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February 6, 2012

Marieka Schrader
Senior Environmental Planner
GPA Environmental
231 California Street
El Segundo, CA 90245

Re: Locomotive Emissions Assessment for the Proposed Westgate Metrolink Station Project, City of Placentia, CA.

Dear Ms. Schrader,

The following report provides additional information regarding locomotive emissions attributable to the proposed Westgate Metrolink Station project.

Project Description

The project provides for the development of a Metrolink commuter rail station. The project site consists of roughly 4.75 acres located in the City of Placentia, east of the 57 Freeway, north of Orangethorpe Avenue at the northeast corner of Melrose Avenue and Crowther Avenue in Orange County. The purpose of the project is to provide a Metrolink commuter rail station that meets current and future transit demand and fosters train ridership growth in the region. The project is a key component of the transit-oriented district envisioned in the proposed Westgate Specific Plan. However, the project will operate independent of the Specific Plan and irrespective of any land uses that may be proposed and ultimately constructed if the Specific Plan is approved. The Westgate Metrolink Station project includes street, railroad track, and pedestrian improvements and other infrastructure improvements, as well as the development of new rail platforms and parking.

Background Information

Railroad emissions in the region are predominantly associated with freight transport activities. According to SCAQMD, passenger trains operating in the region, such as Metrolink and Amtrak, contribute less than 10 percent of the NOX and PM emissions from railroad operations in the region and are currently exempt from SCAQMD rules and regulations pertaining to railroad operations.[1]

The proposed Westgate Metrolink Station would be served by Metrolink's 91 Line. Currently, nine daily Metrolink trains run along the 91 Line. By year 2030, Metrolink estimates that the number of trains serving this line would increase to approximately 32 trains daily.[2] Metrolink is upgrading its locomotive fleet to include more energy-efficient, low-emission trains equipped with an automatic engine stop-start technology build into the train to reduce idle emissions, as funding becomes available. Most recently, in 2008, Metrolink announced the purchase of 15 new 'green' locomotives, which were reported to reduce emissions of NO_X by 42 percent and carbon

[1] South Coast Air Quality Management District. Accessed: January 31, 2012. *Fact Sheet: Locomotive Operations and Air Pollution in Southern California.* Available at website url: http://www.aqmd.gov/news1/2006/LocomotiveFactSheet2.html.

[2] Metrolink. February 3, 2012. Email from Perry Tseko Jr., Records Management Specialist.

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monoxide and hydrocarbons by 70 percent.[3] As new trains are introduced into the fleet, older locomotives are pulled from service and rebuilt to achieve cleaner emissions standards. Roughly 42 percent of Metrolink's locomotive fleet currently meet or exceed EPA's Tier II emissions standards.[2]

SCAQMD-Recommended Thresholds of Significance

The SCAQMD staff has developed localized significance threshold (LST) methodology that can be used to determine if a proposed project would generate significant adverse localized air quality impacts (both short-term and long-term). LSTs are derived based on the location of the activity (i.e., the source/receptor area); the emission rates of the project, including emissions of NO_X, CO, PM_{10} and $PM_{2.5}$; and the distance to the nearest exposed individual. These LSTs represent the maximum emissions from a project that would not cause or contribute to an exceedance of the most stringent applicable federal or State ambient air quality standard, taking into account the ambient pollutant concentrations in the project area. The LSTs were derived using an air quality dispersion model to back-calculate the emissions per day that would cause or contribute to a violation of any air quality standard within various receptor areas. The difference between the ambient air quality standard and the peak ambient concentration in the SRA produces the maximum concentration that a project can contribute. The SCAQMD's recommended LSTs applicable to the project area are summarized in **Table 1**.[4]

Table 1
SCAQMD Localized Significance Thresholds (LSTs)

Pollutant	Emissions (lbs/day)
NO_X	221
PM_{10}	3
$PM_{2.5}$	2
CO	1311

Based on a project site acreage of 5 acres, source-receptor area 16.

The SCAQMD has also established thresholds for determining the significance of health impacts from proposed land use development projects. Based on these thresholds, a project would result in a less-than-significant cancer risk impact if the incremental cancer risk due to the project is less than 10 in one million (i.e., 10 × 10-6) at the maximum exposed individual receptor. Non-cancer chronic and acute risks would be considered less than significant if the predicted hazard index at the MEIR is less than one.[5]

Locomotive Emissions

As previously discussed, the proposed Westgate Metrolink Station is served by the 91 line, which currently averages 9 commuter trains per day. By year 2030, Metrolink estimates that the number of commuter trains serving this line would increase to approximately 32 trains/day. The proposed project would not result in a change in existing or projected future train volumes along the existing Metrolink rail corridor. However, increased emissions would occur associated with the idling of commuter trains at the station. The localized pollutant of primary concern with regard to locomotive engines would include diesel-exhaust particulate matter (DPM). To a

[3] Orange County Register. April 22, 2008. *Metrolink Debuts its First 'Green' Locomotive*. Available at website url: http://www.ocregister.com/news/metrolink-145217-new-train.html.

