



April 30, 2019

Los Angeles County Public Works

Attn: Brittany Barker, George De La O, Veronica Mardis, Michael Simon, Sterling Klippel

900 S. Fremont Ave.

Alhambra, CA 91803

Subject: Devil's Gate Localized Haul Truck Emissions Demonstration - UPDATED

On November 14, 2018, ECORP Consulting was retained to articulate the localized contribution of air toxic pollutants associated with the proposal to haul material from the Devil's Gate Reservoir (Reservoir) as part of necessary maintenance activities. The following discussion is an update to the original *Devil's Gate Localized Haul Truck Emissions Demonstration* prepared by ECORP Consulting and dated November 30, 2018; and includes a detailed account of the methodology and conclusions of a demonstration intended underscore the existing pollution levels routinely generated the vicinity of the Reservoir. The results of this demonstration are not intended to update or replace any of the previous analysis prepared for the whole of the *Devil's Gate Reservoir Sediment Removal and Management Project*.

The intent of this demonstration is to create an understanding of the current air quality-related environment in the Project vicinity in order to develop an appropriate baseline with which to compare the contribution of air toxic emissions associated with haul trucks. This demonstration focuses a 5-mile segment of the Interstate 210 Foothill Freeway (I-210) between the La Canada – Flintridge, East Junction Route 2 interchange and the Pasadena, Junction Routes 134/710 interchange as its subject in order to provide an 'apples-to-apples' comparison of potential air quality effects. Further, this 5-mile segment of I-210 traverses adjacent to the Devil's Gate Reservoir and will be used by the material haul trucks.

Existing Air Toxic Pollutant Emissions

The Devil's Gate Reservoir is located in the City of Pasadena, in Los Angeles County. The City of La Cañada Flintridge lies west of the Reservoir, and the unincorporated community of Altadena lies to the east. Land uses directly adjacent to the Reservoir include the California Institute of Technology (Caltech)/National Aeronautics and Space Administration (NASA) – Jet Propulsion Laboratory (JPL) to the northwest and east; La Cañada High School and Hillside School and Learning Center to the west; single-family residential uses to the north, east, and south; and I-210 to the south.

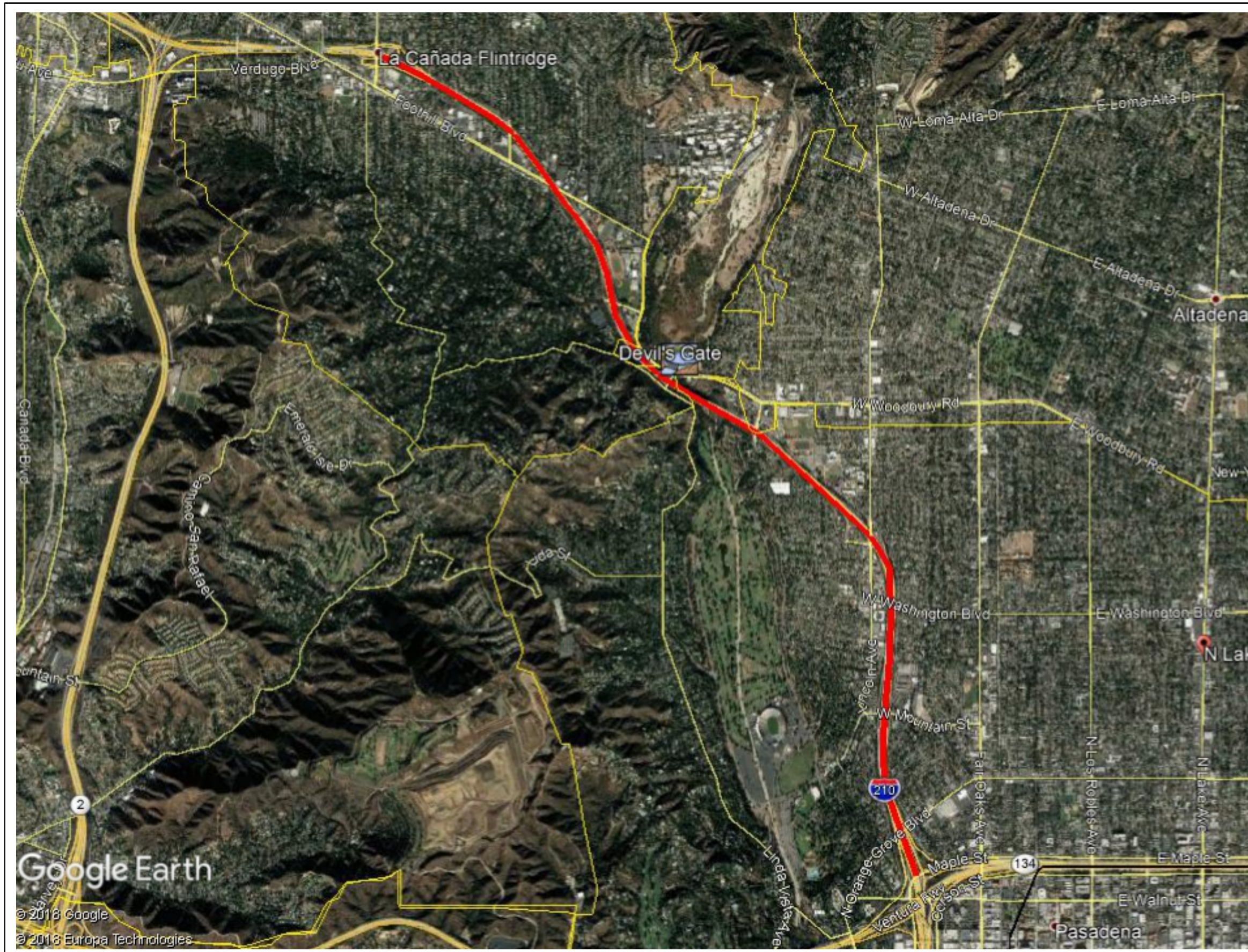
I-210 is the dominant source of air pollutant emissions in the vicinity of the Reservoir. According to the California Department of Transportation's (Caltrans') *2016 Annual Average Daily Truck Traffic on*

