Appendix D

China Shipping Past Performance Review

CHINA SHIPPING PERFORMANCE REVIEW ANALYSIS

This technical memorandum describes the findings of a review of air quality impacts from operations of the Port of Los Angeles (POLA or "the Port") China Shipping marine terminal (Berths 97-109) during the period 2005-2013, in comparison to those predicted by the Environmental Impact Report (EIR) for the modernization and expansion of the China Shipping terminal[1]. This performance review evaluated the impacts of operations of the terminal on (1) mass emissions; (2) criteria pollutant concentrations; and (3) human health risk. Other air quality impacts associated with EIR analyses under the California Environmental Quality Act (CEQA) were not evaluated as they are either qualitative or not considered part of the scope of this analysis. In all cases, comparisons were made to the Mitigated Project scenario in the EIR.

1.1 Methodology

The detailed air quality impacts modeling conducted for the EIR were used as the basis for the performance review analysis. Inputs to the modeling were modified to reflect actual data for the period 2005-2013 to the extent possible. Although the models used for emission factors or dispersion modeling (e.g. California Air Resources Board's EMFAC model, or the U.S. Environmental Protection Agency's AERMOD model) have been updated since the original EIR development, the updated versions were not used in the performance review. Updates to the models would complicate the comparison of past year emissions and pollutant dispersion with predictions from the EIR.

In general the data sources for the analysis are the detailed equipment, activity, and emissions data gathered by the Port as part of annual emission inventories[2]. These inventories cover the years 2005-2013; detailed data for the China Shipping terminal specifically were requested from the Port's contractor developing the inventory[3]. The detailed data was requested as the inventories do not provide a breakdown of activity and emissions at the level of an individual terminal, and do not provide the detailed activity or emissions characteristics needed to determine impacts.

Additional data sources included ocean-going vessel (OGV) call data for the China Shipping terminal provided directly by the Port, which include a detailed list of all OGV vessel visits with durations and data on the use of Alternative Maritime Power (AMP)[4]. Throughput data for the China Shipping terminal in the period 2005-2013 were provided directly by the Port[5].

[1] http://www.portoflosangeles.org/EIR/ChinaShipping/FEIR/feir_china_shipping.asp
[2] See for example: http://www.portoflosangeles.org/pdf/2012_Air_Emissions_Inventory_Highlights.pdf
[3] Starcrest, LLC, personal communication, May-June 2014.
[4] Port of Los Angeles, Carter Atkins, personal communication, June 25, 2014.
[5] Port of Los Angeles, Shozo Yoshikawa, personal communication, June 2014.

Data were used to modify input assumptions to the air quality analysis for five major source categories: (1) OGVs; (2) harborcraft; (3) cargo-handling equipment (CHE); (4) locomotives including yard locomotives at the on-dock railyard and linehaul locomotives; and (5) drayage trucks. For each source category a number of different activity and equipment inputs were updated to reflect actual data based on the Port emission inventories where possible, including the following:

- OGV call data: vessel size, number of calls, control equipment configuration, marine engine tier level, duration of visit, speed of transit, vessel power configuration, fuel usage, and AMP usage;
- Harborcraft data: vessel size, activity of harborcraft per OGV visit, control equipment configuration, marine engine tier level, and fuel usage;
- CHE data: type and number of CHE, horsepower-hours of usage by type, fuel type, engine tier level, control equipment, and load factors;
- Rail data: number of train visits, average hours of operation, size and load, type of fuel (S content), fleet mix by tier level, and emission factors by tier level;
- Truck data: number of truck visits, truck vehicle miles traveled (VMT), fleet mix by model year and fuel type, and fleet average emission factors;

These modifications were propagated through the original EIR emissions processing to determine both new mass emission impacts, and new inputs to the dispersion modeling conducted for the original EIR. No updates were made to the dispersion models and other dispersion modeling inputs (i.e. meteorological data, source locations, etc.), only to the emission inputs to the dispersion models as described above.

1.2 Throughput

The revised throughput data for the China Shipping terminal and comparison to the EIR assumptions are shown below in Table 1. Note that the EIR provided twenty-foot equivalent unit (TEU) throughput data for 2005, 2010 and 2015. For comparison purposes the throughput was linearly interpolated between these three discrete years to obtain estimated throughput for all other years.

Table 1. Actual vs. EIR estimated throughput.

Year	Total TEU throughput at China Shipping Terminal	
	Actual	EIR Estimates*
2005	456,739	403,200
2006	520,248	*443,600*
2007	559,027	*484,000*
2008	387,004	*524,400*
2009	607,630	*564,800*
2010	690,597	605,200
2011	613,252	*717,040*
2012	699,609	*828,880*
2013	813,845	*940,720*

*EIR estimates for years other than 2005, 2010 and 2015 are derived from linear interpolation between these years;

1.3 Impacts Analysis

Based on the updated equipment and activity inputs, operational air quality impacts were evaluated using the same threshold and comparative approach as used in the original EIR for impacts AQ-3, AQ-4, and AQ-7. The results of the updated impact analyses were compared to those in the original EIR. For calendar year 2013, EIR analysis, data and mitigation requirements were used to develop an estimate of the EIR's predicted impacts for 2013 (since calendar year 2013 was not an analysis year in the EIR).

1.3.1 AQ-3 Operational Mass Emissions

Tables 2-7 below show a comparison of peak day operational mass emissions relative to the CEQA baseline only, for the years 2005, 2010 and 2013 where a direct comparison between the performance review analysis and the EIR can be made.

Figures 1 and 2 show a summary of the peak daily NOx and PM10 emissions respectively by source category for comparison purposes.