[4] South Coast Air Quality Management District. Accessed: January 30, 2012. *Localized Significance Thresholds*. Available at website url: http://www.aqmd.gov/ceqa/handbook/LST/LST.html

[5] South Coast Air Quality Management District. Accessed: January 30, 2012. *SCAQMD Air Quality Significance Thresholds*. Available at website url: http://www.aqmd.gov/ceqa/handbook/signthres.pdf.

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lesser extent, localized concentrations of carbon monoxide (CO) and acrolein would also be of potential concern. Based on information provided by Metrolink, each commuter train would idle for a total of approximately one minute per stop.[2]

Daily Mass Emissions

Emissions associated with locomotive idling were quantified based on the above data and the most current locomotive emission factors, derived from the *Carl Moyer Program Guidelines*[6] and the U.S. EPA's *Emission Factors for Locomotives*.[7] Calculated locomotive idling emissions for the proposed Westgate Metrolink Station, for both existing and year 2030 conditions, are summarized in **Table 2**. As indicated, locomotive idling emissions would not exceed SCAQMD's LSTs. As a result, project-related increases of locomotive emissions would not cause or contribute to an exceedance of the most stringent applicable federal or State ambient air quality standard, taking into account the ambient pollutant concentrations in the project area.

Table 2
Daily Locomotive Idling Emissions

Scenario	Daily Trains	Emissions (lbs/day)			
		$PM_{10}/PM_{2.5}$*	NO_X	ROG	CO
Existing (Year 2012)	9	0.0001	0.0034	0.0004	0.0006
Future (Year 2030)	32	0.0002	0.0067	0.0005	0.0021
SCAQMD LST:		3/2	221	None	1311
Exceeds SCAQMD LST?:		No	No		No

**To be conservative, emissions of $PM_{2.5}$ are considered equivalent to PM_{10}.*
PM_{10}=Particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$= Particulate matter less than or equal to 2.5 microns in diameter
CO=Carbon Monoxide
ROG=Reactive Organic Gases
NO_X=Oxides of Nitrogen

Localized Concentrations of DPM and Risk Characterization

Potential increases in health risk due to exposure of nearby receptors to localized concentrations of DPM emitted from idling commuter trains at the proposed station were evaluated using the SCREEN3 dispersion model, based on the PM emissions rates identified above (**Table 2**). Based on the modeling conducted, the maximum concentrations of DPM would occur at a distance of 25 meters from the source. Assuming a total of 9 trains/day for existing conditions, the predicted annual-average concentration of DPM at the maximum exposed individual receptor (MEIR) would be 0.0015 µg/m^3. Under year 2030 conditions, with projected increases in train service to 32 trains/day, predicted annual-average concentration of DPM at the MEIR would be 0.0024 µg/m^3. Predicted future year 2030 locomotive emissions would be somewhat offset by improvements in locomotive efficiency and emissions reductions associated with the use of cleaner-burning locomotive engines.

The SCAQMD-recommended significance threshold for health risk exposure to DPM is 10 in one million. For DPM, cancer risks are assumed to occur exclusively through the inhalation pathway. Cancer risk was quantified based on the exposure assessment and dose-response relationship at the MEI for a 70-year exposure duration. Cancer risk was calculated based on the following equation:

[6] California Air Resources Board (CARB). April 28, 2011. *Carl Moyer Program Guidelines. Chapter 11: Locomotives*.

[7] U.S. Environmental Protection Agency (U.S. EPA) Office of Transportation and Air Quality. April 2009. *Emission Factors for Locomotives. EPA-420-F-09-025.*

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Risk = (SF x C x DBR x A x EF x ED x 10^{-6})/AT

Where:

SF = DPM inhalation cancer slope factor 1.1 $(mg/kg\text{-}day)^{-1}$

C = DPM ground-level Conc. at the MEIR ($\mu g/m^3$)

DBR = Daily Breathing rate (95^{th} Percentile, 393 L/kg BW – day)

EF = Exposure frequency – number of days per year an exposure occurs (350 days/yr)

ED = Exposure duration – number of years of a lifetime during which an exposure occurs (70 years)

AT = Averaging time – number of days in a 70-year lifespan (25,550 days)

Based on localized concentrations of DPM for existing operations, assuming 9 commuter trains/day, the calculated cancer risk at the MEIR would be 0.634 in one million (i.e., 6.34E-07). With the assumed increase in future year train volumes, the calculated cancer risk at the MEIR would increase slightly to 0.893 in one million (i.e., 8.93E-07). Predicted incremental increases in cancer risk would not exceed the SCAQMD's recommended significance threshold of 10 cancers per million (i.e., 10E-06). Based on the modeling analysis of locomotive DPM emissions, the noncancer health risks would be well below the Hazard Index of 1.0 at the MEIR.