the California State Highway System (2017)¹, an average of 126,000 automobiles traverse the 5-mile segment of I-210 between the La Canada – Flintridge, East Junction Route 2 interchange and the Pasadena, Junction Routes 134/710 interchange, daily. (This segment of I-210 is shown in Figure 1.) According to this same document, 10,900 of these automobiles are classified as heavy-duty diesel trucks. This averaged total of heavy-duty diesel trucks is further refined in *2016 Annual Average Daily Truck Traffic on the California State Highway System* to identify the specific classes of heavy-duty diesel trucks, as defined by the number of axles. The breakdown of automobile type estimated to traverse the 5-mile segment of I-210 between the La Canada – Flintridge, East Junction Route 2 interchange and the Pasadena, Junction Routes 134/710 interchange, daily, is shown in Table 1.

Table 1. Automobiles Traversing I-210 Between East Junction Route 2 and Junction Route 134/710 by Type	
Vehicle Type	Number
Total Automobiles Daily	126,000
--Non-Heavy-duty Diesel Trucks	--115,100
--Heavy-duty Diesel Trucks	-- 10,900
➤ 2-Axle	➤ 3,152
➤ 3-Axle	➤ 458
➤ 4-Axle	➤ 239
➤ 5-Axle	➤ 7,051

Source: California Department of Transportation. 2017. *2016 Annual Average Daily Truck Traffic on the California State Highway System*.

¹ Available at <http://www.dot.ca.gov/trafficops/census/>



Map Date: 11/28/2018
 Photo (or Base) Source: Google Earth 2018

Figure 1

There are many different types of air toxic pollutants, with varying degrees of toxicity. Sources of air toxics include industrial processes, such as petroleum refining and chrome-plating operations; commercial operations, such as gasoline stations and dry cleaners; and motor vehicle exhaust. To date, the California Air Resources Board (CARB) has designated nearly 200 compounds as air toxics, expressed as toxic air contaminants (TACs) by CARB.

CARB identified diesel particulate matter (DPM) as a TAC. DPM differs from other TACs in that it is not a single substance but rather a complex mixture of hundreds of substances. Diesel exhaust is a complex mixture of particles and gases produced when an engine burns diesel fuel. Generally, DPM poses the greatest health risk among the TACs emitted in California. Accordingly, DPM is the focus of this discussion.

In order to quantify DPM currently generated daily within the subject 5-mile segment of I-210, the 2014 version of the Emission FACTor model (*EMFAC*) developed by CARB was employed. *EMFAC 2014* is a mathematical model that was developed to calculate emission rates from motor vehicles that operate on highways, freeways, and local roads in California and is commonly used by CARB to project changes in future emissions from on-road mobile sources including cars, trucks, and buses in California. *EMFAC 2014* includes the latest data on California's car and truck fleets and travel activity. New forecasting methods have been incorporated for developing vehicle age distributions and estimating vehicle miles traveled (VMT). *EMFAC 2014 accounts for speed correction factors, tampering, mal-maintenance and deterioration rates, and other factors. EMFAC's deterioration rates for heavy-duty vehicles is sourced from a study prepared by the Radian Corporation (Heavy-Duty Diesel Inspection and Maintenance Study, prepared for California Air Resources Board, May 16, 1988).* The model also reflects the emissions benefits of CARB's recent rulemakings, including on-road diesel fleet rules, Advanced Clean Car Standards, and the Smartway/Phase I Heavy Duty Vehicle Greenhouse Gas Regulation. The model includes updates to heavy-duty diesel truck emission factors based on the latest test data.² (See Figure 2 for a view of the *EMFAC* software interface.)

