Table D14. Annual Emissions (2018)

Barge	Mining Events	Activity	Hours	Emission Rates (lb/hr)					Annual Emissions (tons per year)				
				NOx	PM	ROG	CO	CO2	NOx	PM	ROG	CO	CO2
		Cruising	2	18.1	0.9	2.2	6.7	1,827.6	7.2	0.4	0.9	2.7	727.4
		Mining	5.5	24.7	1.3	3.3	10.3	2,499.8	27.1	1.4	3.6	11.2	2,736.0
Hanson (TS&G 230)	398	Unloading	4	8.1	0.5	1.4	4.6	819.4	6.5	0.4	1.1	3.7	652.3
		Cruising	2	13.0	0.7	1.7	5.3	1,313.6	5.2	0.3	0.7	2.1	522.8
		Mining	5.5	21.7	1.0	2.5	7.7	2,052.9	23.8	1.1	2.8	8.5	2,246.9
Hanson (DS-10)	398	Unloading	4	16.6	0.7	1.9	6.3	1,436.9	13.2	0.6	1.5	5.0	1,143.8
		Cruising	2	18.1	0.9	2.2	6.7	1,827.6	0.7	0.0	0.1	0.3	69.5
Suisun Associates (TS&G		Mining	5.5	24.7	1.3	3.3	10.3	2,499.8	2.6	0.1	0.3	1.1	261.2
230)	38	Unloading	4	8.1	0.5	1.4	4.6	819.4	0.6	0.0	0.1	0.4	62.3
		Cruising	2	13.0	0.7	1.7	5.3	1,313.6	0.5	0.0	0.1	0.2	48.6
Suisun Associates (DS-		Cruising	2	21.7	1.0	2.5	7.7	2,052.9	0.8	0.0	0.1	0.3	76.0
10)	37	Cruising	2	16.6	0.7	1.9	6.3	1,436.9	0.6	0.0	0.1	0.2	53.2
		Cruising	2	7.3	0.4	0.9	2.6	740.1	0.5	0.0	0.1	0.2	55.5
Suisun Associates (Jerico		Mining	5.5	1.8	0.1	0.3	0.9	182.9	0.4	0.0	0.1	0.2	37.7
Barge)	75	Unloading	12	0.9	0.0	0.1	0.7	108.4	0.4	0.0	0.1	0.3	48.8
		Cruising	2	7.3	0.4	0.9	2.6	740.1	0.2	0.0	0.0	0.1	23.7
		Mining	5.5	1.8	0.1	0.3	0.9	182.9	0.2	0.0	0.0	0.1	16.1
Jerico	32	Unloading	12	0.9	0.0	0.1	0.7	108.4	0.2	0.0	0.0	0.1	20.8
Total Emisisons (tons per year)									90.5	4.5	11.6	36.6	8,802.4

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Table D14A. Annual Emissions (2018) - Corrected

Barge	Mining Events	Activity	Hours	Emission Rates (lb/hr)					Annual Emissions (tons per year)				
				NOx	PM	ROG	CO	CO2	NOx	PM	ROG	CO	CO2
		Cruising	2	15.9	0.9	2.2	6.7	1771.5	6.3	0.4	0.9	2.7	705.1
		Mining	5.5	21.4	1.3	3.3	10.3	2423.0	23.4	1.4	3.6	11.2	2,652.0
Hanson (TS&G 230)	398	Unloading	4	6.7	0.5	1.4	4.6	794.3	5.4	0.4	1.1	3.7	632.2
		Cruising	2	11.3	0.7	1.7	5.3	1273.3	4.5	0.3	0.7	2.1	506.8
		Mining	5.5	17.8	1.0	2.5	7.7	1989.9	19.5	1.1	2.8	8.5	2,178.0
Hanson (DS-10)	398	Unloading	4	12.3	0.7	1.9	6.3	1392.8	9.8	0.6	1.5	5.0	1,108.7
		Cruising	2	15.9	0.9	2.2	6.7	1771.5	0.6	0.0	0.1	0.3	67.3
Suisun Associates (TS&G		Mining	5.5	21.4	1.3	3.3	10.3	2423.0	2.2	0.1	0.3	1.1	253.2
230)	38	Unloading	4	6.7	0.5	1.4	4.6	794.3	0.5	0.0	0.1	0.4	60.4
		Cruising	2	11.3	0.7	1.7	5.3	1273.3	0.4	0.0	0.1	0.2	47.1
Suisun Associates (DS-		Cruising	2	17.8	1.0	2.5	7.7	1989.9	0.7	0.0	0.1	0.3	73.6
10)	37	Cruising	2	12.3	0.7	1.9	6.3	1392.8	0.5	0.0	0.1	0.2	51.5
		Cruising	2	6.4	0.4	0.9	2.6	717.4	0.5	0.0	0.1	0.2	53.8
Suisun Associates (Jerico		Mining	5.5	1.5	0.1	0.3	0.9	182.9	0.3	0.0	0.1	0.2	37.7
Barge)	75	Unloading	12	0.9	0.0	0.1	0.7	108.4	0.4	0.0	0.1	0.3	48.8
		Cruising	2	6.4	0.4	0.9	2.6	740.1	0.2	0.0	0.0	0.1	23.7
		Mining	5.5	1.5	0.1	0.3	0.9	182.9	0.1	0.0	0.0	0.1	16.1
Jerico	32	Unloading	12	0.9	0.0	0.1	0.7	108.4	0.2	0.0	0.0	0.1	20.8
Total Emisisons (tons per year)									75.5	4.5	11.6	36.6	8,536.7
				% Reduction due to TRC corrections:					16.62%	0.00%	0.00%	0.00%	3.02%