Table 2. 2005 peak daily operational emissions impacts.

Peak Daily Operational Emissions (Performance Review)						
	Peak Daily Emissions (lb/day)					
Emission Source	VOC	CO	NOx	SOx	PM10	PM2.5
Project Year 2005						
Ships - Transit and Anchoring	182	369	3,429	1,790	296	237
Ships - Hoteling	3	9	101	55	5	4
Tugboats	11	47	179	1	7	7
Trucks	438	1,189	3,039	20	230	158
Trains	102	281	1,955	51	68	62
Railyard Equipment	30	91	239	1	13	12
Terminal Equipment	150	1,012	833	7	27	25
Worker Commuter Vehicles	8	87	12	0	10	2
Total - Project Year 2005	**923**	**3,085**	**9,786**	**1,924**	**656**	**506**
CEQA Impacts						
CEQA Baseline Emissions	161	607	1,523	28	85	78
Project minus CEQA Baseline	762	2,479	8,263	1,896	571	428
Thresholds	55	550	55	150	150	55
Significant?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Peak Daily Operational Emissions With Mitigation (EIR)						
	Peak Daily Emissions (lb/day)					
Emission Source	VOC	CO	NOx	SOx	PM10	PM2.5
Project Year 2005						
Ships - Transit and Anchoring	133	278	3,266	3,179	385	308
Ships - Hoteling	35	94	1,249	2,294	194	156
Tugboats	2	10	68	5	3	3
Trucks	252	1,194	2,222	16	172	115
Trains	100	274	1,904	124	66	61
Railyard Equipment	37	131	371	3	18	16
Terminal Equipment	450	6,644	2,642	10	48	46
Worker Commuter Vehicles	8	87	12	0	10	2
Total - Project Year 2005	**1,016**	**8,714**	**11,734**	**5,629**	**896**	**706**
CEQA Impacts						
CEQA Baseline Emissions	161	607	1,523	28	85	78
Project minus CEQA Baseline	855	8,107	10,211	5,601	812	628
Thresholds	55	550	55	150	150	55
Significant?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Table 3. 2005 comparison of peak daily operational emissions impacts between performance review and EIR.

Emission Source	Absolute Difference (Perf Review- EIR)					
	VOC	CO	NOx	SOx	PM10	PM2.5
Project Year 2005						
Ships - Transit and Anchoring	49	92	163	-1,389	-89	-71
Ships - Hoteling	-32	-85	-1,147	-2,239	-190	-152
Tugboats	9	36	111	-4	4	4
Trucks	186	-6	817	5	58	43
Trains	3	7	51	-73	2	1
Railyard Equipment	-7	-40	-133	-2	-5	-5
Terminal Equipment	-300	-5,632	-1,809	-3	-21	-21
Worker Commuter Vehicles	0	0	0	0	0	0
Total - Project Year 2005	-93	-5,628	-1,948	-3,705	-241	-200
CEQA Impacts						
Project minus CEQA Baseline	-93	-5,628	-1,948	-3,705	-241	-200

	% Difference (Perf Review/EIR)					
	VOC	CO	NOx	SOx	PM10	PM2.5
Project Year 2005						
Ships - Transit and Anchoring	37%	33%	5%	-44%	-23%	-23%
Ships - Hoteling	-90%	-90%	-92%	-98%	-98%	-98%
Tugboats	419%	345%	165%	-82%	163%	163%
Trucks	74%	0%	37%	30%	33%	37%
Trains	3%	3%	3%	-59%	3%	2%
Railyard Equipment	-20%	-31%	-36%	-54%	-28%	-28%
Terminal Equipment	-67%	-85%	-68%	-33%	-44%	-45%
Worker Commuter Vehicles	0%	0%	0%	0%	0%	0%
Total - Project Year 2005	-9%	-65%	-17%	-66%	-27%	-28%
CEQA Impacts						
Project minus CEQA Baseline	-11%	-69%	-19%	-66%	-30%	-32%

Red indicates increase in emissions from EIR analysis

Blue indicates decrease in emissions from EIR analysis

Table 4. 2010 peak daily operational emissions impacts.

Peak Daily Operational Emissions (Performance Review)						
	Peak Daily Emissions (lb/day)					
Emission Source	VOC	CO	NOx	SOx	PM10	PM2.5
Project Year 2010						
Ships - Transit and Anchoring	260	524	4,432	1,586	137	112
Ships - Hoteling	10	27	301	82	11	8
Tugboats	10	41	130	0	5	6
Trucks	130	359	1,321	4	137	44
Trains	44	279	1,215	5	28	27
Railyard Equipment	24	83	194	0	10	9
Terminal Equipment	121	630	722	1	30	28
Worker Commuter Vehicles	9	109	14	0	20	4
Total - Project Year 2010	**608**	**2,053**	**8,330**	**1,677**	**378**	**238**
CEQA Impacts						
CEQA Baseline Emissions	161	607	1,523	28	85	78
Project minus CEQA Baseline	447	1,446	6,807	1,649	293	161
Thresholds	55	550	55	150	150	55
Significant?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Peak Daily Operational Emissions With Mitigation (EIR)						
	Peak Daily Emissions (lb/day)					
Emission Source	VOC	CO	NOx	SOx	PM10	PM2.5
Project Year 2010						
Ships - Transit and Anchoring	174	340	2,971	2,766	397	317
Ships - Hoteling	65	175	2,318	4,258	361	289
Tugboats	3	21	126	0	4	4
Trucks	247	1,101	2,500	4	201	94
Trains	84	269	1,481	31	48	45
Railyard Equipment	4	134	115	0	3	3
Terminal Equipment	1,456	27,456	5,180	5	78	77
Worker Commuter Vehicles	9	109	14	0	20	4
Total - Project Year 2010	**2,042**	**29,606**	**14,705**	**7,065**	**1,111**	**831**
CEQA Impacts						
CEQA Baseline Emissions	161	607	1,523	28	85	78
Project minus CEQA Baseline	1,880	28,999	13,182	7,036	1,027	754
Thresholds	55	550	55	150	150	55
Significant?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Table 5. 2010 comparison of peak daily operational emissions impacts between performance review and EIR.