Almost all diesel exhaust particle mass is 10 microns or less in diameter. Therefore, coarse particulate matter ranging in size from 2.5 to 10 microns in diameter (PM₁₀) and fine particulate matter measuring less than 2.5 microns in diameter (PM_{2.5}) are employed as surrogates for DPM in the *EMFAC* model. Because most diesel exhaust particles are 10 microns or less in diameter, DPM is a subset of particulate matter under 10 microns in diameter.

² *EMFAC 2014* is available to download free of cost at <https://www.arb.ca.gov/msei/categories.htm>



Map Date: 11/28/2018
Photo (or Base) Source: EMFAC 2014 User's Guide

Figure 2

As noted in Table 1, 115,100 automobiles that are not considered heavy-duty diesel trucks traverse the subject 5-mile segment of I-210 every day. The *2016 Annual Average Daily Truck Traffic on the California State Highway System* document cited for this information does not further refine this data to identify the specific vehicle classes of these automobiles. Therefore, *EMFAC 2014* is relied upon to provide a vehicle mix of the 115,100 non-heavy-duty diesel trucks for the purposes of this demonstration. The breakdown of non-heavy-duty truck types estimated to traverse the subject 5-mile segment of I-210 every day is shown in Table 2.

Table 2. Vehicle Type Mix for Non-Heavy-Duty Diesel Trucks	
Vehicle Type	Number
Non-Heavy-duty Diesel Trucks	115,100
➤ Passenger Cars (LDA)	-- 63,669
➤ Light-Duty Trucks (LDT1) (GVWR < 6,000 lbs & ETW ≤ 3,750 lbs)	-- 5,907
➤ Light-Duty Trucks (LDT2) (GVWR < 6,000 lbs & ETW 3,751 – 5,750 lbs)	-- 23,541
➤ Light-Heavy-Duty Trucks (GVWR 8,501 – 10,000 lbs)	-- 2,635
➤ Motorcycles	-- 1,151
➤ Medium-Duty Trucks (GVWR 6,000 & 8,500 lbs)	-- 15,055
➤ Motor Homes	-- 706
➤ School Buses	-- 675
➤ Urban Buses	-- 895
➤ Other Buses	-- 866

Source: EMFAC 2014.

Notes: GVWR = gross vehicle weight rating. ETW = equivalent test weight.

As also noted in Table 1, the 10,900 heavy-duty diesel trucks traversing the subject 5-mile segment of I-210 consist of 2-axle, 3-axle, 4-axle, and 5-axle trucks, as cited from the Department of Transportation's *2016 Annual Average Daily Truck Traffic on the California State Highway System* document. Table 3 identifies the specific *EMFAC 2014* vehicle classes employed to represent 2-axle, 3-axle, 4-axle, and 5-axle trucks.

Vehicle Type		Number
Heavy-duty Diesel Trucks by Axle	Equivalent EMFAC Vehicle Class	10,900
2-Axle	Light-Heavy-Duty Trucks (GVWR 10,001 – 14,000 lbs)	3,152
3-Axle	Medium-Heavy-Duty Trucks	458
4-Axle	Heavy-Heavy-Duty Trucks	239
5-Axle	Heavy-Heavy-Duty Trucks	7,051

Notes: GVWR = gross vehicle weight rating.

EMFAC further breaks down the Medium-Heavy-Duty Trucks and Heavy-Heavy-Duty Trucks into 9 distinct sub-categories used in this demonstration (e.g., instate trucks, out-of-state trucks, public fleet trucks, utility trucks, etc.).

With the appropriate vehicle mix parameters established, the *EMFAC 2014* model was run to quantify the amount of PM₁₀ and PM_{2.5} (considered surrogates for DPM) generated daily from within the subject segment of I-210 (see Table 4). This includes emissions from every automobile predicted to traverse this segment daily, yet only during the time of travel within the 5-mile subject segment. The maximum speed limit posted on the subject segment of I-210 is 65 miles per hour (mph), and to account for potential fluctuations in vehicle speeds over the course of a day, an average speed of 50 mph was considered for the purposes of this demonstration.

	PM ₁₀	PM _{2.5}
Existing Traffic - 5 Miles of Travel at 50 mph	100.27 pounds	48.82 pounds

Source: EMFAC 2014. See Attachment A.