TRC

Appendix 4 – Emissions Modified Baseline

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Table D1. Emissions Summary - Averaged Mined Per Year 1998-2008

Scenario	Annual Emissions (tons per year)					Metric Tons
	NOx	PM	ROG	CO	CO2	CO2
Existing						
Hanson (TS&G)	52.3	1.8	4.6	14.3	3,257.6	
Hanson (DS-10)	39.8	1.6	4.0	12.7	3,088.1	
Suisin Assoc. (TS&G)	1.8	0.1	0.2	0.5	110.3	
Suisun Assoc. (DS-10)	0.7	0.0	0.1	0.2	51.2	
Suisun Assoc. (Jerico)	0.6	0.0	0.1	0.3	55.1	
Jerico	0.7	0.0	0.1	0.4	69.7	
CEMEX	6.1	0.2	0.5	1.7	380.9	
TOTAL	*102.0*	*3.7*	*9.5*	*30.1*	*7012.8*	*6,362*
Future (2010)						
Hanson (TS&G)	64.1	2.2	5.6	17.6	3,989.3	
Hanson (DS-10)	48.9	1.9	4.9	15.6	3,793.4	
Suisin Assoc. (TS&G)	6.1	0.2	0.5	1.7	380.9	
Suisun Assoc. (DS-10)	2.2	0.1	0.2	0.7	172.3	
Suisun Assoc. (Jerico)	1.4	0.1	0.2	0.7	137.6	
Jerico	0.6	0.0	0.1	0.3	58.7	
TOTAL	*123.4*	*4.5*	*11.6*	*36.6*	*8,532.2*	*7,740*
Change from Existing	***21.4***	*0.8*	*2.0*	*6.5*	*1,519.4*	*1,378*
Future (2011) NOx Emissions						
Hanson (TS&G)	42.9	--	--	--	--	
Hanson (DS-10)	44.5	--	--	--	--	
Suisin Assoc. (TS&G)	4.1	--	--	--	--	
Suisun Assoc. (DS-10)	2.0	--	--	--	--	
Suisun Assoc. (Jerico)	1.4	--	--	--	--	
Jerico	0.6	--	--	--	--	
TOTAL	*95.5*	--	--	--	--	
Change from existing	***(6.5)***	--	--	--	--	-
Future (2018) NOx Emissions						
Hanson (TS&G)	35.1	--	--	--	--	
Hanson (DS-10)	33.8	--	--	--	--	
Suisin Assoc. (TS&G)	3.4	--	--	--	--	
Suisun Assoc. (DS-10)	1.5	--	--	--	--	
Suisun Assoc. (Jerico)	1.2	--	--	--	--	
Jerico	0.5	--	--	--	--	
TOTAL	*75.5*	--	--	--	--	
Change from Existing	*(26.5)*	--	--	--	--	-

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Table D2. Mining Events (Current and Requested) Averaged Mined Per Year 1998-2008

Parcel	Average Mined per Year 1998-2008		Requested Conditions	
	Annual Volume	Mining Events [a]	Annual Volume	Mining Events [a]
State Lands Commission Parcels				
PRC 709.1 Presidio Shoals (Hanson)	389,344	195	340,000	170
PRC 2036.1 Point Knox South (Hanson)	274,099	137	450,000	225
PRC 7779.1 Point Knox Shoal (Hanson)	378,201	189	550,000	275
PRC 7780.1 Alcatraz South Shoal (Hanson)	104,925	52	200,000	100
PRC 7781.1: Suisun Associates	103,987	52	300,000	150
PRC 5871.1 CEMEX	51,989	26		
State Lands Lease Totals	*1,302,545*	*651*	*1,840,000*	*920*
Private Parcels				
Grossi Middle Ground: ACOE Permit No. 25653N (Hanson)	75,858	38	25,000	13
Grossi Middle Ground: ACOE Permit No. 24996N (Hanson)	75,858	38	25,000	13
Grossi Middle Ground: ACOE Permit No. 24913N (Jerico)	75,858	38	150,000	75
CEMEX	19,539	10		
Private Parcel Lease Totals	*247,113*	*124*	*200,000*	*101*
Total All Leases	**1,549,658**	**775**	**2,040,000**	**1,021**
Net Change in Mining Events	**246**			