Emission Source	Absolute Difference (Perf Review- EIR)						% Difference (Perf Review/EIR)					
	VOC	CO	NOx	SOx	PM10	PM2.5	VOC	CO	NOx	SOx	PM10	PM2.5
Project Year 2010							Project Year 2010					
Ships - Transit and Anchoring	86	184	1,462	-1,179	-259	-205	49%	54%	49%	-43%	-65%	-65%
Ships - Hoteling	-55	-148	-2,018	-4,176	-350	-280	-84%	-84%	-87%	-98%	-97%	-97%
Tugboats	7	21	4	0	1	2	248%	98%	4%	27%	27%	54%
Trucks	-117	-742	-1,179	-1	-64	-49	-47%	-67%	-47%	-15%	-32%	-52%
Trains	-40	10	-266	-27	-20	-18	-47%	4%	-18%	-85%	-41%	-40%
Railyard Equipment	19	-51	78	0	7	6	453%	-38%	68%	-54%	192%	192%
Terminal Equipment	-1,335	-26,826	-4,458	-4	-48	-48	-92%	-98%	-86%	-80%	-61%	-63%
Worker Commuter Vehicles	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%
Total - Project Year 2010	-1,434	-27,553	-6,375	-5,387	-733	-593	-70%	-93%	-43%	-76%	-66%	-71%
CEQA Impacts							CEQA Impacts					
Project minus CEQA Baseline	-1,434	-27,553	-6,375	-5,387	-733	-593	-76%	-95%	-48%	-77%	-71%	-79%

Red indicates increase in emissions from EIR analysis

Blue indicates decrease in emissions from EIR analysis

Table 6. 2013 peak daily operational emissions impacts.

Peak Daily Operational Emissions (Performance Review)						
	Peak Daily Emissions (lb/day)					
Emission Source	VOC	CO	NOx	SOx	PM10	PM2.5
Project Year 2013						
Ships - Transit and Anchoring	207	387	2,605	299	78	63
Ships - Hoteling	27	71	784	220	28	22
Tugboats	10	63	108	0	4	4
Trucks	153	436	1,449	4	133	38
Trains	58	279	1,248	1	39	36
Railyard Equipment	21	80	165	0	8	8
Terminal Equipment	203	861	1,116	1	28	27
Worker Commuter Vehicles	9	109	14	0	20	4
Total - Project Year 2013	687	2,285	7,489	525	338	202
CEQA Impacts						
CEQA Baseline Emissions	161	607	1,523	28	85	78
Project minus CEQA Baseline	526	1,678	5,966	497	253	124
Thresholds	55	550	55	150	150	55
Significant?	Yes	Yes	Yes	Yes	Yes	Yes

Peak Daily Operational Emissions With Mitigation (EIR)						
	Peak Daily Emissions (lb/day)					
Emission Source	VOC	CO	NOx	SOx	PM10	PM2.5
Project Year 2013						
Ships - Transit and Anchoring	207	400	3,164	135	110	88
Ships - Hoteling	5	23	163	60	15	13
Tugboats	3	21	126	0	4	4
Trucks	121	453	1,136	3	189	49
Trains	80	269	1,423	1	44	40
Railyard Equipment	3	132	68	0	2	2
Terminal Equipment	2,127	40,140	6,449	6	79	79
Worker Commuter Vehicles	9	109	14	0	20	4
Total - Project Year 2013	2,554	41,548	12,544	205	462	279
CEQA Impacts						
CEQA Baseline Emissions	161	607	1,523	28	85	78
Project minus CEQA Baseline	2,393	40,941	11,021	177	378	201
Thresholds	55	550	55	150	150	55
Significant?	Yes	Yes	Yes	Yes	Yes	Yes

Table 7. 2013 comparison of peak daily operational emissions impacts between performance review and EIR.

	Absolute Difference (Perf Review- EIR)					
Emission Source	VOC	CO	NOx	SOx	PM10	PM2.5
Project Year 2013						
Ships - Transit and Anchoring	0	-14	-559	164	-33	-26
Ships - Hoteling	22	48	620	160	13	10
Tugboats	7	42	-18	0	0	0
Trucks	33	-18	313	1	-56	-11
Trains	-22	9	-175	0	-4	-4
Railyard Equipment	18	-52	97	0	6	6
Terminal Equipment	-1,924	-39,279	-5,333	-4	-51	-52
Worker Commuter Vehicles	0	0	0	0	0	0
Total - Project Year 2013	-1,867	-39,263	-5,055	320	-124	-77
CEQA Impacts						
Project minus CEQA Baseline	-1,867	-39,263	-5,055	320	-124	-77

	% Difference (Perf Review/EIR)					
VOC	CO	NOx	SOx	PM10	PM2.5	
Project Year 2013						
0%	-3%	-18%	122%	-30%	-29%	
438%	210%	380%	265%	86%	76%	
227%	202%	-14%	20%	-2%	-2%	
27%	-4%	28%	22%	-30%	-23%	
-27%	3%	-12%	-17%	-10%	-9%	
688%	-40%	144%	-54%	324%	324%	
-90%	-98%	-83%	-76%	-64%	-65%	
0%	0%	0%	0%	0%	0%	
-73%	-95%	-40%	156%	-27%	-28%	
CEQA Impacts						
-78%	-96%	-46%	181%	-33%	-38%	

