.549	0.052036	n.c.

Rock Delivery Trucks on Roadways GHG emissions = 3,180 Metric Tons (MT)/Year CO2 equivalent (CO2 eq). Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021; 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Note: ^a Used Other Construction Equipment emission for Water Truck emission

^b Used Heavy-Heavy-Duty Diesel Trucks emissions for Flatbed trailer/Dump Trucks

Inland Quarry Rock Delivery Truck Hauling on Roadways Land Emissions General Conformity Applicability Rates (Tons/Year); MT/Year CO₂ eq
 GHG³ = CO₂³ + CH₄³

Air Basin Air District General Conformity (Tons/Year)		Pollutant	VOC ¹	CO	NOX	SOX	PM10	PM2.5	CO ₂ ³	CH ₄ ³	Pb(Lead) ²
MDAB Mojave Desert AQMD Gen. Con. Threshold(Tons/Year)			25	100	100	100	100	100	n/a	n/a	25
SCAB SCAQMD General Conformity Thresholds(Tons/Year)			10	100	100	100	100	70	n/a	n/a	25
SCCAB Ventura CO. APCD Gen. Con. Thresholds(Tons/Year)			50	100	100	100	100	100	n/a	n/a	25

Note(s): ¹ Ozone (O₃) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NO_x) and VOC. The relation between O₃, NO_x, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O₃ is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O₃ emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O₃ formation reaction is variable and reversible, actual O₃ levels are lower than those estimated. Reactive Organic Gases (ROG) is interchangeable with VOC, and Reactive Organic Compounds (ROCs). NAAQS Ozone (O₃) is for 8-hour. There is no NAAQS 1-hour for Ozone (O₃).

² Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

**Highest (Most Conservative) EMFAC2007 (version 2.3)
Emission Factors for On-Road Heavy-Heavy-Duty Diesel Trucks**

Projects in the SCAQMD (Scenario Years 2007 - 2026)

Derived from Peak Emissions Inventory (**Winter, Annual, Summer**)

Vehicle Class:

Heavy-Heavy-Duty Diesel Trucks (33,001 to 60,000 pounds)

Scenario Year: **2021**

All model years in the range 1977 to 2021

HHDT-DSL (pounds/mile)	
CO	0.00503726
NOx	0.01179977
ROG	0.00103095
SOx	0.00004033
PM10	0.00059437
PM2.5	0.00046287
CO2	4.21495573
CH4	0.00004734

HHDT-DSL, Exh (pounds/mile)	
PM10	0.00045411
PM2.5	0.00041729

SCAB Fleet Average Emission Factors (Diesel) - Off Road

2021	
Air Basin	SC

		(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)
Equipment	MaxHP	ROG	CO	NOX	SOX	PM	CO2	CH4
Crane	250	0.0667	0.2407	0.4404	0.0013	0.0152	112	0.0060
Loader	250	0.0769	0.3430	0.3814	0.0019	0.0131	172	0.0069
Water Truck	175	0.0491	0.5858	0.2972	0.0012	0.0142	107	0.0044

Highest (Most Conservative) EMFAC2007 (version 2.3)

Emission Factors for On-Road Passenger Vehicles & Delivery Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)

Derived from Peak Emissions Inventory (**Winter, Annual, Summer**)

Vehicle Class:

Passenger Vehicles (<8500 pounds) & Delivery Trucks (>8500 pounds)

Scenario Year: **2021**

All model years in the range 1977 to 2021

Passenger Vehicles (pounds/mile)	
CO	0.00421218
NOx	0.00037757
ROG	0.00050573
SOx	0.00001073
PM10	0.00009640
PM2.5	0.00006364
CO2	1.11009559
CH4	0.00004322

Delivery Trucks (pounds/mile)	
CO	0.00748303
NOx	0.00773500
ROG	0.00115568
SOx	0.00002755
PM10	0.00033125
PM2.5	0.00025331
CO2	2.86434187
CH4	0.00004905

The above emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model and extracting the **Heavy-Heavy-Duty Diesel Truck (HHDT)** Emission Factors.

These emission factors can be used to calculate on-road mobile source emissions for the vehicle/emission categories listed in the tables below, by use of the following equation:

$$\text{Emissions (pounds per day)} = N \times TL \times EF$$

where N = number of trips, TL = trip length (miles/day), and EF = emission factor (pounds per mile)

The **HHDT-DSL** vehicle/emission category accounts for all emissions from heavy-heavy-duty diesel trucks, including start, running and idling exhaust. In addition, ROG emission factors account for diurnal, hot soak, running and resting emissions, and the PM10 & PM2.5 emission factors account for tire and brake wear.

The **HHDT-DSL, Exh** vehicle/emission category includes only the exhaust portion of PM10 & PM2.5 emissions from heavy-heavy-duty diesel trucks.

Proposed Project Port San Luis Harbor Breakwater O&M Repair - Inland Quarry Rock Truck Hauling Transport on Roadways Construction Air Emissions. Inland Quarry in Apple Valley/Victorville (San Bernardino County High Desert) to Port of Hueneme (Ventura County). Maximum emission is work done in 26 weeks @ 6 work days a week, approx. 174 workdays (approx. 7 months) (year 2021). Emissions factors from EMFAC2007.

OFF ROAD EMISSION FACTORS

				VOC	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	Pb (Lead)
				lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
Crane		250		0.0667	0.2407	0.4404	0.0013	0.0152	0.0135	112	0.0060	Not Calculated (n.c.)
Crawler Loader		250		0.0769	0.3430	0.3814	0.0019	0.0131	0.0116	172	0.0069	n.c.
Water Truck ^a		175		0.0491	0.5858	0.2972	0.0012	0.0142	0.0127	107	0.0044	n.c.