As shown, 100.27 pounds of PM₁₀ and 48.82 pounds of PM_{2.5} are emitted daily from automobiles traversing the subject 5-mile segment of I-210. (These totals do NOT include emissions from idling, though emissions from brake wear and tire wear are included.)

As disclosed in the *Devil's Gate Reservoir Sediment Removal and Management Project Final EIR*, the hauling of sediment from the Devil's Gate Reservoir will generate 2.4 pounds of PM₁₀ emissions daily and 2.2 pounds of PM_{2.5} daily. This emission total accounts for 425 heavy-duty truck trips traveling to either the Scholl Canyon dump site, Irwindale dump site, or Sun Valley dump site, and back to the Reservoir, for a total of 15,024 miles traveled daily.

The analysis of Project air pollutant emissions in the Final EIR employed the *EMFAC* model to

calculate emissions, which identifies PM₁₀-related emission rates associated with heavy-duty haul trucks as 0.0778 grams PM₁₀ per mile during highway travel and 0.0467 grams PM₁₀ per mile on surface streets. EMFAC identifies PM_{2.5}-related emission rates associated with heavy-duty haul trucks as 0.0715 grams PM_{2.5} per mile during highway travel and 0.0430 grams PM_{2.5} per mile on surface streets (see Appendix A of Appendix B, *Air Quality Report*, in the Final EIR). Using these emissions rates, the amount of PM₁₀ and PM_{2.5} generated in the immediate vicinity of the Reservoir by the hauling of sediment has been calculated in order to identify the PM pollutants emitted at the localized level (i.e., 3.1-mile radius of the Reservoir). 3.1 miles was selected since all heavy-duty truck trips will have to travel 0.6 mile on surface streets after exiting the Reservoir, regardless of what dump site is traveled to, before entering the I-210 facility and traveling either southbound or northbound, where a value of 2.5 miles of travel is applied. Thus, this analysis of localized PM emission accounts of 0.6 mile of travel on surface streets and 2.5 miles on the I-210 freeway for each haul truck trip.

Based on this methodology, the hauling of sediment from the Devil’s Gate Reservoir will generate 0.208 pounds of the overall 2.4 pounds of daily PM₁₀ emissions within 3.1 miles of the Reservoir and 0.191 pounds of the overall 2.2 pounds of daily PM_{2.5} emissions within 3.1 miles of the Reservoir.³

Table 5 provides a summation of all subject emission sources.

Table 5. Particulate Matter Emissions by Source		
Emission Source	PM₁₀ Emissions – Pounds Per Day	PM_{2.5} Emissions – Pounds Per Day
Total Devil’s Gate Sediment Removal (425 Heavy-Duty Haul Truck Trips Daily Traveling 15,024 miles)	2.4 pounds	2.2 pounds
Localized Devil’s Gate Sediment Removal (425 Heavy-Duty Haul Truck Trips Daily within 3.1-mile radius of the Reservoir).	0.208 pounds	0.191 pounds
Existing Traffic on 5-mile segment of I-210 (Between the La Canada – Flintridge, East Junction Route 2 interchange and the Pasadena, Junction Routes 134/710 interchange)	100.27 pounds	48.82 pounds

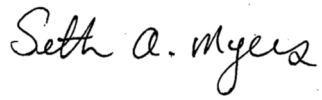
³ Per EMFAC, 0.0778 grams PM₁₀/mile during highway travel and 0.0467 grams PM₁₀/mile during surface street travel and 0.0715 grams PM_{2.5}/mile during highway travel and 0.0430 grams PM_{2.5}/mile during surface street travel.

Localized highway travel for PM₁₀: 0.0778 x 2.5 miles = 0.1945 grams PM₁₀/trip. Localized surface street travel PM₁₀: 0.0467 x 0.6 mile = 0.0280 grams PM₁₀/trip. 0.1945 grams (highway) + 0.0280 grams (surface street) = 0.2225 grams per trip. 0.2225 grams x 425 trips = 94.56 grams PM₁₀ total. 94.56 grams/453.59 = 0.208 pounds.

Localized highway travel for PM_{2.5}: 0.0715 x 2.5 miles = 0.1787 grams PM_{2.5}/trip. Localized surface street travel PM_{2.5}: 0.0430 x 0.6 mile = 0.0258 grams PM_{2.5}/trip. 0.1787 grams (highway) + 0.0258 grams (surface street) = 0.2045 grams per trip. 0.2045 grams x 425 trips = 86.91 grams PM_{2.5} total. 86.91 grams/453.59 = 0.191 pounds.

If you would like to discuss further, please contact me, Seth Myers, at (530) 965-5925 or via e-mail at smyers@ecorpconsulting.com.

Sincerely,

A handwritten signature in black ink that reads "Seth A. Myers". The signature is written in a cursive, flowing style.