Red indicates increase in emissions from EIR analysis

Blue indicates decrease in emissions from EIR analysis

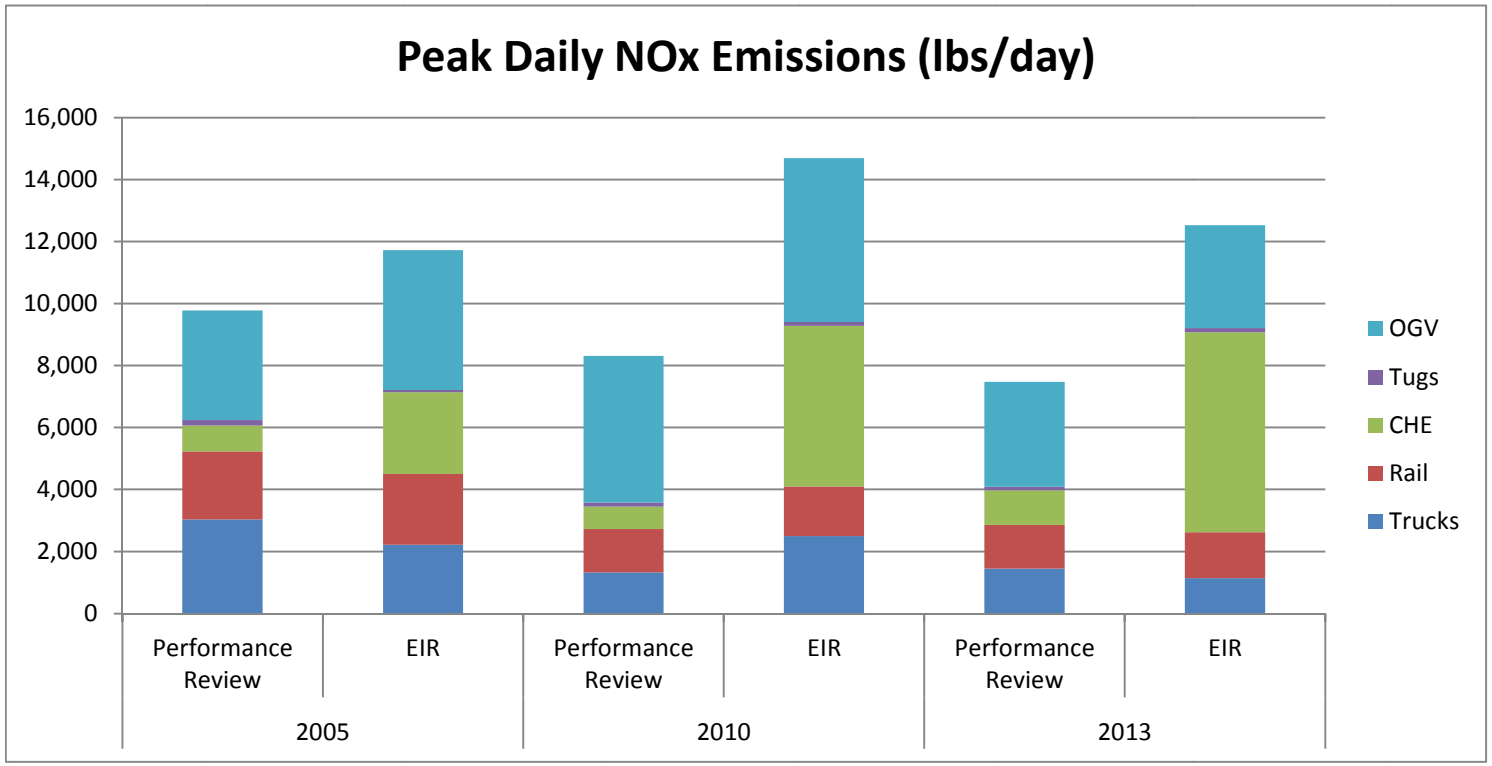

Figure 1. Comparison of NOx emissions between the performance review and EIR.

