Chapter III
ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION

A. Air Quality

1. Introduction

This section presents the potential air quality impacts of both the Original Project and the Business Plan Project Alternative. Wherever a discernible difference exists between the two projects, it is clearly called out for the reader. Unless otherwise indicated, the reader should assume that the impacts of the two projects would be identical.

The SCCRTC received many comments regarding the air quality analysis presented in the May 2004 Draft EIR. The Monterey Bay Unified Air Pollution Control District (MBUAPCD) asked that a screening level health risk assessment be performed to evaluate the potential effect of the project to residents living along the rail corridor.

In response to comments received on the Draft EIR, the SCCRTC performed a screening health risk assessment for the proposed recreational rail service. The analysis was performed according to MBUAPCD's CEQA Air Quality Guidelines Appendix C.[1] The results of the analysis confirm that neither the Original Project nor the Business Plan Project Alternative would have a potentially significant impact on local or regional air quality.

2. Approach and Methodology

The maximum exposure to diesel exhaust would occur at the proposed train stations because the train would idle at these locations during passenger loading and unloading. The screening level health risk assessment conducted by the SCCRTC analyzes emissions at a proposed station area to determine the effect of idling emissions on passengers and local residents. A summary of the analysis is included in this section. The entire screening level analysis is available for public review between the hours of 8:00 a.m. and 5:00 p.m. at the Santa Cruz County Recreational Transportation Commission (SCCRTC): 1523 Pacific Avenue, Santa Cruz, CA. Technical reports are also available online at www.sccrtc.org.

The measurements in this section refer to a self-propelled diesel rail car powered by two 225 horsepower diesel engines operating at 60 percent capacity with a 48-horsepower Auxiliary Power Unit (APU) operating at 100 percent capacity.[2] Diesel locomotive emission factors are used to provide a worst-case analysis.

BUDD rail cars are available in a range of sizes up to 800 horsepower. However, an engine with 800 horsepower would be utilized at a much lower capacity because the weight of the rail car and the terrain

[1] Monterey Bay Unified Air Pollution Control District, *Diesel Health Risk Assessment Guidance for Analyzing Health Risks near Truck Stops, Warehouse/Distribution Center, Transit Center, Train Idling for CEQA Air Quality Analysis Requirements,* October 2003.
[2] *Air Quality Impact of Recreational Rail Service*, Don Ballanti, December 2004.

would not require full capacity. The use of two 225 horsepower diesel engines operating at 60 percent capacity is consistent with a reasonable assumption of power usage and output required for the project.

3. Environmental Setting

a. Affected Environment

Both the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) have established ambient air quality standards for common pollutants. These ambient air quality standards are levels of contaminants that represent safe levels required to avoid specific adverse health effects associated with each pollutant. The ambient air quality standards cover what are called criteria pollutants due to health and/or other effects. The proposed project site is located within the North Central Coast Air Basin (Basin), which is comprised of Santa Cruz, San Benito and Monterey Counties and is regulated by the Monterey Bay Unified Air Pollution Control District (MBUAPCD). As shown in Table III.A.1 below, the Basin is designated as a maintenance area for the federal one-hour ozone standard. The Basin is designated as an attainment area for the federal eight-hour ozone standard. The Basin is unclassified or in attainment for other national ambient air quality standards. The Basin is designated as moderate non-attainment for the state one-hour ozone standard. The Basin is also designated non-attainment for the state PM_{10} standard.[3]

The Monterey Bay Unified Air Pollution Control District (MBUAPCD) shares responsibility with the California Air Resources Board (CARB) for ensuring that the State and national ambient air quality standards are met within the North Central Coast Air Basin. State law assigns local air districts the primary responsibility for control of air pollution from stationary sources while reserving to the CARB control of mobile sources. The District is responsible for developing regulations governing emissions of air pollution, permitting and inspecting stationary sources, monitoring air quality and air quality planning activities.

Table III.A.1 Current Basin Compliance with State and Federal Air Quality Standards

Ozone - Federal (1-hour standard)	Ozone- Federal (8-hour standard)	Ozone - State (1-hour standard)	PM_{10} State standard	All Other National Ambient Air Quality Standards
Maintenance area	Attainment area	Moderate non-attainment	Non-attainment	Unclassified or in attainment

The District adopted an Air Quality Management Plan in 1991 and has updated it every three years. In 2004, the MBUAPCD published its 2004 Air Quality Management Plan, the current plan.

The goal of the Plan is to improve air quality through tighter industry controls, cleaner cars and trucks, cleaner fuels, and increased commute alternatives. Adopted Transportation Control Measures (TCMs) are:

[3] The PM_{10} standard specifies the allowable measure of particulate matter (particles of less than or equal to 10 microns in size) contained in a cubic meter of air and is expressed in micrograms per cubic meter ($\mu g/m^3$).

- Improved Public Transit
- Area Wide TIDM
- Signal Synchronization
- New and Improved Bicycle Facilities
- Alternate Fuels
- Park and Ride Lots
- Livable Communities
- Selected Intelligent Transportation Systems
- Traffic Calming

The health effects associated with major criteria pollutants are shown in Table III.A.2 below. In addition to the criteria pollutants, Toxic Air Contaminants (TACs) are another group of pollutants of concern. There are many different types of TACs, with varying degrees of toxicity. Sources of TACs include industrial processes such as petroleum refining and chrome plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle exhaust. Cars and trucks release at least forty different toxic air contaminants. The most important, in terms of health risk, are diesel particulate, benzene, formaldehyde, 1,3-butadiene and acetaldehyde.

Public exposure to TACs can result from emissions from normal operations, as well as accidental releases. Health effects of TACs include cancer, birth defects, neurological damage and death.