Seth Myers
Air Quality Analyst

EMFAC 2014 Output Files – Existing Conditions

**Particulate Matter Emissions Generated at 5-Mile
Segment of I-210 Daily EXISTING CONDITIONS**

Exhaust Emissions

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Los Angeles
Calendar Year: 2018
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, g/mile for RUNEX

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Emission Rates		I-210 5-Mile Segment Between SR 2 & SR 134 per Caltrans' 2016 Daily Traffic Volumes		I-210 5-Mile Segment Between SR 2 & SR 134 per Caltrans' 2016 Daily Traffic Volumes		
						PM10_RUNEX	PM2_5_RUNEX	PM10	PM2_5	PM10	PM2_5	
						Grams/Mile		Total Grams per Vehicle Class		Total Pounds per Vehicle Class		
NON - TRUCKS												
Los Angeles	2018	LDA	Aggregated	50	GAS	0.001341333	0.001234082	LDA	3129.957	2986.721	6.90	6.58
Los Angeles	2018	LDA	Aggregated	50	DSL	0.018322507	0.017529883					
						avg	0.00983192	0.009381982				
Los Angeles	2018	LDT1	Aggregated	50	GAS	0.002640285	0.002430217	LDT1	1601.276	1530.590	3.53	3.37
Los Angeles	2018	LDT1	Aggregated	50	DSL	0.105793176	0.10121661					
						avg	0.05421673	0.051823414				
Los Angeles	2018	LDT2	Aggregated	50	GAS	0.001315933	0.001210861	LDT2	376.184	357.077	0.83	0.79
Los Angeles	2018	LDT2	Aggregated	50	DSL	0.00507616	0.004856567					
						avg	0.003196047	0.003033714				
Los Angeles	2018	LHD1	Aggregated	50	GAS	0.001177749	0.001084909	LHD1	123.543	117.923	0.27	0.26
Los Angeles	2018	LHD1	Aggregated	50	DSL	0.017578964	0.016818505					
						avg	0.009378356	0.008951707				
Los Angeles	2018	MCY	Aggregated	50	GAS	0.001421518	0.001333713	MCY	8.178	7.673	0.02	0.02
						avg	0.001421518					
Los Angeles	2018	MDV	Aggregated	50	GAS	0.001505569	0.001389034	MDV	306.285	291.101	0.68	0.64
Los Angeles	2018	MDV	Aggregated	50	DSL	0.006632342	0.00634543					
						avg	0.004068956	0.003867232				
Los Angeles	2018	MH	Aggregated	50	GAS	0.00185285	0.001717275	MH	157.965	151.067	0.35	0.33
Los Angeles	2018	MH	Aggregated	50	DSL	0.106246567	0.101650388					
Los Angeles	2018	Motor Coach	Aggregated	50	DSL	0.026076529	0.02494847			0.01	0.00	
						avg	0.044725316	0.042772044				
Los Angeles	2018	OBUS	Aggregated	50	GAS	0.00054393	0.000500417	OBUS	2.358	2.170	0.01	0.00
						avg	0.00054393					
Los Angeles	2018	SBUS	Aggregated	50	GAS	0.00072303	0.000664799	SBUS	54.468	52.066	0.12	0.11
Los Angeles	2018	SBUS	Aggregated	50	DSL	0.031578312	0.030212248					
						avg	0.016150671	0.015438524				
Los Angeles	2018	UBUS	Aggregated	50	GAS	0.001246104	0.001149582	UBUS	271.064	259.242	0.60	0.57
Los Angeles	2018	UBUS	Aggregated	50	DSL	0.119895711	0.114709076					
						avg	0.060570908	0.057929329				
TRUCKS												
2-AXLE												
Los Angeles	2018	LHD2	Aggregated	50	GAS	0.000822785	0.000756895	LHD2	119.547	114.137	0.26	0.25
Los Angeles	2018	LHD2	Aggregated	50	DSL	0.014357324	0.013736233					
						avg	0.007590055	0.007246564				
3-AXLE												
Los Angeles	2018	T6 CAIRP heavy	Aggregated	50	DSL	0.008183675	0.007829653	MHD	136.970	131.036	0.30	0.29
Los Angeles	2018	T6 CAIRP small	Aggregated	50	DSL	0.072609539	0.069468483					
Los Angeles	2018	T6 instate heavy	Aggregated	50	DSL	0.012052732	0.011531336					
Los Angeles	2018	T6 instate small	Aggregated	50	DSL	0.125393336	0.119968876					
Los Angeles	2018	T6 OOS heavy	Aggregated	50	DSL	0.009039348	0.00864831					
Los Angeles	2018	T6 OOS small	Aggregated	50	DSL	0.072609539	0.069468483					
Los Angeles	2018	T6 Public	Aggregated	50	DSL	0.023078619	0.022080248					
Los Angeles	2018	T6 utility	Aggregated	50	DSL	0.00170936	0.001635414					
Los Angeles	2018	T6TS	Aggregated	50	GAS	0.000772801	0.000711327					
						avg	0.041886879					
4- & 5-AXLE												
Los Angeles	2018	T7 CAIRP	Aggregated	50	DSL	0.018494482	0.017694419	HHD	836.728	800.478	1.84	1.76
Los Angeles	2018	T7 NNOOS	Aggregated	50	DSL	0.009781541	0.009358396					
Los Angeles	2018	T7 NOOS	Aggregated	50	DSL	0.019088039	0.018262298					
Los Angeles	2018	T7 POLA	Aggregated	50	DSL	0.025753658	0.024639566					
Los Angeles	2018	T7 Public	Aggregated	50	DSL	0.049642687	0.047495167					
Los Angeles	2018	T7 Single	Aggregated	50	DSL	0.040660725	0.03890176					
Los Angeles	2018	T7 SWCV	Aggregated	50	DSL	0.00873601	0.008358094					
Los Angeles	2018	T7 utility	Aggregated	50	DSL	0.002608365	0.002495528					
Los Angeles	2018	T7IS	Aggregated	50	GAS	0.000584759	0.000539859					
						avg	0.023619691					
										Total Pounds Per Day Generated at 5-Mile Segment		
										15.71	14.99	