OFF ROAD EMISSIONS				VOC	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	Pb (Lead)
	Qty	Hrs/Day	Total Day	Total lbs.								
Crane	1	11	174	127.5994	460.6208	842.9429	2.41543	29.11383	25.91131	214672.1	11.51309	n.c.
Crawler Loader	1	11	174	147.1011	656.4657	729.9875	3.698491	25.02728	22.27428	328704.6	13.2727	n.c.
Water Truck ^a	1	11	174	93.90437	1121.262	568.9079	2.293902	27.25281	24.255	203871.3	8.472841	n.c.
Total Off Road Emissions				368.6049	2238.349	2141.838	8.407822	81.39392	72.44059	747248	33.25862	n.c.

ON ROAD EMISSION FACTORS

				VOC	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	Pb (Lead)
				lb/mile	lb/mile							
Flatbed trailer/Dump Trucks ^b	26	11	174	0.00103095	0.00503726	0.01179977	0.00004033	0.00059437	0.00046287	4.21495573	0.00004734	n.c.
Passenger Vehicles	12	2	174	0.00050573	0.00421218	0.00037757	0.00001073	0.00009640	0.00006364	1.11009559	0.00004322	n.c.

ON ROAD EMISSIONS

		Total	Miles per	VOC	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	Pb (Lead)
		Trips	Round trip	Total lbs.	n.c.							
Flatbed trailer/Dump Trucks ^b	26	164	360	1582.543	7732.392	18113.12	61.9022	912.3846	710.5296	6470126	72.6678	n.c.
Passenger Vehicles	29	1820	20	533.8485	4446.373	398.5585	11.32456	101.7561	67.17772	1171817	45.62807	n.c.
Total On Road Emissions				2116.392	12178.77	18511.68	73.22676	1014.141	777.7073	7641943	118.2959	n.c.

**TOTAL EMISSIONS
DAILY**

Total on & offroad emissions (lbs)				2484.997	14417.11	20653.52	81.63458	1095.535	850.1479	8389190	151.5545	n.c.
Total on & offroad emissions (lbs)/day				13.65383	79.21491	113.4809	0.448542	6.019421	4.671142	46094.45	0.832717	n.c.

Rock Delivery Trucks on Roadways GHG emissions = 3,180 Metric Tons (MT)/Year CO2 equivalent (CO2 eq). Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021, 3/24/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Note: ^a Used Other Construction Equipment emission for Water Truck emission

^b Used Heavy-Heavy-Duty Diesel Trucks emissions for Flatbed trailer/Dump Trucks

Inland Quarry Rock Truck Haul on Roadways Land Emissions Air Basin/APCD Thresholds(lb/day)

$$\text{GHG} = \text{CO}_2 + \text{CH}_4 + \text{N}_2\text{O}$$

Air Basin Air Districts Emissions Thresholds (lbs/day)	ROG¹	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Pb (Lead)
MDAB Mojave Desert AQMD Emission Thresholds (lbs/day)	137 lb/day	548 lb/day	137 lb/day	137 lb/day	82 lb/day	65 lb/day	GHG: 548,000 lb/day			3 lbs/day
SCAB SCAQMD Emission Thresholds (lbs/day)	55 lb/day	550 lb/day	55 lb/day	150 lb/day	150 lb/day	55 lb/day	GHG: 10,000 MT/yr CO ₂ eq			3 lbs/day
SCCAB Ventura CO.APCD Emissions Thresholds(lbs/day)	25 lb/day		25 lb/day				GHG: 10,000 MT/yr CO ₂ eq			

Note(s): ¹ Ozone (O₃) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NO_x) and VOC. The relation between O₃, NO_x, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O₃ is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O₃ emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O₃ formation reaction is variable and reversible, actual O₃ levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O₃) is for 8-hour. There is no NAAQS 1-hour for Ozone (O₃).

² Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

Highest (Most Conservative) EMFAC2007 (version 2.3)

Emission Factors for On-Road Heavy-Heavy-Duty Diesel Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)

Derived from Peak Emissions Inventory (**Winter, Annual, Summer**)

Vehicle Class:

Heavy-Heavy-Duty Diesel Trucks (33,001 to 60,000 pounds)

Scenario Year: **2021**

All model years in the range 1977 to 2021

HHDT-DSL (pounds/mile)	
CO	0.00503726
NOx	0.01179977
ROG	0.00103095
SOx	0.00004033
PM10	0.00059437
PM2.5	0.00046287
CO2	4.21495573
CH4	0.00004734

HHDT-DSL, Edh (pounds/mile)	
PM10	0.00045411
PM2.5	0.00041729

SCAB Fleet Average Emission Factors (Diesel) - Off Road

2021								
Air Basin	SC							
		(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)
Equipment	Mash	ROG	CO	NOX	SOX	PM	CO2	CH4
Crane	250	0.0667	0.2407	0.4404	0.0013	0.0152	112	0.0060
Loader	250	0.0769	0.3430	0.3814	0.0019	0.0131	172	0.0069
Water Truck	175	0.0491	0.5858	0.2972	0.0012	0.0142	107	0.0044

**Highest (Most Conservative) EMFAC2007 (version 2.3)
Emission Factors for On-Road Passenger Vehicles & Delivery Trucks**

Projects in the SCAQMD (Scenario Years 2007 - 2026)

Derived from Peak Emissions Inventory (**Winter, Annual, Summer**)

Vehicle Class:

Passenger Vehicles (<8500 pounds) & Delivery Trucks (>8500 pounds)

Scenario Year: **2021**

All model years in the range 1977 to 2021

Passenger Vehicles (pounds/mile)		Delivery Trucks (pounds/mile)	
CO	0.00421218	CO	0.00748303
NOx	0.00037757	NOx	0.00773500
ROG	0.00050573	ROG	0.00115568
SOx	0.00001073	SOx	0.00002755
PM10	0.00009640	PM10	0.00033125
PM2.5	0.00006364	PM2.5	0.00025331
CO2	1.11009559	CO2	2.86434187
CH4	0.00004322	CH4	0.00004905

The above emission factors were compiled by running the California Air Resources Board's EMFAC2007 (version 2.3) Burden Model and extracting the **Heavy-Heavy-Duty Diesel Truck (HHDT)** Emission Factors.