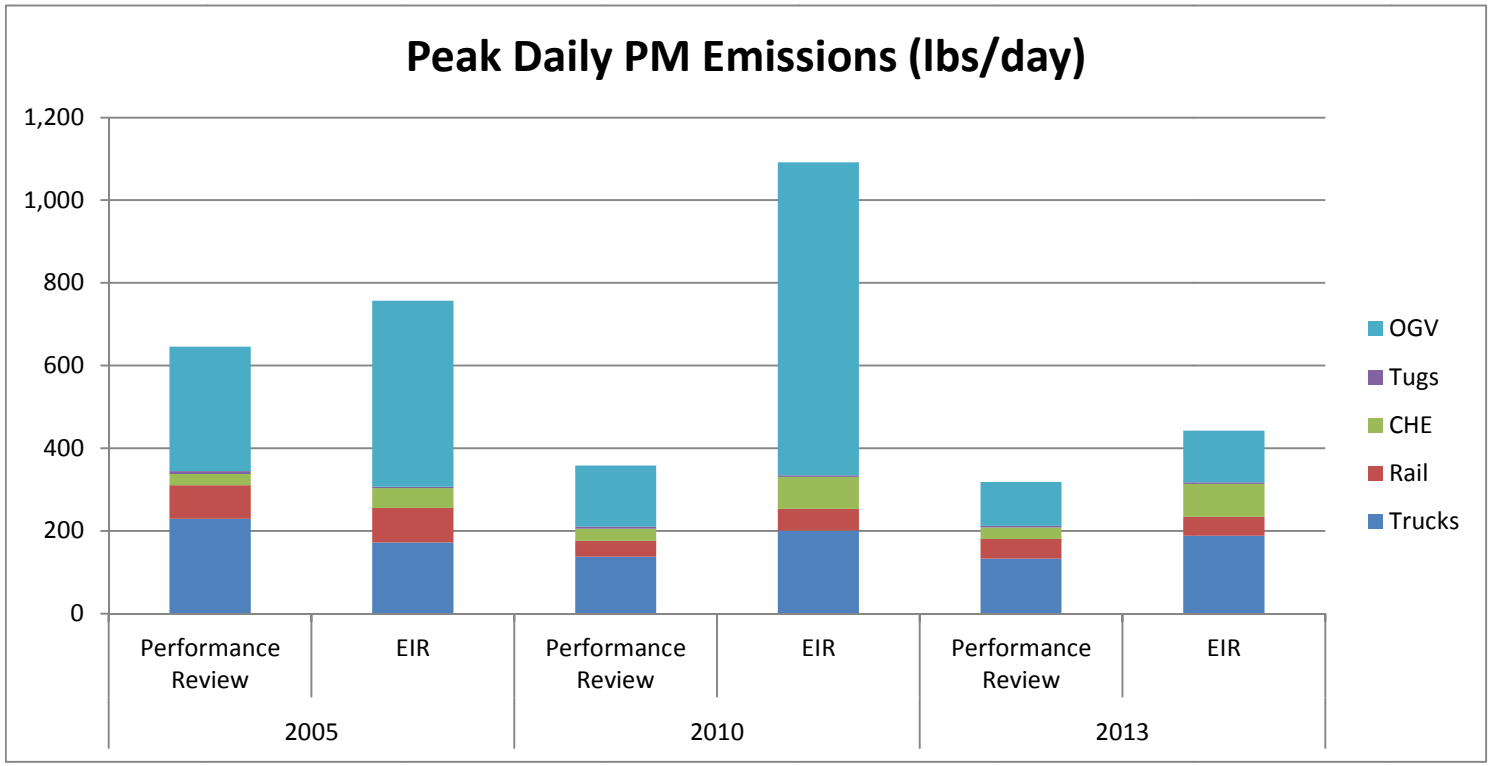

Figure 2. Comparison of PM10 emissions between the performance review and EIR.

Observations:

Based on the mass emission impact analysis described above and comparison to the impact analysis in the original EIR, a number of observations are presented below on similarities and differences between the two analyses. These observations are grouped by source category.

- OGV
  - Annual number of vessel visits and peak day vessel visits differ from EIR assumptions
    - lower peak day activity in performance review analysis;
    - fewer annual vessel visits in performance review analysis than in EIR assumptions;
  - Vessel mix by size differs from EIR assumptions depending on calendar year – generally larger vessels called during 2005-2013 than in EIR assumptions;
  - VSR and fuel sulfur level compliance differ from EIR assumptions and vary by calendar year and transit zone – generally higher sulfur fuel was used in the performance review analysis than in the mitigated EIR assumptions;
  - Fraction of calls that were AMP'ed generally lower in the performance review analysis than in EIR assumptions;

- Harbor Craft
  - Annual activity generally consistent with EIR assumptions in early years, lower activity in 2010 and 2013 in performance review analysis due to lower throughput/fewer OGV calls;
  - Peak day emissions higher in performance review analysis than in EIR in all years due to higher activity and differences in EFs;

- CHE
  - Significant difference in activity throughout analysis period
    - EIR overestimated the CHE usage by combining activity at CS/YM/WBICTF;
    - Overestimate varies from 3.2-3.8x factor depending on calendar year;
  - Peak day and annual NOx and PM emissions lower in all years in the performance review analysis than in EIR analysis;
  - NOx EFs for LPG yard tractors substantially lower in performance review analysis than EIR assumptions in early years;
  - PM EFs comparable in performance review analysis and EIR assumptions in all years particularly for yard tractors which make up the majority of CHE activity;

- Rail
  - Annual emissions generally scale between performance review analysis and EIR with throughput;
  - Peak day activity is identical (i.e. 1 train per day) between performance review analysis and EIR;

- EFs for NOx and PM lower in performance review analysis than in EIR due to incorporation of rebuild emission standards (i.e. Tier 1+, Tier 2+);
- Emissions from on-dock yard equipment were doubled-counted in EIR; they are removed from the performance review analysis

- Trucks
  - Truck activity (VMT) higher in 2005 and 2010 in performance review analysis than in EIR due to higher throughput;
  - Truck EFs comparable in 2005 in the two analyses;
  - Truck EFs lower for NOx and PM in 2010 in performance review analysis than in EIR due to early implementation of CTP (85% compliant with MY2007 PM standard) and high fraction of MY2010 compliant trucks (27%) in Port fleet in 2010;
  - Truck NOx emissions higher in performance review analysis than in EIR in 2013, primarily due to implementation of MM AQ-19 and MM AQ-20 in EIR analysis
    - EIR assumed high fraction of MY2010 compliant diesel trucks in 2013;
    - EIR assumed LNG trucks (50% of fleet) would meet MY2010 standards;
  - Truck PM emissions lower in performance review analysis than in EIR in 2013
    - PM2.5 exhaust EFs are comparable between the two analyses;
    - Throughput (hence VMT) is substantially less in the performance review analysis than in the EIR;
    - PM10 is more closely tied to VMT than PM2.5 due to fugitive dust – so PM10 substantially lower in performance review analysis than in EIR due to lower throughput;

1.3.2 AQ-4 Criteria Pollutant Concentrations

Tables 8 through 11 below show a comparison of maximum criteria pollutant concentrations predicted for the original EIR and the performance review. The EIR concentrations were based on dispersion modeling with AERMOD. The performance review concentrations were scaled from the EIR concentrations by the relative emissions for each source category. The highest emission rate for each source category in 2005, 2010, and 2013 was selected for the performance review analysis. New dispersion modeling was not done for the performance review because both the dispersion model and meteorological data have been updated since the EIR, making a comparison based only on the difference in emissions impossible. As a result, the performance review concentrations are estimates.