**Particulate Matter Emission at 5-Mile Segment of I-210 Daily
Existing Conditions
Brake Tire Wear Emissions**

Year	Region	Vehicle Class PM10 Brake Wear	Fuel Type	Process	Pollutant	Emission	I-210 5-Mile Segment Between SR 2 & SR 134 (grams)	I-210 5-Mile Segment Between SR 2 & SR 134 (pounds)	
						Rate Grams per Mile Traveled			
2018	Los Angeles (SC)	NON-TRUCKS LDA	All	PMBW	PM10	0.03675	11699.234	25.79	
2018	Los Angeles (SC)	LDT1	All	PMBW	PM10	0.03675	1085.401	2.39	
2018	Los Angeles (SC)	LDT2	All	PMBW	PM10	0.03675	4325.587	9.54	
2018	Los Angeles (SC)	LHD1	All	PMBW	PM10	0.07644	1006.963	2.22	
2018	Los Angeles (SC)	MCY	All	PMBW	PM10	0.01176	6.766	0.01	
2018	Los Angeles (SC)	MDV	All	PMBW	PM10	0.03675	2766.310	6.10	PM10 Brake Wear Total
2018	Los Angeles (SC)	MH/Motor Coach	All	PMBW	PM10	0.13034	460.348	1.01	71.02
2018	Los Angeles (SC)	OBUS	All	PMBW	PM10	0.13034	565.138	1.25	
2018	Los Angeles (SC)	SBUS	All	PMBW	PM10	0.7448	2511.829	5.54	
2018	Los Angeles (SC)	UBUS	All	PMBW	PM10	0.84182	3767.267	8.31	
		TRUCKS							
		2-Axle							
2018	Los Angeles (SC)	LHD2	All	PMBW	PM10	0.08918	1404.630	3.10	
		3-Axle							
2018	Los Angeles (SC)	T6 CAIRP Heavy		PMBW	PM10	0.13034			
2018	Los Angeles (SC)	T6 CAIRP Small		PMBW	PM10	0.13034			
2018	Los Angeles (SC)	T6 Instate Heavy		PMBW	PM10	0.13034			
2018	Los Angeles (SC)	T6 Instate Small		PMBW	PM10	0.13034			
2018	Los Angeles (SC)	T6 OOS Heavy	All	PMBW	PM10	0.13034	426.212	0.94	
2018	Los Angeles (SC)	T6 OOS Small		PMBW	PM10	0.13034			
2018	Los Angeles (SC)	T6 Public		PMBW	PM10	0.13034			
2018	Los Angeles (SC)	T6 Utility		PMBW	PM10	0.13034			
2018	Los Angeles (SC)	T6TS		PMBW	PM10	0.13034			
		4- & 5-Axle							
2018	Los Angeles (SC)	T7 CAIRP		PMBW	PM10	0.06174			
2018	Los Angeles (SC)	T7 NNOOS		PMBW	PM10	0.06174			
2018	Los Angeles (SC)	T7 NOOS		PMBW	PM10	0.06174			
2018	Los Angeles (SC)	T7 POLA		PMBW	PM10	0.06174	2187.140	4.82	