These emission factors can be used to calculate on-road mobile source emissions for the vehicle/emission categories listed in the tables below, by use of the following equation:

$$\text{Emissions (pounds per day)} = N \times TL \times EF$$

where N = number of trips, TL = trip length (miles/day), and EF = emission factor (pounds per mile)

The **HHDT-DSL** vehicle/emission category accounts for all emissions from heavy-heavy-duty diesel trucks, including start, running and idling exhaust. In addition, ROG emission factors account for diurnal, hot soak, running and resting emissions, and the PM10 & PM2.5 emission factors account for tire and brake wear.

The **HHDT-DSL, Edh** vehicle/emission category includes only the exhaust portion of PM10 & PM2.5 emissions from heavy-heavy-duty diesel trucks.

Proposed Project Port San Luis Harbor Excavation Around Breakwater Work Air Emission Calculations

Project Data

- (1) Excavation around Breakwater Equipment: a crane-equipped barge (crane will be outfitted with a clamshell bucket), a scow, small craft support vessels, tug boats.
- (2) Total work days: approximately 18 days; 11 to 22 hours a day; 6 day work week
- (3) Approximate production rate: approximately 1000 cy/day
- (4) Total sediment volume: approximately 15,000 cubic yards (cy)
- (5) Distance to placement site: approximately 1,000 feet
- (6) 10 to 12 laborers for crew/construction work
- (7) Proposed Project area (breakwater) is located in Port San Luis Harbor, San Luis Obispo County

Engine Data

Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hours Per Day	Daily Hp-Hrs	Work Days	Annual Hp-Hrs	Ref. Notes
Crane equipped barge	180	0.50	1	90	22	1,980	18	35,640	(1) (2)
Scow	195	0.50	1	98	22	2,145	18	38,610	(1) (2)
Small Craft Support Vessel	250	0.20	2	100	22	2,200	18	39,600	(1) (2)
Tug Boat	800	0.25	2	400	22	8,800	18	158,400	(1) (2)

(1) Horsepower (Hp) and Load Factor data from Port of Los Angeles (POLA) 2009 Channel Deepening Project AQ Appendix, EIS/EIR

(2) Hp from engine data matched to Emission Factors below which are categorized by Hp

Emission Factors

Emission Factors (Gm/Hp-Hr)	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Ref. Notes
Off-Road Equipment - 25-50 Hp	2.06	5.92	5.94	0.18	0.70	0.64	568	0.11	0.01	
Off-Road Equipment - 51-120 Hp	1.11	3.77	7.56	0.18	0.77	0.71	568	0.1	0.01	
Off-Road Equipment - 121-175 Hp	0.71	3.04	6.94	0.18	0.42	0.38	568	0.09	0.01	
Off-Road Equipment - 176-250 Hp	0.46	1.48	6.66	0.18	0.23	0.21	568	0.09	0.01	
Off-Road Equipment - 251-500 Hp	0.37	1.73	5.51	0.18	0.20	0.18	568	0.08	0.01	
Off-Road Equipment - 501-750 Hp	0.46	1.99	6.66	0.18	0.24	0.22	568	0.08	0.01	
Off-Road Equipment >750 Hp	0.47	2.02	6.48	0.18	0.20	0.18	568	0.08	0.01	
Small Craft Support Vessels	0.16	1.27	7.46	0.47	0.30	0.28	481.34	0.07	0.00	
Tugboat	0.20	1.87	8.94	0.81	0.22	0.21	481.34	0.07	0.01	

Annual Emissions (Tons/year)

GHG = CO₂ + CH₄ + N₂O

Activity/Equipment Type	ROG ¹	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	Pb (Lead) ²	Ref. Notes
Crane equipped barge	0.02	0.05	0.24	0.01	0.01	0.01	20.24	0.00	0.00	Not Calculated (n.c.)	
Scow	0.02	0.06	0.26	0.01	0.01	0.01	21.93	0.00	0.00	n.c.	
Small Craft Support Vessels	0.01	0.05	0.30	0.02	0.01	0.01	19.06	0.00	0.00	n.c.	
Tug Boats	0.03	0.30	1.42	0.13	0.03	0.03	76.24	0.01	0.00	n.c.	
Excavation work Emissions (Tons/year)	0.07	0.46	2.21	0.16	0.06	0.06	137.48	0.02	0.00	n.c.	

Excavation GHG emissions = 125 Metric Tons (MT)/Year CO₂ equivalent (CO₂ eq). Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>; accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO₂ equivalent (MT/Year CO₂eq).

Total Emissions Year 2021

$$\text{GHG} = \text{CO}_2 + \text{CH}_4 + \text{N}_2\text{O}$$

	ROG ¹	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Pb (Lead) ²
Est. Emissions	0.07	0.46	2.21	0.16	0.06	0.06	137.48	0.02	0.00	n.c.
Applicability Rates	100	100	100	100	100	100	n/a	n/a	n/a	25

Daily Emissions (lbs/day)

Activity/Equipment Type	ROG ¹	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Pb (Lead) ²	Ref. Notes
Crane equipped barge	2.01	6.46	29.07	0.79	1.00	0.92	2479.37	0.39	0.04	n.c.	(3)
Scow	2.18	7.00	31.49	0.85	1.09	0.99	2685.98	0.43	0.05	n.c.	(3)
Small Craft Support Vessels	0.78	6.16	36.18	2.28	1.46	1.36	2334.54	0.34	0.00	n.c.	(3)
Tug Boats	3.88	36.28	173.44	15.71	4.27	4.07	9338.17	1.36	0.10	n.c.	(3)
Excavation Emissions (lbs/day)	8.84	55.90	270.19	19.63	7.81	7.34	16838.05	2.52	0.19	n.c.	
Excavation Emissions (Tons/QTR)	0.07	0.46	2.21	0.16	0.06	0.06	137.48	0.02	0.00	n.c.	