Conclusions

Increases of locomotive emissions attributable to the proposed Westgate Metrolink Station project would not exceed SCAQMD's LSTs. As a result, taking into account the ambient pollutant concentrations in the project area, project-related increases of locomotive emissions would not cause or contribute to an exceedance of the most stringent applicable federal or State ambient air quality standard. Likewise, increases in localized concentrations of DPM attributable to locomotive operations would not result in predicted incremental increases in cancer or non-cancer risks at the nearest receptors that would exceed applicable SCAQMD significance thresholds. As a result, increased locomotive emissions attributable to the proposed project and associated health-related impacts to nearby receptors would be considered less than significant.

Thank you for the opportunity to assist you with this project.

Sincerely,

Kurt Legleiter
Principal

APPENDIX
EMISSIONS MODELING

LOCOMOTIVE IDLING EMISSIONS CALCULATION

	EXISTING	2030
IDLE MINUTES/TRAIN	1	1
NUMBER OF TRAINS/DAY	9	32
IDLE MINUTES/DAY	9	32
IDLE HOURS/DAY	0.15	0.53
PM10-G/HR		
EMISSION FACTORS (G/HR)		
NOX	10.39	5.675
ROG	1.26	0.465
PM10	0.41	0.17875
CO	1.83	1.83

NOX, ROG, PM10 EMISSION FACTORS DERIVED FROM CARL MOYER PROGRAM GUIDELINES. CHAPTER 11, LOCOMOTIVES. APRIL 28, 2011. LOW-POWER CYCLE [SWITCHER] EMISSION FACTOR. NEAR-TERM: TIER 0-2 AVG; 2030: TIER 2-4 Avg)

CO EMISSION FACTORS DERIVED FROM US EPA. *EMISSION FACTORS FOR LOCOMOTIVES. EPA-420-F-09-025.* (2009)

EMISSIONS (LBS/DAY)	EXISTING	2030	SCAQMD LST (SRA 16)	EXCEEDS LST?:
NOX	0.0034	0.0067	221	NO
ROG	0.0004	0.0005		
PM10	0.0001	0.0002	3	NO
CO	0.0006	0.0021	1311	NO

LOCALIZED DPM CONCENTRATIONS/RISK (SCREEN3)

SIMPLE TERRAIN	
SOURCE TYPE	POINT
STACK HEIGHT	4.5
STACK DIAM	0.1
EXIT VELOCITY	9.1
STK GAS TEMP	455
AMBIENT AIR TEMP	293
RECEPTOR HEIGHT	1.5
SETTING	URBAN
BUILDING	NONE
MIXING HEIGHT	DEFAULT
ANEMOMETER HEIGHT	DEFAULT
BUOY FLUX	0.079
MOM. FLUX	0.133

EMISSIONS (ANN-AVG G/SEC) DPM	5.06703E-07	7.85459E-07	
SCREEN 3: DPM 1-HR CONC (ug/m3):	0.001912	0.002964	
SCREEN 3: DPM ANN-AVG CONC (ug/m3):	0.0015296	0.0023712	MEIR @ 25M
DPM CANCER RISK*:	6.34E-07		
ADJUSTED DPM CANCER RISK*:	1.63047E-07	7.30187E-07	8.9323E-07

HIGHEST PREDICTED DPM CANCER RISK:	8.9323E-07
SCAQMD SIGNIFICANCE THRESHOLD:	10E-06
EXCEEDS THRESHOLD?:	NO

**CANCER RISK IS BASED ON A TRAIN VOLUME OF 9 TRAINS/DAY AND A 70-YEAR EXPOSURE DURATION.*

ADJUSTED CANCER RISK TAKES INTO ACCOUNT PROJECTED FUTURE INCREASES IN TRAIN VOLUMES/EMISSIONS STANDARDS, ASSUMES EXISTING CONCENTRATIONS FOR YEARS 1-18 AND FUTURE CONCENTRATIONS FOR YEARS 19-70. BASED ON A 70-YEAR EXPOSURE DURATION.

		*Cancer Risk = SF * C * DBR * A * EF * ED *10-6 / AT*
		Where:
1.1	1.1	*SF = Slope Factor for substance (Diesel Exhaust (URF=3.0E-4)*
0.0015296	0.0023712	*C = Concentration in the air*
393	393	*DBR = Daily Breathing Rate:*
1	1	*A = Inhalation Absorption Rate = 1*
350	350	*EF = Exposure Frequency (Residential)*
18	52	*ED = Exposure Duration*
25550	25550	*AT = Averaging Time = 25,550 days*