Table 8. Maximum NO2 and CO concentrations from the EIR.

Pollutant	Averaging Time	Project Concentration (ug/m3)	Background Concentration (ug/m3)	Total Concentration (ug/m3)	Significance Threshold (ug/m3)	Significant?
NO2	1-Hour	1,919	263	2,182	338	Yes
	Annual	48	53	101	56	Yes
CO	1-Hour	10,613	4,809	15,422	23,000	No
	8-Hour	2,620	4,008	6,628	10,000	No

Source: Appendix E2, Table E2.5-7 (Mitigated Project operation).

Table 9. Maximum NO2 and CO concentrations from the performance review (estimated).

Pollutant	Averaging Time	Project Concentration (ug/m3)	Background Concentration (ug/m3)	Total Concentration (ug/m3)	Significance Threshold (ug/m3)	Significant?	Change Relative to EIR (Perf. Period minus EIR)
NO2	1-Hour	1,277	263	1,540	338	Yes	-642
	Annual	37	53	89	56	Yes	-11
CO	1-Hour	706	4,809	5,515	23,000	No	-9,907
	8-Hour	175	4,008	4,183	10,000	No	-2,445

Note: Results are estimated based on scaling; no new dispersion modeling was conducted.

Table 10. Maximum PM10 and PM2.5 concentrations from the EIR.

Pollutant	Averaging Time	Project Concentration (ug/m3)	CEQA Increment (ug/m3)	Significance Threshold (ug/m3)	Significant?
PM10	24-Hour	10.1	6.5	2.5	Yes
PM2.5	24-Hour	7.8	5.2	2.5	Yes

Source: Appendix E2, Table E2.5-8 (Mitigated Project operation).

Table 11. Maximum PM10 and PM2.5 concentrations from the performance review (estimated).

Pollutant	Averaging Time	Project Concentration (ug/m3)	CEQA Increment (ug/m3)	Significance Threshold (ug/m3)	Significant?	Change Relative to EIR (Perf. Period minus EIR)
PM10	24-Hour	9.3	4.7	2.5	Yes	-1.8
PM2.5	24-Hour	5.7	2.8	2.5	Yes	-2.4

Note: Results are estimated based on scaling; no new dispersion modeling was conducted.

Observations:

Based on the scaling analysis, the maximum concentrations of NO2, PM10, and PM2.5 that were significant in the original EIR were also significant in the performance review. However, in each case the performance review concentration was less than the EIR concentration. The main factor that led to lower concentrations was:

- Much less terminal equipment activity in the performance review compared to the EIR. Terminal equipment was the dominant contributor to the maximum NO2, PM10, and PM2.5 concentrations.

CO concentrations were less than significant in the EIR and remained less than significant in the performance review.

1.3.3 AQ-7 Human Health Risk

Tables 12 and 13 below show a comparison of maximum health impacts predicted for the original EIR and the performance review. The EIR health values were based on dispersion modeling with AERMOD. The performance review health values were scaled from the EIR health values by the relative emissions for each source category.

For cancer risk, the scaling analysis used the total 9-year (2005-2013) DPM emissions for each emission source category from the EIR and performance review. The net change in risk for the 9-year period was estimated and applied to the EIR results to estimate the performance review results. For the chronic and acute hazard indices, the highest emission rate for each source category in 2005, 2010, and 2013 was selected for the performance review analysis.

New dispersion modeling was not done for the performance review because both the dispersion model and meteorological data have been updated since the EIR, making a comparison based only on the difference in emissions impossible. As a result, the performance review health values are estimates.

Table 12. Maximum health impacts from the EIR.

Health Impact	Receptor Type	Proposed Project Absolute	CEQA Increment	Significance Threshold	Significant?
Cancer Risk (per million)	Residential	19	11	10	Yes
	Occupational	13	13		Yes
	Sensitive	9	7		No
	Student	0.2	0.2		No
	Recreational	20	20		Yes
Chronic Hazard Index	Residential	0.2	0.1	1.0	No
	Occupational	0.6	0.3		No
	Sensitive	0.1	0.0		No
	Student	0.1	0.0		No
	Recreational	0.5	0.3		No
Acute Hazard Index	Residential	1.1	1.1	1.0	Yes
	Occupational	1.7	1.7		Yes
	Sensitive	1.0	0.9		No
	Student	1.0	0.9		No
	Recreational	1.4	1.4		Yes

Source: Appendix E3, Table E3-7-4 (Mitigated Project).

Table 13. Maximum health impacts from the performance review (estimated).