Ref. Notes: (3) grams to lbs conversion 1lb = 453.6 g

Ref. Note: lbs to tons conversion 2204.6 lbs = 1 ton

Excavation Around Breakwater Emissions General Conformity Applicability Rates (Tons/Year)

$$GHG^3 = CO2^3 + CH4^3 + N2O^3$$

Air Basin Air District Emissions(Tons/Year)	General Conformity	ROG ¹	CO	NOx	SOx	PM10	PM2.5	CO2 ³	CH4 ³	N2O ³	Pb (Lead)
SCCAB SLOCAPCD General Conformity Thresholds(Tons/Year)		100	100	100	100	100	100	n/a	n/a	n/a	25

Note(s): ¹ Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n.c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

Proposed Project Excavation Around Breakwater Emissions Comparison to SLOCAPCD Daily Thresholds (lbs/day); Tons/QTR

Proposed Project Excavation	Pollutant	ROG¹	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Pb (Lead)²
Proposed Project Excavation lb/day		8.84	55.90	270.19	19.63	7.81	7.34	16838.05	2.52	0.19	n.c.
Proposed Project Excavation Tons/QTR		0.07	0.46	2.21	0.16	0.06	0.06	137.48	0.02	0.00	n.c.
Proposed Project Excavation Tons/Year		0.07	0.46	2.21	0.16	0.06	0.06	137.48	0.02	0.00	n.c.
Proposed Project Excavation GHG MT/yr CO2eq								GHG: 125 MT/yr CO2eq ⁴			
SCCAB SLOCAPCD Emission Thresholds (lbs)		137 L/D ^a		137 L/D ^a		2.5 T/Q ^c	7 L/D ^b	GHG: 10,000 MT/yr CO2eq			

Notes: ^a ROG+ NOx (combined) = 137 lbs per day (L/D); Quarterly (QTR.) Tier 1 = 2.5 tons; Quarterly Tier 2 = 6.3 tons.

^b Diesel Particulate Matter (DPM) Emissions - 7 lbs/day (L/D); Quarterly Tier 1 = 0.13 tons; Quarterly Tier 2 = 0.32 tons. Assume PM2.5 emission is similar to DPM emission.

^c Fugitive Particulate Matter (PM10), Dust Emissions Quarterly 1= 2.5 Tons/QTR (T/Q).

Note(s): ¹ Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG emissions Metric Tons (MT)/Year calculator. Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Proposed Project Port San Luis Harbor Operations and Maintenance (O&M) Breakwater Rock Repair Construction Work Air Emissions Calculations

Project Data

- (1) Equipment: barges, tug boats, a crew boat, a crane equipped barge, a scow, a work boat, a skiff vessel.
- (2) Total work days: approximately 174 days, 6 day work week, approximately 11 hours workday (daylight hours); an approximately 7 months project duration (April through October)
- (3) Approximate production rate (placement of approximately 60,000 tons of new stone placed on breakwater from rock barge. Approximately 30 to 35 stones can be picked and placed on the breakwater per day using the crane-equipped barge, or roughly three to four stones per hour on average can be placed on the breakwater.
- (4) Approximate 29,000 tons of existing rock on breakwater to be reset.
- (5) 10 to 12 laborers for crew/construction work
- (6) Proposed Project area (breakwater) is located in Port San Luis Harbor, San Luis Obispo County

Engine Data

Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hours Per Day	Daily Hp-Hrs	Work Days	Annual Hp-Hrs	Ref. Notes
Barge (rock/storage)	195	0.20	2	78	11	858	174	149,292	(1)(2)
Tug Boat	800	0.25	2	400	11	4,400	174	765,600	(1) (2)
Crew Boat	400	0.20	1	80	11	880	174	153,120	(1) (2)
Crane equipped barge	180	0.50	1	90	11	990	174	172,260	(2) (2)
Scow	195	0.20	1	39	11	429	174	74,646	(1) (2)
Work Boat	250	0.20	1	50	11	550	174	95,700	(1) (2)
Skiff vessel (Small Craft Support)	250	0.20	1	50	11	550	174	95,700	(1) (2)

Ref. Notes: (1) Horsepower (Hp) and Load Factor data from Port of Los Angeles (POLA) 2009 Channel Deepening Project Air Quality (AQ) Appendix, EIS/EIR

Ref. Notes: (2) Hp from engine data matched to Emission Factors below which are categorized by Hp

Emission Factors

Emission Factors (Gm/Hp-Hr)	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Ref. Notes
Off-Road Equipment - 25-50 Hp	2.06	5.92	5.94	0.18	0.70	0.64	568	0.11	0.01	
Off-Road Equipment - 51-120 Hp	1.11	3.77	7.56	0.18	0.77	0.71	568	0.1	0.01	
Off-Road Equipment - 121-175 Hp	0.71	3.04	6.94	0.18	0.42	0.38	568	0.09	0.01	
Off-Road Equipment - 176-250 Hp	0.46	1.48	6.66	0.18	0.23	0.21	568	0.09	0.01	
Off-Road Equipment - 251-500 Hp	0.37	1.73	5.51	0.18	0.20	0.18	568	0.08	0.01	
Off-Road Equipment - 501-750 Hp	0.46	1.99	6.66	0.18	0.24	0.22	568	0.08	0.01	
Off-Road Equipment >750 Hp	0.47	2.02	6.48	0.18	0.20	0.18	568	0.08	0.01	
Crew /Work/Skiff Boat	0.16	1.27	7.46	0.47	0.30	0.28	481.34	0.07	0.00	
Tugboat	0.20	1.87	8.94	0.81	0.22	0.21	481.34	0.07	0.01	

