

ATTACHMENT D

ANALYSES SUPPORTING THE PROPOSED 15-DAY CHANGES TO THE
PROPOSED REGULATION

**UPDATES TO THE HEALTH ANALYSES: CONTROL MEASURE FOR
OCEAN-GOING VESSELS AT BERTH**

March 26, 2020

This attachment to the “Notice of Public Availability of Modified Text and Availability of Additional Documents and Information” related to Proposed At Berth Regulation is an update to Appendix G to the Initial Statement of Reasons (ISOR) supporting the proposed regulation released October 15, 2019. The tables and figures included in this attachment reflect the suggested changes (15-day changes) to the proposed regulation and a correction to Appendix G. The information provided in this attachment also updates the health analysis information presented in Chapters V and VI in the ISOR.

UPDATES TO THE HEALTH ANALYSES: CONTROL MEASURE FOR OCEAN-GOING VESSELS AT BERTH

1. Overview of suggested 15-day changes to the Proposed Regulation that impact the non-cancer mortality and illness estimates.

The proposed 15-day changes to the At Berth Regulation include changes to the implementation dates for ro-ros and tankers. The updated proposed implementation timeline is summarized in Updated Table 1 (the table numbers have been maintained from Appendix G to the Initial Statement of Reasons (ISOR) to provide easier comparison with that document). Specifically, emission control requirements for tankers would begin in 2025 at the Ports of Los Angeles and Long Beach (POLA, POLB) instead of 2027, with control requirements for the remainder of the tanker terminals statewide beginning in 2027 instead of 2029. Ro-ro vessel requirements begin in 2024, instead of 2025 and include increased regulated visits in 2025. The increase in regulated visits for ro-ro vessels in 2025 is due to a decrease in Terminal Incident Events (from 15 percent in 2024 to 5 percent in 2025). Other changes that do not impact the non-cancer and illness are not included in this attachment.

The earlier implementation dates for ro-ros and tankers provide increased emissions reductions during 2024 for ro-ro vessels; 2025 and 2026 for tankers at POLA and POLB; and 2027 and 2028 for tankers in the rest of the state. As described in Appendix G, the estimated statewide particulate matter (PM) 2.5 non-cancer mortality and illness impacts are associated with exposure to primary PM_{2.5} (diesel PM and boiler PM) and secondary PM_{2.5} from nitrogen oxides (NO_x) emissions. Because the 15-day changes result in greater reductions of PM_{2.5} and NO_x emissions, the benefits from avoided non-cancer mortality and illness resulting from the proposed At Berth Regulation will be greater. The following tables show the impact of the updates in the 15-day changes on the PM_{2.5} and NO_x emissions by air basin and the associated increase in avoided PM mortality and illness. Updated Table 24 provides statewide valuation from avoided adverse health outcomes between 2021 and 2032 for the proposed 15-day changes.

Updated Table 1. Proposed Regulation Implementation Schedule

2021	2024	2025	2027
Container, Reefer, and Cruise			
	Ro-ro		
		Tankers - POLA/POLB* Terminals	
			Tankers – Remaining Statewide Terminals

* Port of Los Angeles (POLA), Port of Long Beach (POLB)

Updated Table 5. At Berth Proposed Regulation PM2.5 Emissions by Air Basin* (tons per year)

Year	SF	SC	SCC ¹	SD	SJV
2021	35.75	57.39	2.19	4.60	3.08
2022	36.45	58.58	2.24	4.76	3.14
2023	36.22	58.26	2.28	4.78	3.21
2024	36.23	58.59	1.80	4.06	3.28
2025	35.63	42.50	1.67	3.94	3.36
2026	36.44	43.08	1.71	4.07	3.45
2027	26.69	43.68	1.74	4.20	3.36
2028	27.41	44.33	1.78	4.35	3.45
2029	28.16	45.04	1.81	4.49	3.54
2030	28.93	45.80	1.85	4.64	3.64
2031	29.78	47.23	1.89	4.81	3.75
2032	30.66	48.70	1.92	4.98	3.86

* San Francisco (SF), South Coast (SC), South Central Coast (SCC), San Diego (SD), San Joaquin Valley (SJV)

1. Years 2021-2023 show a slight increase in emissions compared to the Existing Regulation due to the lower projected shore power usage in the Proposed Regulation at the Port of Hueneme.

**Updated Table 7. At Berth Proposed Regulation NOx Emissions by Air Basin
(tons per year)**

Year	SF	SC	SCC¹	SD	SJV
2021	1127.0	1828.2	101.5	217.4	116.5
2022	1148.5	1857.6	102.8	221.1	119.2
2023	1103.9	1793.2	104.7	216.2	121.7
2024	1075.8	1767.9	71.8	164.2	125.0
2025	1008.4	1201.9	62.5	151.3	128.4
2026	1029.7	1222.2	63.7	155.6	132.3
2027	750.0	1242.2	65.0	160.0	124.8
2028	769.1	1264.5	65.9	164.6	128.9
2029	787.7	1287.4	66.6	168.3	132.6
2030	807.7	1306.6	67.7	147.5	134.3
2031	820.6	1323.7	67.8	150.4	135.3
2032	840.1	1303.8	69.2	153.1	124.2

1. Years 2021-2023 show a slight increase as compared to the Existing Regulation due to the lower projected shore power usage in the Proposed Regulation at the Port of Hueneme.

2. Updates to Regional PM2.5 Mortality and Illness Analysis for California Air Basins: PM Mortality and Illness: Reduction in Health Outcomes.