Health Impact	Receptor Type	Proposed Project Absolute	CEQA Increment	Significance Threshold	Significant?	Change Relative to EIR (Perf. Review minus EIR)
Cancer Risk (per million)	Residential	17	9	10	No	-2.0
	Occupational	12	12		Yes	-0.9
	Sensitive	8	6		No	-0.9
	Student	0.4	0.4		No	0.2
	Recreational	19	19		Yes	-1.4
Chronic Hazard Index	Residential	0.2	0.1	1.0	No	0.0
	Occupational	0.7	0.4		No	0.1
	Sensitive	0.1	0.0		No	0.0
	Student	0.1	0.0		No	0.0
	Recreational	0.6	0.3		No	0.1
Acute Hazard Index	Residential	0.8	0.8	1.0	No	-0.3
	Occupational	1.3	1.2		Yes	-0.4
	Sensitive	0.7	0.6		No	-0.3
	Student	0.7	0.6		No	-0.3
	Recreational	1.1	1.0		Yes	-0.4

Notes:

1. Cancer risk values reflect the full 70-year exposure period; emissions outside the 2005-2013 period were assumed to be identical to the EIR.
2. Results are estimated based on scaling; no new dispersion modeling was conducted.

Observations:

Based on the scaling analysis, the maximum cancer risks for occupational and recreational receptors that were significant in the original EIR remained significant in the performance review. However, in each case the performance review risk was less than the EIR risk. Furthermore, the maximum cancer risk for a residential receptor that was significant in the original EIR was reduced to less than significant in the performance review. The main factors that led to lower cancer risks are:

- Early voluntary compliance with the Clean Truck Program in the performance review led to lower truck DPM emissions prior to 2012 than was assumed in the EIR (see Table 20 for CTP compliance rates). This was enough to overcome the higher emissions in 2013 due to lower LNG truck percentages than was assumed in the EIR.
- Much less terminal equipment activity in the performance review compared to the EIR. This was enough to overcome the higher emission factors due to fewer electric and Tier 4 equipment than was assumed in the EIR.

Based on the scaling analysis, the maximum acute hazard indices for occupational and recreational receptors that were significant in the original EIR remained significant in the performance review. However, in each case the performance review hazard index was less than the EIR hazard index. Furthermore, the maximum acute hazard index for a residential receptor that was significant in the original EIR was reduced to less than significant in the performance review. The main factors that led to lower acute hazard indices are:

- Lower peak hour ship transit and hoteling emissions during the performance review relative to the EIR.

The following health impacts were less than significant in the EIR and remained less than significant in the performance review: cancer risks at sensitive and student receptors, chronic hazard indices at all receptors, and acute hazard indices at sensitive and student receptors.

Mitigation Measures

A comparison between the inventory data used to develop the performance review analysis and the EIR assumptions with regard to mitigation measures for specific sources is provided below. For each mitigation measure, the requirements of the measure by calendar year are compared to the actual inventory data where possible. This comparison is presented for mitigation measures MM AQ-9 through MM AQ-12 and MM AQ-15 through MM AQ-20.

MM AQ-9: Alternative Maritime Power (AMP)

This MM called for percentages of vessel calls to use AMP: 60% during January 1 to June 30, 2005; 70% from July 1, 2005 through December 31, 2009; 90% beginning January 1, 2010; 100% beginning January 1, 2011. Table 14 below shows the comparison with actual data.

Table 14. Evaluation of MM AQ-9.

MM AQ-9: Alternative Maritime Power		
Vessels must use AMP at specified fractions of vessel visits.		
Year	**Measure**	**Actual**
2005	60%	95%
2005 July	70%	97%
2006	70%	46%
2007	70%	87%
2008	70%	87%
2009	70%	78%
2010	90%	72%
2011	90%	65%
2012	90%	12%
2013	90%	34%

MM AQ-10: Vessel Speed Reduction

This MM called for vessels to comply with the vessel speed reduction program (VSRP) to maintain a maximum speed of 12 knots between 40nm from Point Fermin and the Precautionary Area, with 100% compliance required in 2009 and thereafter. Table 15 below shows the comparison with actual data.

Table 15. Evaluation of MM AQ-10.

MM AQ-10: Vessel Speed Reduction Program			
100% of vessel visits 2009 and thereafter must comply with VSRP requirement of 12 knots out to 40nm.			
Year	**Measure**	**Actual 20 nm**	**Actual 40 nm**
2009	100%	99%	20%
2010	100%	97%	42%
2011	100%	99%	41%
2012	100%	93%	47%
2013	100%	99%	89%

MM AQ-11: Low-Sulfur Fuel

This MM required that vessels calling at Berth 97-109 use low sulfur fuel, defined as 0.2% maximum fuel sulfur content, on all engines within 40nm of Point Fermin (including hotelling). Participation rates were assumed to be: 30% of all engine types by 2009; 50% of all engine types by 2010; 100% of all engine types by 2013 and thereafter.

Insufficient data was gathered at this stage to determine specific compliance with this MM, since average fuel sulfur content was used to determine the mass emissions for purposes of the impact analysis described above. Average sulfur content was significantly higher than the 0.2% for all engine types for all calendar years except 2012.

MM AQ-12: Slide Valve

This MM required that main engines of vessels visiting Berths 97-109 be equipped with slide valves or equivalent technology in the following schedule: 25% in 2009; 50% in 2010; 75% in 2012; 100% in 2014 and thereafter. Table 16 below shows the comparison with actual data.

Table 16. Evaluation of MM AQ-12.

MM AQ-12: Slide Valve.		
Vessel main engines must be equipped with slide valves at specified fractions.		
Year	**Measure**	**Actual**
2009	25%	57%
2010	50%	96%
2011	50%	99%
2012	75%	100%
2013	75%	78%

MM AQ-15: Yard Tractors at Berth 97-109 Terminal

This MM called for all yard tractors at the terminal to be run on alternative fuel (LPG) beginning Sept. 30, 2004 through December 31, 2014. Beginning January 1, 2015 all yard tractors would be the cleanest available NOx alternative fueled engine meeting 0.015 g/hp-hr for PM (modeled as LNG yard tractors in the EIR). Table 17 below shows the comparison with actual data.