Annual Emissions (tons/year)

GHG = CO2 + CH4 + N2O

Activity/Equipment Type	ROG ¹	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Pb (Lead) ²	Ref. Notes
Barge (carrying rock)	0.07	0.22	0.99	0.03	0.03	0.03	84.80	0.01	0.00	Not Calculated (n.c.)	
Tug Boat	0.15	1.43	6.84	0.62	0.17	0.16	368.51	0.05	0.00	n.c.	
Crew Boat	0.02	0.19	1.14	0.07	0.05	0.04	73.70	0.01	0.00	n.c.	
Crane equipped barge	0.08	0.25	1.15	0.03	0.04	0.04	97.84	0.02	0.00	n.c.	
Scow	0.03	0.11	0.50	0.01	0.02	0.02	42.40	0.01	0.00	n.c.	
Work Boat	0.02	0.12	0.71	0.04	0.03	0.03	46.06	0.01	0.00	n.c.	
Skiff vessel	0.02	0.12	0.71	0.04	0.03	0.03	46.06	0.01	0.00	n.c.	
Breakwater Rock Repair Emission(Tons/year)	0.39	2.46	12.05	0.85	0.36	0.34	759.39	0.11	0.01	n.c.	

Breakwater Rock Repair GHG emissions = 694 Metric Tons (MT)/Year CO2 equivalent (CO2 eq). Source:

<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Daily Emissions (lbs/day)

GHG = CO2 + CH4 + N2O

Activity/Equipment Type	ROG ¹	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Pb (Lead) ²	Ref. Note
Barge (carrying rock)	0.87	2.80	12.60	0.34	0.44	0.40	1074.39	0.17	0.02	n.c.	(3)
Tug Boat	1.94	18.14	86.72	7.86	2.13	2.04	4669.08	0.68	0.05	n.c.	(3)
Crew Boat	0.31	2.46	14.47	0.91	0.58	0.54	933.82	0.14	0.00	n.c.	(3)
Crane Equipped Barge	1.00	3.23	14.54	0.39	0.50	0.46	1239.68	0.20	0.02	n.c.	(3)
Scow	0.44	1.40	6.30	0.17	0.22	0.20	537.20	0.09	0.01	n.c.	(3)
Work Boat (Survey Boat)	0.19	1.54	9.05	0.57	0.36	0.34	583.64	0.08	0.00	n.c.	(3)
Tug Boat	0.24	2.27	10.84	0.98	0.27	0.25	583.64	0.08	0.01	n.c.	(3)
Breakwater Rock Repair Emissions (lbs/day)	5.00	31.84	154.51	11.22	4.50	4.23	9621.44	1.44	0.10	n.c.	(3)
Breakwater Rock Repair Emission(Tons/QTR)	0.18	1.13	5.50	0.40	0.16	0.15	342.28	0.05	0.00	n.c.	

Ref. Notes: (3) grams to lbs conversion 1lb = 453.6 g

Ref. Note: lbs to tons conversion 2204.6 lbs = 1 ton

Proposed Project O&M Breakwater Rock Repair Emissions General Conformity Applicability Rates (Tons/Year)

$$GHG^3 = CO2^3 + CH4^3 + N2O^3$$

Air Basin Air District Emissions General Conformity Applicability Rates (Tons/Year)	ROG ¹	CO	NOx	SOx	PM10	PM2.5	CO2 ³	CH4 ³	N2O ³	Pb (Lead)
SCCAB SLOCAPCD General Conformity Thresholds(Tons/Year)	100	100	100	100	100	100	n/a	n/a	n/a	25

Note(s): ¹ Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

Proposed Project O&M Breakwater Rock Repair Emissions Comparison to SLOPCAD Thresholds (lbs/day); Tons/QTR; Tons/Year; GHG MT/Year CO2eq

$$\text{GHG} = \text{CO}_2 + \text{CH}_4 + \text{N}_2\text{O}$$

Proposed Project O&M Breakwater Rock Repair	Pollutant	ROG¹	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Pb (Lead)²
O&M Breakwater Rock Repair lb/day		5.00	31.84	154.51	11.22	4.5	4.23	9621.44	1.44	0.1	n.c.
O&M Breakwater Rock Repair Tons/QTR		0.18	1.13	5.50	0.40	0.16	0.15	342.28	0.05	0.00	n.c.
O&M Breakwater Rock Repair Tons/Year		0.39	2.46	12.05	0.85	0.36	0.34	759.39	0.11	0.01	
O&M Breakwater Rock Repair GHG MT/Year CO2eq								GHG = 694 MT/yr CO2eq ⁴			
SCCAB SLOPCAD Emission Thresholds		137 L/D ^a		137 L/D ^a		2.5 T/Q ^c	7 L/D ^b	GHG: 10,000 MT/yr CO2eq			

Notes: ^a ROG+ NOx (combined) = 137 lbs per day (L/D); Quarterly Tier 1 = 2.5 tons; Quarterly Tier 2 = 6.3 tons.

^b Diesel Particulate Matter (DPM) Emissions - 7 lbs/day (L/D); Quarterly Tier 1 = 0.13 tons; Quarterly Tier 2 = 0.32 tons. Assume PM2.5 emission is similar to DPM emission.

^c Fugitive Particulate Matter (PM10), Dust Emissions Quarterly 1= 2.5 Tons/Quarter (Tons/Qtr) or (T/Q).

Note(s): ¹ Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOx, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG emissions Metric Tons (MT)/Year calculator. Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO₂ equivalent (MT/Year CO₂eq).

