APPENDIX F
AIR QUALITY METHODOLOGY AND ASSUMPTIONS

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CALINE-4 INTERSECTION MODELING

The CALINE-4 model is a fourth-generation line source air quality model that is based on the Gaussian diffusion equation and employs a mixing zone concept to characterize pollutant dispersion over the roadway. Given source strength, meteorology, site geometry and site characteristics, the model predicts pollutant concentrations for receptors located within 150 meters of the roadway. The CALINE-4 model allows roadways to be broken into multiple links that can vary in traffic volume, emission rates, height, width, etc..

Receptors (locations where the model calculates concentrations) were located at distance of 10 meters from the roadway centerline.

Emission factors for 1991 and 2010 were taken from published sources.[1]

The worst case mode of the CALINE-4 model was employed. In this mode the wind direction is varied to determine which wind direction results in the highest concentration for each receptor. Temperature was assumed to be 50 degrees F.

The computation of carbon monoxide levels assumed the following worst-case meteorological conditions:

Windspeed: 1 mps
Stability: G Category
Mixing Height: 1000 meters
Surface Roughness: 100 cm
Standard Deviation of Wind Direction: 15 degrees

The CALINE-4 model calculates the local contribution of nearby roads to the total concentration. The other contribution is the background level attributed to more distant traffic. The 1-hour background level was taken as 7.8 PPM in 1991 and 7.3 PPM in 2010. These values were derived from published background levels.[1]

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[1] Bay Area Air Quality Management District, *Air Quality and Urban Development- Guidelines*, 1985.

To calculate 8-hour concentrations from the 1-hour output of the CALINE-4 model, a persistence factor was employed. The persistence factor was derived from the average ratio of the highest observed 1-hour and 8-hour concentrations at the Fremont monitoring site during the years 1987-1989. The resulting persistence factor was 0.62. The 1-hour concentrations predicted by the CALINE-4 model were multiplied by this factor to obtain the 8-hour estimated concentration.

URBEMIS-3 Model

Estimates of regional emissions generated by project traffic were made using a program called URBEMIS-3. URBEMIS-3 is a program that estimates the emissions that would result from various land use development projects. It was adapted for use with this project by utilizing a dummy residential land use input that resulted in the appropriate number of daily trips. The distribution of residential trips between Home-to-Work, Home-to-Shop and Home-to-Other categories was set to 100% Home-to-Work, and the average trip length changed to reflect project trips.

The average length of trips to the proposed BART stations was estimated by the project transportation consultant as 6.0 miles.

The following is a description of the parameters that were used in the regional air quality analysis of the proposed project:

- Ambient Temperature: 60 degrees F.
- Year of Analysis: 1991, 1998 and 2010
- Average Speed: 35 MPH

The assumed drive-to-transit trips included both parking and kiss-and-ride trips. The following table summarizes assumed trip generation by station and by alternative.

Table F-1
Daily Station Trip Generation

Alternative	Total Daily Trips To:		
	Irvington	Warm Springs	South Warm Springs
1991			
Proposed Project	1,788	2,994	2,616
Alt's 4-5	1,754	3,880	--
Alt's 6-8	--	3,066	2,736
Alt 9	--	3,860	--
Alt 10	--	--	6,390
Alt 11	2,616	--	4,880
1998			
Proposed Project	1,948	3,350	2,808
Alt's 4-5	1,908	4,312	--
Alt's 6-8	--	3,438	2,934
Alt 9	--	4,292	--
Alt 10	--	--	6,994
Alt 11	2,842	--	5,238
2010			
Proposed Project	2,198	3,980	3,166
Alt's 4-5	2,152	5,072	--
Alt's 6-8	--	4,080	3,312
Alt 9	--	5,052	--
Alt 10	--	--	8,080
Alt 11	3,206	--	5,908

Source: DKS Associates, 1991
Donald Ballanti, 1991