Particulate Matter Emission at 5-Mile Segment of I-210 Daily

Existing Conditions

Brake Tire Wear Emissions

2018	Los Angeles (SC)	T7 Public	All	PMBW	PM10	0.06174		
2018	Los Angeles (SC)	T7 Single		PMBW	PM10	0.06174		
2018	Los Angeles (SC)	T7 SWCV		PMBW	PM10	0.06174		
2018	Los Angeles (SC)	T7 SWCV		PMBW	PM10	0.06174		
2018	Los Angeles (SC)	T7IS		PMBW	PM10	0.06174		

**PM10
Tire Wear**

NON-TRUCKS

**Grams per
Mile Traveled**

2018	Los Angeles (SC)	LDA	All	PMTW	PM10	0.008	2546.772	5.61
2018	Los Angeles (SC)	LDT1	All	PMTW	PM10	0.008	236.278	0.52
2018	Los Angeles (SC)	LDT2	All	PMTW	PM10	0.008	941.624	2.08
2018	Los Angeles (SC)	LHD1	GAS	PMTW	PM10	0.012		
2018	Los Angeles (SC)	LHD1	DSL	PMTW	PM10	0.008		
					avg	0.01	131.733	0.29
2018	Los Angeles (SC)	MCY	GAS	PMTW	PM10	0.004	23.013	0.05
2018	Los Angeles (SC)	MDV	All	PMTW	PM10	0.008	602.190	1.33
2018	Los Angeles (SC)	MH	GAS	PMTW	PM10	0.016		
2018	Los Angeles (SC)	MH/Motor Coach	DSL	PMTW	PM10	0.012	49.447	0.11
					avg	0.014		
2018	Los Angeles (SC)	OBUS	GAS	PMTW	PM10	0.012	52.030	0.11
2018	Los Angeles (SC)	SBUS	GAS	PMTW	PM10	0.012		
2018	Los Angeles (SC)	SBUS	DSL	PMTW	PM10	0.008	33.725	0.07
					avg	0.01		
2018	Los Angeles (SC)	UBUS	All	PMTW	PM10	0.012	53.702	0.12

PM10 Tire Wear Total

13.54

TRUCKS

2-Axle

2018	Los Angeles (SC)	LHD2	GAS	PMTW	PM10	0.012		
2018	Los Angeles (SC)	LHD2	DSL	PMTW	PM10	0.008	157.505	0.35
					avg	0.01		

3-Axle

2018	Los Angeles (SC)	T6 CAIRP Heavy		PMTW	PM10	0.012		
2018	Los Angeles (SC)	T6 CAIRP Small		PMTW	PM10	0.012		
2018	Los Angeles (SC)	T6 Instate Heavy		PMTW	PM10	0.012		
2018	Los Angeles (SC)	T6 Instate Small		PMTW	PM10	0.012		
2018	Los Angeles (SC)	T6 OOS Heavy	All	PMTW	PM10	0.012	39.24	0.09
2018	Los Angeles (SC)	T6 OOS Small		PMTW	PM10	0.012		
2018	Los Angeles (SC)	T6 Public		PMTW	PM10	0.012		

Particulate Matter Emission at 5-Mile Segment of I-210 Daily

Existing Conditions

Brake Tire Wear Emissions

2018	Los Angeles (SC)	T6 Utility		PMTW	PM10	0.012		
2018	Los Angeles (SC)	T6TS		PMTW	PM10	0.012		
4- & 5-Axle								
2018	Los Angeles (SC)	T7 CAIRP		PMTW	PM10	0.036		
2018	Los Angeles (SC)	T7 NNOOS		PMTW	PM10	0.036		
2018	Los Angeles (SC)	T7 NOOS		PMTW	PM10	0.036		
2018	Los Angeles (SC)	T7 POLA		PMTW	PM10	0.036		
2018	Los Angeles (SC)	T7 Public	All	PMTW	PM10	0.036	1275.300	2.81
2018	Los Angeles (SC)	T7 Single		PMTW	PM10	0.036		
2018	Los Angeles (SC)	T7 SWCV		PMTW	PM10	0.036		
2018	Los Angeles (SC)	T7 SWCV		PMTW	PM10	0.036		
2018	Los Angeles (SC)	T7IS		PMTW	PM10	0.036		