Proposed Project Excavation Around Breakwater Emission Comparison to SLOCAPCD Daily Threshold (lb/day);Ton/QTR; Tons/Year; MT/Year CO2eq

$$\text{GHG} = \text{CO}_2 + \text{CH}_4 + \text{N}_2\text{O}$$

Proposed Project Excavation	Pollutant	ROG ¹	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Pb (Lead) ²
Excavation lbs/day		8.84	55.90	270.19	19.63	7.81	7.34	16838.05	2.52	0.19	n.c.
Excavation Tons/QTR		0.07	0.46	2.21	0.16	0.06	0.06	137.48	0.02	0.00	n.c.
Excavation Tons/Year		0.07	0.46	2.21	0.16	0.06	0.06	137.48	0.02	0.00	n.c.
Excavation GHG MT/Year CO2eq								GHG = 125 MT/yr CO2eq ⁴			
SCCAB SLOCAPCD Emission Thresholds		137 L/D ^a		137 L/D ^a		2.5 T/Q ^c	7 L/D ^b	GHG: 10,000 MT/yr CO2eq			

Notes: ^a ROG+ NOx (combined) = 137 lbs per day (L/D); Quarterly Tier 1 = 2.5 tons; Quarterly Tier 2 = 6.3 tons.

^b Diesel Particulate Matter (DPM) Emissions - 7 lbs/day (L/D); Quarterly Tier 1 = 0.13 tons; Quarterly Tier 2 = 0.32 tons. Assume PM2.5 emission is similar to DPM emission.

^c Fugitive Particulate Matter (PM10), Dust Emissions Quarterly 1= 2.5 Tons/Quarter (Tons/Qtr) or (T/Q).

Note(s): ¹ Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants

were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG emissions Metric Tons (MT)/Year calculator. Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Proposed Project SLO County (SLO) Sea Vessels Rock Delivery Emissions Compared to SLOCAPCD Thresholds (lbs/day); Tons/QTR; Tons/Year ; HG MT/Year CO2eq

GHG = CO2 + CH4 + N2O

County	Pollutant	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	GHG	Pb(Lead) ²	Units
SLO Sea Vessels Rock Delivery (lbs/day)		0.67	4.41	21.45	1.59	0.62	0.58	1320.71	0.20	0.01	1320.92	n.c.	lbs/day
SLO Sea Vessels Rock Delivery (Tons/QTR)		0.01859	0.11726	0.57629	0.04147	0.01716	0.01573	35.94455	0.005352	0.000358	35.95026	n.c.	Tons/QTr
SLO Sea Vessels Rock Delivery (Tons/Year)		0.01859	0.11726	0.57629	0.04147	0.01716	0.01573	35.94455	0.005352	0.000358	35.95026	n.c.	Tons/Year
Sea Vessels Rock Delivery GHG (MT/Year CO2eq)		137 L/D ^a									GHG=CO2+CH4+N2O =32.8 MT/yr CO2eq ⁴		MT/Year CO2eq

SLOCAP CD Thresholds		137 L/D ^a		137 L/D ^a		2.5 T/Q ^c	7 lbs/d ay ^b				GHG=CO2+CH4+N2O =10,000 MT/yr CO2eq		
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Notes: ^a ROG+ NOx (combined) = 137 lbs per day (L/D); Quarterly Tier 1 = 2.5 tons; Quarterly Tier 2 = 6.3 tons.

^b Diesel Particulate Matter (DPM) Emissions - 7 lbs/day (L/D); Quarterly Tier 1 = 0.13 tons; Quarterly Tier 2 = 0.32 tons. Assume PM2.5 emission is similar to DPM emission.

^c Fugitive Particulate Matter (PM10), Dust Emissions Quarterly 1= 2.5 Tons/Quarter (Tons/Qtr) or (T/Q).

Note(s): ¹ Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX , and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

⁴ GHG emissions Metric Tons (MT)/Year calculator. Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>, accessed 3/16/2021, 3/17/2021; GHG Units in Metric Tons/Year CO2 equivalent (MT/Year CO2eq).

Proposed Project Construction (Excavation Around Breakwater + O&M Breakwater Rock Repair) Emissions + Sea Vessels Rock Delivery Emissions Comparison to SLOCAPCD Thresholds (lbs/day); Tons/QTR; Ton/Year; MT/Year CO2eq

GHG = CO2 + CH4 + N2O

Proposed Work Activity Emissions	Pollutant	ROG ¹	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	Pb (Lead) ²
Sea Vessel Rock Delivery Emissions(Lb/Day)		0.67	4.41	21.45	1.59	0.62	0.58	1320.71	0.20	0.01	n.c.
Construction(Excavate+ Breakwater Repair) Lb/Day		13.84	87.74	424.70	30.85	12.31	11.57	26459.49	3.96	0.29	n.c.
Total Construction Emissions (Lb/Day)		14.51	92.15	446.15	32.44	12.93	12.15	27780.20	4.16	0.30	n.c.
Sea Vessel Rock Delivery Emission(Ton/QTR))		0.01859	0.11726	0.57629	0.04147	0.01716	0.01573	35.94455	0.00535	0.00036	n.c.
Construction(Excavate+ Breakwater Repair) Tons/QTR		0.25	1.59	7.71	0.56	0.22	0.21	479.76	0.07	0.00	n.c.
Sea Rock Deliver + Construction (Tons/QTR)		0.26646	1.70997	8.28298	0.60062	0.23725	0.22621	515.707	0.07658	0.00392	n.c.
Sea Vessel Rock Deliver Emission(Ton/Year)		0.01859	0.11726	0.57629	0.04147	0.01716	0.0173	35.94455	0.00535	0.00036	n.c.
Construction(Excavate+ Breakwater Repair) Tons/Year		0.46	2.92	14.26	1.01	0.42	0.4	896.87	0.13	0.01	n.c.
Sea Rock Deliver + Construction (Tons/Year)		0.47859	3.03726	14.8363	1.051457	0.43716	0.4173	932.8146	0.13535	0.01036	
Sea Vessel Rock Delivery GHG Emissions MT/Year CO2eq								GHG = 32.80 MT/Year CO2eq			
Construction (Excavate+ Breakwater Repair) GHG Emissions MT/Year CO2eq								GHG = 819.00 MT/Year CO2eq			

Sea Vessels Rock Delivery + Construction GHG Emissions MT/Year CO2eq								GHG = 851.80 MT/Year CO2eq			
SCCAB SLOCAPCD Emission Thresholds (lbs)		137 L/D ^a		137 L/D ^a		2.5 T/Q ^c	7 L/D ^b	GHG: 10,000 MT/Year CO2eq			

Notes: ^a ROG+ NOx (combined) = 137 lbs per day (L/D); Quarterly (QTR) Tier 1 = 2.5 tons; Quarterly (QTR) Tier 2 = 6.3 tons.