[a] Assumes that 2,000 cubic yards of sand are collected during each mining event

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TRC

Table D3. Emission Factors for Mining Equipment (Baseline) - Averaged Mined per Year 1998-2008

Equipment Name	Type	Manufacture Year [a]	Horsepower [a]	Load Factor [b]	Emission Factor (g/bhp-hr) [c,d]					Emission Rate (lb/hr)				
					NOx	PM	ROG	CO	CO2	NOx	PM	ROG	CO	CO2
Hanson American River	Tug (2 engines)	2003	1,710	0.5	6.93	0.29	0.68	1.97	568.3	13.1	0.5	1.3	3.7	1,071.2
Hanson San Joaquin River	Tug (2 engines)	2001	2,600	0.5	6.93	0.29	0.68	1.97	568.3	19.9	0.8	1.9	5.6	1,628.8
	Barge - Main Engine	1983	1,000	0.52	13.17	0.36	0.95	3.07	568.3	15.1	0.4	1.1	3.5	651.5
	Barge - Generator (Aux)	1984	265	0.43	10.23	0.32	1.07	4.33	568.3	2.6	0.1	0.3	1.1	142.8
Hanson TS & G	Barge - Thruster (Aux)	1984	304	0.43	10.23	0.32	1.07	4.33	568.3	2.9	0.1	0.3	1.2	163.8
	Barge - Main Engine	2001	1,100	0.52	6.93	0.29	0.68	1.97	568.3	8.7	0.4	0.9	2.5	716.7
	Barge - Monitor Pump (Aux)	2002	440	0.43	6.93	0.26	0.81	2.78	568.3	2.9	0.1	0.3	1.2	237.0
	Barge - Flood Pump (Aux)	2002	440	0.43	6.93	0.26	0.81	2.78	568.3	2.9	0.1	0.3	1.2	237.0
Hanson DS-10	Barge - Generator (Aux)	1984	375	0.43	10.23	0.32	1.07	4.33	568.3	3.6	0.1	0.4	1.5	202.0
	Tug (2 engines)	2001	1,060	0.5	6.93	0.29	0.68	1.97	568.3	8.1	0.3	0.8	2.3	664.0
Jerico Tug	Tug (generator)	2000	64	0.31	6.93	0.46	1.18	3.59	568.3	0.3	0.0	0.1	0.2	24.9
	Barge Generator (Aux)	2004	99	0.43	4.62	0.46	1.18	3.59	568.3	0.4	0.0	0.1	0.3	53.3
Jerico Barge	Barge Pump (Aux)	2001	230	0.43	6.93	0.26	0.81	2.78	568.3	1.5	0.1	0.2	0.6	123.9
Jerico Loader	Loader	2007	195	0.43	4.83	0.12	0.81	3.73	568.3	0.9	0.0	0.1	0.7	105.1
CEMEX Tug[e]	Tug (2 engines)	2001	2,600	0.5	6.93	0.29	0.68	1.97	568.3	19.9	0.8	1.9	5.6	1,628.8
CEMEX Barge[e]	Barge - Main Engine	1983	1,000	0.52	13.17	0.36	0.95	3.07	568.3	15.1	0.4	1.1	3.5	651.5
	Barge - Generator (Aux)	1984	265	0.43	10.23	0.32	1.07	4.33	568.3	2.6	0.1	0.3	1.1	142.8

[a] Provided by Project Applicants.

[b] Based on information provided in Appendix B - Emissions Estimation Methodology for Commercial Harbor Craft Operating in California, from CARB's*Technical Support Document: Initial Statement of Reason for Proposed Rule Making, Proposed Regulation for Commercial Harbor Craft*, September 2007.

[c] Criteria pollutant emission factors obtained from Appendix B (cited above). All Equipment except for the TS&G assumes a fuel correction factor of 0.948 and 0.8 for NOx and PM respectively while the TS&G assumes a fuel correction factor of 0.930 and 0.720 for NOx and PM10 respectively.

[d] CO2 emission factors derived from OFFROAD2007. Represents CO2 emission factors for diesel fueled engines.

[e] CEMEX Tug and barge specs are estimated based on comparable equipment operated by Hanson.

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TRC