Table 17. Evaluation of MM AQ-15.

MM AQ-15: Yard Tractors at Berth 97-109 Terminal			
All yard tractors operated at the Berth 97-109 terminal shall run on alternative fuel (LPG)			
Year	**Measure**	**Actual**	**Remaining Diesel**
2005	100%	40%	DOC, Emulsified Diesel
2006	100%	42%	DOC, Emulsified Diesel
2007	100%	42%	DOC
2008	100%	100%	
2009	100%	100%	
2010	100%	100%	
2011	100%	100%	
2012	100%	100%	
2013	100%	100%	

MM AQ-16: Yard Equipment at Berth 121-131 Rail Yard

This MM called for newly purchased and existing terminal rail yard equipment to meet NOx and PM standards under the following conditions: beginning January 1, 2009 all newly purchased equipment must be either (1) the cleanest available NOx alternative-fueled engine meeting 0.015 g/hp-hr for PM or (2) the cleanest available NOx diesel-fueled engine meeting 0.015 g/hp-hr for PM or (3) the cleanest available and equipped with VDECS if conditions (1) and (2) cannot be met; by end of 2012 all equipment less than 750hp must be Tier 4; by end of 2014 all equipment must be Tier 4. Table 18 below shows the comparison with actual data.

Table 18. Evaluation of MM AQ-16.

MM AQ-16: Yard Equipment at Berth 121-131 Rail Yard.		
Year	**Measure**	**Actual**
2009	Purchase Cleanest	No New Purchases
2010	Purchase Cleanest	No New Purchases
2011	Purchase Cleanest	No New Purchases
2012	Purchase Cleanest	No New Purchases
2013	Tier 4 <750 hp	76% DPF on diesel equipment

MM AQ-17: Yard Equipment at Berth 97-109 Terminal

This MM calls for a variety of conditions on yard equipment including: by September 30, 2004 all diesel-powered toppicks and sidepicks shall run on emulsified diesel fuel plus a DOC; by January 1 2009 all RTGs shall be electric, all toppicks shall have the cleanest available NOx alternative-fueled engines meeting 0.015 g/hp-hr for PM, and all newly purchased equipment

must be either (1) the cleanest available NOx alternative-fueled engine meeting 0.015 g/hp-hr for PM or (2) the cleanest available NOx diesel-fueled engine meeting 0.015 g/hp-hr for PM or (3) the cleanest available and equipped with VDECS if conditions (1) and (2) cannot be met; by end of 2012 all equipment less than 750hp must be Tier 4; by end of 2014 all equipment must be Tier 4. This measure applies to all equipment except yard tractors, RTGs and toppicks. Table 19 below shows the comparison with actual data.

Table 19. Evaluation of MM AQ-17.

MM AQ-17: Yard Equipment at Berth 97-109 Terminal		
Various Measures for equipment other than yard tractors, RTGs and toppicks.		
Year	**Measure**	**Actual**
2005	100% Emulsified Diesel	90%
2006	100% Emulsified Diesel	91%
2007	100% Emulsified Diesel	0%
2008	100% Emulsified Diesel	0%
2009	Electric RTG: Top Picks Cleanest: Others Purchased New	0%
2010	Electric RTG: Top Picks Cleanest: Others Purchased New	0%
2011	Electric RTG: Top Picks Cleanest: Others Purchased New	76% DPF on the Diesel Equipment
2012	Electric RTG: Top Picks Cleanest: Others Purchased New	76% DPF on the Diesel Equipment
2013	Tier 4 <750 hp	76% DPF on the Diesel Equipment

MM AQ-18: Yard Locomotives at Berth 121-131 Rail Yard

This MM requires yard locomotives at Berth 121-131 railyard to be equipped with DPFs beginning January 1, 2015.

There have been no DPF retrofits of yard locomotives. It is anticipated that newly manufactured locomotives beginning in 2016 and meeting Tier 4 locomotive emission standards, will have DPF technology included as part of the original equipment manufacturers (OEM) design.

MM AQ-19: Clean Truck Program

This MM requires that drayage trucks comply with the San Pedro Bay Ports' Clean Truck Program. Diesel trucks entering the Berth 97-109 terminal must meet the following standards: 50% USEPA MY2007 in 2009; 70% USEPA MY2007 in 2010; 90% USEPA MY2007 in 2011; 100% USEPA MY2007 in 2012. Table 20 below shows the comparison with actual data.

Table 20. Evaluation of MM AQ-19.

MM AQ-19: Clean Truck Program		
Meet MY 2007 emission standards		
Year	**Measure**	**Actual**
2009	50%	91%
2010	70%	99%
2011	90%	100%
2012	100%	100%
2013	100%	100%

*2014 and 2015 drayage trucks are projected to remain 100% USEPA MY2007 based on past year data;

MM AQ-20: LNG Trucks

This MM requires that drayage trucks entering the Berth 97-109 terminal be LNG fueled in the following schedule: 50% in 2012 and 2013; 70 percent in 2014 through 2017; 100% in 2018 and thereafter. Table 21 below shows the comparison with actual data.

Table 21. Evaluation of MM AQ-20.

MM AQ-20: LNG Trucks		
Trucks must be LNG-fueled		
Year	**Measure**	**Actual**
2012	50%	10.0%
2013	50%	9.4%