^b Diesel Particulate Matter (DPM) Emissions - 7 lbs/day (L/D); Quarterly (QTR) Tier 1 = 0.13 tons; Quarterly Tier 2 = 0.32 tons. Assume PM2.5 emission is similar to DPM emission.

^c Fugitive Particulate Matter (PM10), Dust Emissions Quarterly 1= 2.5 Ton/QTR (T/Q).

Note(s): ¹ Ozone (O3) formation is driven by two major classes of directly emitted precursors: nitrogen oxides (NOx) and VOC. The relation between O3, NOX, and VOC is driven by complex nonlinear photochemistry. Furthermore, the chemical reaction leading to the formation of O3 is reversible. Moreover, CARB on-road and off-road do not provide estimates for the compound. Instead, the emissions estimates for VOCs is used as a surrogate for reporting O3 emissions per the General Conformity Applicability Rates. Since the consumption of VOC in O3 formation reaction is variable and reversible, actual O3 levels are lower than those estimated. Volatile Organic Compounds (VOCs), Reactive Organic Gases (ROGs), and Reactive Organic Compounds (ROC) are similar, and are interchangeable. NAAQS Ozone (O3) is for 8-hour. There is no NAAQS 1-hour for Ozone (O3).

² Not Calculated (n. c.) - Pb (Lead). Emissions were estimated based on both on road and off-road equipment using EMFAC2007 emission factors. Estimates of lead emissions were not calculated. With the exception of lead, estimate of emissions for all criteria pollutants were calculated. Lead emissions from mobile sources in California have significantly decreased due to the near elimination of lead in fuels. Thus, EMFAC2007, does not provide estimated emission factors for lead. Little or no quantifiable and foreseeable lead emissions would be generated by any of the alternatives.

³ Not Applicable (n/a) - Greenhouse Gases (GHG). There are currently no Federal GHG emission thresholds. Therefore, a GHG significance threshold to assess impacts is not proposed. Rather, in compliance with NEPA implementing regulations, the anticipated emissions are disclosed for each alternative without expressing a judgment as to their significance.

If You Have Energy Data | **If You Have Emissions Data**

Amount	Unit	Gas
251.36	Tons	CO ₂ - Carbon Dioxide or CO₂ Equivalent*
	Tons	Carbon or Carbon Equivalent
0.04	Tons	CH ₄ - Methane
0.00	Tons	N ₂ O - Nitrous Oxide
	Tons	HCFC-22 - Hydrofluorocarbon gases
	Tons	CF ₄ - Perfluorocarbon gases
	Tons	SF ₆ - Sulfur Hexafluoride

Calculate

*If your estimated emissions of methane, nitrous oxide, or other non-CO₂ gases are already expressed in [CO₂ equivalent or carbon equivalent](#), please enter your figures in the row for CO₂ or carbon equivalent.

Equivalency Results [How are they calculated?](#)

The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to:

229 **Metric Tons**

If You Have Energy Data

If You Have Emissions Data

Amount	Unit	Gas
35.94455	Tons	CO ₂ - Carbon Dioxide or CO₂ Equivalent*
	Tons	Carbon or Carbon Equivalent
0.005352	Tons	CH ₄ - Methane
0.000358	Tons	N ₂ O - Nitrous Oxide
	Tons	HCFC-22 - Hydrofluorocarbon gases
	Tons	CF ₄ - Perfluorocarbon gases
	Tons	SF ₆ - Sulfur Hexafluoride

Calculate

*If your estimated emissions of methane, nitrous oxide, or other non-CO₂ gases are already expressed in [CO₂ equivalent or carbon equivalent](#), please enter your figures in the row for CO₂ or carbon equivalent.

Equivalency Results [How are they calculated?](#)

The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to:

32.8 Metric Tons

If You Have Energy Data

If You Have Emissions Data

Amount	Unit	Gas
3503.549	Tons	CO ₂ - Carbon Dioxide or CO₂ Equivalent*
	Tons	Carbon or Carbon Equivalent
0.052036	Tons	CH ₄ - Methane
	Tons	N ₂ O - Nitrous Oxide
	Tons	HCFC-22 - Hydrofluorocarbon gases
	Tons	CF ₄ - Perfluorocarbon gases
	Tons	SF ₆ - Sulfur Hexafluoride

Calculate

*If your estimated emissions of methane, nitrous oxide, or other non-CO₂ gases are already expressed in [CO₂ equivalent or carbon equivalent](#), please enter your figures in the row for CO₂ or carbon equivalent.

Equivalency Results [How are they calculated?](#)

The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to:

3,180 Metric Tons

Greenhouse gas emissions from

If You Have Energy Data

If You Have Emissions Data

Amount	Unit	Gas
137.48	Tons	CO ₂ - Carbon Dioxide or CO₂ Equivalent*
	Tons	Carbon or Carbon Equivalent
0.02	Tons	CH ₄ - Methane
0.00	Tons	N ₂ O - Nitrous Oxide
	Tons	HCFC-22 - Hydrofluorocarbon gases
	Tons	CF ₄ - Perfluorocarbon gases
	Tons	SF ₆ - Sulfur Hexafluoride

Calculate

*If your estimated emissions of methane, nitrous oxide, or other non-CO₂ gases are already expressed in [CO₂ equivalent or carbon equivalent](#), please enter your figures in the row for CO₂ or carbon equivalent.