Year	Region	Vehicle Class	Fuel Type	Process	Pollutant	Emission		
						Rate		
PM2.5 Brake Wear								
NON-TRUCKS								
						Grams per Mile Traveled		
2018	Los Angeles (SC)	LDA	All	PMBW	PM2_5	0.01575	5013.958	11.05
2018	Los Angeles (SC)	LDT1	All	PMBW	PM2_5	0.01575	465.172	1.03
2018	Los Angeles (SC)	LDT2	All	PMBW	PM2_5	0.01575	1853.823	4.09
2018	Los Angeles (SC)	LHD1	All	PMBW	PM2_5	0.03276	431.556	0.95
2018	Los Angeles (SC)	MCY	All	PMBW	PM2_5	0.00504	2.900	0.01
2018	Los Angeles (SC)	MDV	All	PMBW	PM2_5	0.01575	1185.561	2.61
2018	Los Angeles (SC)	MH/Motor Coach	All	PMBW	PM2_5	0.05586	197.292	0.43
2018	Los Angeles (SC)	OBUS	All	PMBW	PM2_5	0.05586	242.202	0.53
2018	Los Angeles (SC)	SBUS	All	PMBW	PM2_5	0.3192	1076.498	2.37
2018	Los Angeles (SC)	UBUS	All	PMBW	PM2_5	0.36078	1614.543	3.56
TRUCKS								
2-Axle								
2018	Los Angeles (SC)	LHD2	All	PMBW	PM2_5	0.03822	601.984	1.33
3-Axle								
2018	Los Angeles (SC)	T6 CAIRP Heavy		PMBW	PM2_5	0.05586		
2018	Los Angeles (SC)	T6 CAIRP Small		PMBW	PM2_5	0.05586		
								PM2.5 Brake Wear Total
								30.44

Particulate Matter Emission at 5-Mile Segment of I-210 Daily

Existing Conditions

Brake Tire Wear Emissions

2018	Los Angeles (SC)	T6 Instate Heavy		PMBW	PM2_5	0.05586			
2018	Los Angeles (SC)	T6 Instate Small		PMBW	PM2_5	0.05586			
2018	Los Angeles (SC)	T6 OOS Heavy	All	PMBW	PM2_5	0.05586	182.662	0.40	
2018	Los Angeles (SC)	T6 OOS Small		PMBW	PM2_5	0.05586			
2018	Los Angeles (SC)	T6 Public		PMBW	PM2_5	0.05586			
2018	Los Angeles (SC)	T6 Utility		PMBW	PM2_5	0.05586			
2018	Los Angeles (SC)	T6TS		PMBW	PM2_5	0.05586			
4- & 5-Axle									
2018	Los Angeles (SC)	T7 CAIRP		PMBW	PM2_5	0.02646			
2018	Los Angeles (SC)	T7 NNOOS		PMBW	PM2_5	0.02646			
2018	Los Angeles (SC)	T7 NOOS		PMBW	PM2_5	0.02646			
2018	Los Angeles (SC)	T7 POLA		PMBW	PM2_5	0.02646			
2018	Los Angeles (SC)	T7 Public	All	PMBW	PM2_5	0.02646	937.345	2.07	
2018	Los Angeles (SC)	T7 Single		PMBW	PM2_5	0.02646			
2018	Los Angeles (SC)	T7 SWCV		PMBW	PM2_5	0.02646			
2018	Los Angeles (SC)	T7 SWCV		PMBW	PM2_5	0.02646			
2018	Los Angeles (SC)	T7IS		PMBW	PM2_5	0.02646			
PM2.5 Tire Wear									
NON-TRUCKS									
						Grams per Mile Traveled			
2018	Los Angeles (SC)	LDA	All	PMTW	PM2_5	0.002	636.693	1.40	
2018	Los Angeles (SC)	LDT1	All	PMTW	PM2_5	0.002	59.069	0.13	
2018	Los Angeles (SC)	LDT2	All	PMTW	PM2_5	0.002	235.406	0.52	
2018	Los Angeles (SC)	LHD1	GAS	PMTW	PM2_5	0.003			
2018	Los Angeles (SC)	LHD1	DSL	PMTW	PM2_5	0.002			
					avg	0.0025	32.933	0.07	
2018	Los Angeles (SC)	MCY	GAS	PMTW	PM2_5	0.001	5.753	0.01	
2018	Los Angeles (SC)	MDV	ALL	PMTW	PM2_5	0.002	150.547	0.33	
2018	Los Angeles (SC)	MH	GAS	PMTW	PM2_5	0.004			
2018	Los Angeles (SC)	MH/Motor Coach	DSL	PMTW	PM2_5	0.003	12.362	0.03	
					avg	0.0035			
2018	Los Angeles (SC)	OBUS	All	PMTW	PM2_5	0.003	13.008	0.03	
2018	Los Angeles (SC)	SBUS	GAS	PMTW	PM2_5	0.003			
2018	Los Angeles (SC)	SBUS	DSL	PMTW	PM2_5	0.002	8.431	0.02	
					avg	0.0025			
2018	Los Angeles (SC)	UBUS	All	PMTW	PM2_5	0.003	13.425	0.03	

**PM2.5 Tire Wear Total
3.39**