California Air Resources Board (CARB) staff estimated the reduction in health outcomes from reduced emissions of PM2.5 from the 15-day change version of the Proposed Regulation. These health outcomes include cardiopulmonary mortality, hospital admissions, and emergency room visits. Based on the analysis, staff estimates that the total number of cases statewide that would be reduced due to the implementation of the Proposed Regulation are as follows:

- 250 premature deaths (195 to 305; 95 percent confidence interval (CI)).
- 78 hospital admissions (10 to 145; 95 percent CI).
- 126 emergency room visits (79 to 172; 95 percent CI).

Updated Tables 20 through 22 show the estimated reductions in health outcomes resulting from the Proposed Regulation summed over a 12-year period from 2021 to 2032. The values in parentheses represent the 95 percent confidence interval for each health outcome.

Updated Table 20. Proposed Regulation: Reductions in Health Outcomes from PM2.5^{1,2}

Air Basin	Premature Deaths	Hospital Admissions	Emergency Room Visits
North Coast	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Sacramento Valley	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
San Diego County	1 (0 - 1)	0 (0 - 0)	0 (0 - 0)
San Francisco Bay	5 (4 - 6)	1 (0 - 3)	3 (2 - 4)
San Joaquin Valley	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
South Central Coast	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
South Coast	27 (21 - 34)	4 (1 - 8)	9 (6 - 12)
Total	33 (25 - 40)	6 (1 - 11)	12 (7 - 16)

1. PM2.5 estimates for the South Coast Air Basin were obtained by direct estimation of health outcomes. Other estimates were obtained using incidence per ton (IPT) factors.
2. Due to rounding, numbers may not add up precisely to the totals.

Updated Table 21. Proposed Regulation: Reductions in Health Outcomes from NOx¹

Air Basin	Premature Deaths	Hospital Admissions	Emergency Room Visits
North Coast	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Sacramento Valley	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
San Diego County	6 (5 - 8)	2 (0 - 3)	3 (2 - 4)
San Francisco Bay	27 (21 - 33)	9 (1 - 16)	15 (10 - 21)
San Joaquin Valley	0 (0 - 1)	0 (0 - 0)	0 (0 - 0)
South Central Coast	2 (1 - 2)	0 (0 - 1)	1 (0 - 1)
South Coast	182 (142 - 222)	61 (8 - 114)	95 (60 - 130)
Total	217 (170 - 265)	72 (9 - 134)	114 (72 - 156)

1. Due to rounding, numbers may not add up precisely to the totals.

Updated Table 22. Proposed Regulation: Total Reductions in Health Outcomes^{1,2}

Air Basin	Premature Deaths	Hospital Admissions	Emergency Room Visits
North Coast	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Sacramento Valley	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
San Diego County	7 (5 - 8)	2 (0 - 3)	3 (2 - 4)
San Francisco Bay	31 (24 - 38)	10 (1 - 19)	18 (11 - 24)
San Joaquin Valley	1 (0 - 1)	0 (0 - 0)	0 (0 - 0)
South Central Coast	2 (1 - 2)	1 (0 - 1)	1 (0 - 1)
South Coast	209 (164 - 256)	66 (8 - 122)	104 (66 - 142)
Total	250 (195 - 305)	78 (10 - 145)	126 (79 - 172)

1. PM2.5 estimates for the South Coast Air Basin were obtained by direct estimation of health outcomes. Other estimates were obtained using incidence per ton (IPT) factors.
2. Due to rounding, numbers may not add up precisely to the totals.

Statewide valuation of health benefits were calculated by multiplying the avoided health outcomes by the valuation per incident. Staff quantified the total statewide valuation due to avoided health outcomes between 2021 and 2032. These values are summarized in Updated Table 24. The spatial distribution of these benefits follow the distribution of emission reductions and avoided adverse health outcomes; therefore, most benefits to individuals would occur in the South Coast and San Francisco Bay Area air basins.

Updated Table 24. Statewide Valuation from Avoided Adverse Health Outcomes between 2021 and 2032 as a Result of the Proposed Regulation¹

Outcome	Valuation
Avoided Premature Deaths	\$ 2,432,380,000
Avoided Hospitalizations	\$4,300,000
Avoided Emergency Room Visits	\$105,000
Total Valuation	\$2,436,785,000

1. Values have been rounded and are based on the 2019 dollar year.

3. Corrections to Appendix G to the Initial Statement of Reasons.

The adjustment factor used for the ISOR Appendix G analysis was incorrectly stated as 0.4: the value used in the calculation was 0.5. The adjustment factor is computed based on the ratio of the mortality computed via the IPT methodology to the mortality computed via dispersion modeling, for the South Coast Air basin, for the proposed scenario. The adjustment factor differs slightly from run to run, so different values were

used for the ISOR version of the Proposed Regulation (released October 15, 2019) and the 15 day version of the Proposed Regulation. The value of 0.4 was used for the 15-day change updates presented in this document.

The strikeout/underline version of the ISOR Appendix G language, page G-56, is as follows:

Primary PM2.5: As previously stated, concentrations of PM2.5 in the South Coast Air Basin are based on air dispersion modeling results for at berth sources which allow health outcomes to be directly estimated from concentrations predicted by the model. The modeled concentrations were approximately ~~40~~ 50 percent of the IPT estimates that would be used for on-road diesel engines. Accordingly, estimates for the other air basins and scenarios were adjusted by a factor of ~~0.4~~ 0.5. This is an approximation as the adjustment factor depends on local conditions.