Equivalency Results [How are they calculated?](#)

The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to:

125 Metric Tons

If You Have Energy Data

If You Have Emissions Data

Amount	Unit	Gas
759.39	Tons	CO ₂ - Carbon Dioxide or CO₂ Equivalent*
	Tons	Carbon or Carbon Equivalent
0.11	Tons	CH ₄ - Methane
0.01	Tons	N ₂ O - Nitrous Oxide
	Tons	HCFC-22 - Hydrofluorocarbon gases
	Tons	CF ₄ - Perfluorocarbon gases
	Tons	SF ₆ - Sulfur Hexafluoride

Calculate

*If your estimated emissions of methane, nitrous oxide, or other non-CO₂ gases are already expressed in [CO₂ equivalent or carbon equivalent](#), please enter your figures in the row for CO₂ or carbon equivalent.

Equivalency Results [How are they calculated?](#)

The sum of the greenhouse gas emissions you entered above is of Carbon Dioxide Equivalent. This is equivalent to:

694 Metric Tons

The State of California Air Resources Board (CARB) has established additional standards, California Ambient Air Quality Standards (CAAQS), that are generally more restrictive than the NAAQS. In addition to being subject to the requirements of the CAA, air quality in California is also governed by generally more stringent regulations under CAAQS and regionally under the SLOCAPCD. The SLOCAPCD has developed mass daily emissions rates of criteria pollutants for construction. The daily construction emission thresholds represent the maximum emissions from a project that are not expected to cause or contribute to an exceedance of the most stringent applicable Federal or state ambient air quality standard in the SCCAB. A Table titled **Table SLOCAPCD Threshold of Significance For Construction Operations** summarizes the SLOCAPCD daily (lbs/day) thresholds of significance for construction operations (SLOCAPCD, 2020b).

Table SLOCAPCD Threshold of Significance For Construction Operations ⁽³⁾

Pollutant	Threshold ⁽¹⁾		
	Daily	Quarterly Tier 1	Quarterly Tier 2
ROG + NO _x (combined)	137 lbs	2.5 tons	6.3 tons
Diesel Particulate Matter (DPM)	7 lbs	0.13 tons	0.32 tons
Fugitive Particulate Matter (PM ₁₀), Dust ⁽²⁾		2.5 tons	
Greenhouse Gases (CO ₂ , CH ₄ , N ₂ O, HFC, CFC, F6S)	Amortized and Combined with Operational Emissions (See Below)		

Source: SLOCAPCD, 2020b.

Notes: (1) Daily and quarterly emission thresholds are based on the California Health and Safety Code and the CARB Carl Moyer Guidelines.

(2) Any project with a grading area greater than 4.0 acres of worked area can exceed the 2.5 tons PM₁₀ quarterly threshold.

(3) A Table titled **Table SLOCAPCD Threshold of Significance For Construction Operations** identifying SLOCAPCD Threshold of Significance for Construction Operations is for disclosure purposes under NEPA, and would not be used as a NEPA significance criterion.

The proposed project estimated air pollutant emissions lbs/day and Tons/Quarter (Tons/QTR), and estimated GHG MT/Year CO₂eq emissions for the proposed project located in Port San Luis Harbor in the western portion of San Luis Obispo County within the SCCAB governed by the SLOCAPCD are provided in Table titled **SCCAB (San Luis Obispo County portion) Air Pollutant Emissions and GHG Emission Estimates for Construction and Rock Delivery by Sea Vessels (lbs/day)**. Impacts would be temporary. It is anticipated there would be no indirect impacts. Upon project completion, air quality would return to pre-project conditions. Therefore, impacts would be less than significant.

Table SCCAB (San Luis Obispo County portion) Air Pollutant Emissions and GHG Emission Estimates for Construction and Rock Delivery by Sea Vessels (lbs/day) ⁴

Pollutant	ROG ¹ (VOC) + NOx ² (NO2) lbs/day	DPM ³ lbs/day	Fugitive Particulate Matter (PM10), Dust, Tons/QTR	GHG
Construction	13.84 + 424.70 = 438.54 lbs/day	11.57 lbs/day; 0.21 Tons/QTR	12.31 lbs/day; 0.22 Tons/QTR	819.00 MT/Year CO2eq
Rock Delivery by Sea Vessel	0.67+ 21.45 = 22.12 lbs/day	0.58 lbs/day; 0.01573 Tons/QTR	0.62 lbs/day; 0.01716 Tons/QTR	32.80 MT/Year CO2eq
Total	460.66 lbs/day	12.15 lb/day; 0.22573 Tons/QTR	12.93 lbs/day; 0.23716 Tons/QTR	851.8 MT/Year CO2eq
SLOCAPCD thresholds of significance for construction operations	ROG + NOx (combined) = 137 lbs/day Quarterly Tier I 2.5 tons Quarterly Tier 2 6.3 tons	7 lbs/day Quarterly Tier 1 0.13 tons Quarterly Tier 2 0.32 tons	Quarterly Tier 1 2.5 tons/quarter	10,000 MT/Year CO2eq

Notes: ¹ ROG, ROC, and VOC are similar and are interchangeable.

² NOx is represented by NO2.

³ DPM is assumed to be PM2.5.

⁴ A Table titled **Table SCCAB (San Luis Obispo County portion) Air Pollutant Emissions and GHG Emission Estimates for Construction and Rock Delivery by Sea Vessels (lbs/day)** identifying SCCAB (San Luis Obispo County portion) Air Pollutant Emissions and GHG Emission Estimates for Construction and Rock Delivery by Sea (lbs/day) under the jurisdiction of SLOCAPCD is for disclosure purposes under NEPA, and would not be used as a NEPA significance criterion.