Table III.A.2: Major Criteria Pollutants, Health Effects and Major Sources

Pollutant	Characteristics	Health Effects
Ozone	A highly reactive photochemical pollutant created by the action of sunshine on ozone precursors (primarily reactive hydrocarbons and oxides of nitrogen. Often called photochemical smog.	• Eye Irritation • Respiratory function impairment.
Carbon Monoxide	Carbon monoxide is an odorless, colorless gas that is highly toxic. It is formed by the incomplete combustion of fuels.	• Impairment of oxygen transport in the bloodstream. • Aggravation of cardiovascular disease. • Fatigue, headache, confusion, dizziness. • Can be fatal in the case of very high concentrations.
Nitrogen Dioxide	Reddish-brown gas that discolors the air, formed during combustion.	• Increased risk of acute and chronic respiratory disease.
Sulfur Dioxide	Sulfur dioxide is a colorless gas with a pungent, irritating odor.	• Aggravation of chronic obstruction lung disease. • Increased risk of acute and chronic respiratory disease.
Particulate Matter	Solid and liquid particles of dust, soot, aerosols and other matter which are small enough to remain suspended in the air for a long period of time.	• Aggravation of chronic disease and heart/lung disease symptoms.

b. Air Quality Assessment

Daily emissions of ozone precursors[4] and PM_{10} from operation of the Original Project and the Business Plan Project Alternative would depend on the model year of the train engine. Although the BUDD cars being considered by SCCRTC date from 1950, the engine in any given BUDD rail car would have been upgraded at some point over the period from 1950 to present. It would be highly unlikely that a BUDD rail car operating with its original engine would be available at this point in time. The BUDD cars currently in use in Oregon utilize engines dating from the 1990s.

The U.S. Environmental Protection Agency published their latest *Emission Factors for Locomotives* in 1997. This document established three classifications of engines (Tiers 0, 1, and 2) based on the level of emissions generated for a series of similar model years. The exact age or model for a diesel rail car cannot be specified since several engine models have been utilized over the period of manufacturing. For this reason Table III.A.3 shows air emissions impacts that would occur for several engine ages that could be utilized. Tier 0 emissions represent the worst case, where the diesel rail car had not been recently re-powered.

Table III.A.3 – Maximum Daily Emissions in Pounds per Day

	Reactive Organic Gases (ROG)	**Nitrogen Oxides (NOx)**	**Particulate Matter (PM_{10})**
MBUAPCD Threshold of Significance	**137.0 lbs/day**	**137.0 lbs/day**	**82.0 lbs/day**
Tier 0 Rec. Train Locomotive (Model Year 1973-2001)	3.1 lbs/day *(2.0 lbs/day)*	54.3 lbs/day *(36.1 lbs/day)*	2.0 lbs/day *(1.3 lbs/day)*
Tier 1 Rec. Train Locomotive (Model Year 2002-2004)	3.0 lbs/day *(2.0 lbs/day)*	42.3 lbs/day *(28.2 lbs/day)*	2.0 lbs/day *(1.3 lbs/day)*
Tier 2 Rec. Train Locomotive (Model Year after 2004)	1.7 lbs/day *(1.1 lbs/day)*	31.6 lbs/day *(21.0 lbs/day)*	1.1 lbs/day *(0.7 lbs/day)*

Source: U.S. Environmental Protection Agency, *Emission Factors for Locomotives*, EPA420-F-97-051, December 1997.
Note: Tiers 0, 1, and 2 are classifications established by the Environmental Protection Agency that categorize locomotives

[4] Ozone precursors are chemical compounds (e.g. carbon monoxide, methane, non-methane hydrocarbons and nitrogen oxides) which in the presence of solar radiation react with other chemical compounds to form ozone (smog) (Environmental Protection Agency, 2004).

Table III.A.3 shows maximum daily new train emissions for each project based upon an assumed diesel rail car with two 225-horsepower engines at a load factor of 60 percent, and a 48-hp APU at a load factor of 100 percent.[5] The difference in the emissions shown in Table III.A.3 is based solely on the number of operating hours per day. The Original Project would operate for up to nine hours per day, while the Business Plan Project Alternative (*whose emissions are shown italicized in parenthesis*) would operate for up to six hours per day.

Table III.A.3 also includes the MBUAPCD thresholds of significance, so the reader can compare the project emissions with the thresholds. As shown in the table, emissions from both the Original Project and the Business Plan Project Alternative would be substantially below these thresholds and would represent a less-than-significant impact. The emissions shown in Table III.A.2 would occur along the 6-mile-long corridor. Pollutant levels for adjacent land uses and hikers/bikers along the corridor would be slightly increased from what is currently experienced.

Table III.A.4 compares per-mile emission rates for different mobile sources. This information is included to give the reader a sense of how the emissions generated by the proposed recreational rail vehicle compare to the emissions generated by the freight trains that will continue to operate on the rail line, as well to cars and trucks. Here the information would be identical for either the Original Project or the Business Plan Project Alternative, since the train would be identical for either scenario.

Table III.A.4 – Comparison of Per-Mile Emission Rates for Mobile Sources[a]

	Reactive Organic Gases (ROG)	Nitrogen Oxides (NOx)	Particulate Matter (PM_{10})
Automobile	0.22	0.53	0.02
Medium Duty Truck	0.27	1.23	0.03
Heavy Duty Truck	0.84	11.29	0.335
Rec. Train (Tier 0)	8.64	154.80	5.75
Rec. Train (Tier 1)	8.47	120.59	5.75
Rec. Train (Tier 2)	4.67	89.99	3.06
Freight Train	230.4	5460.00	134.40

[a]On-road emission rates from EMFAC-2002 for a 2004 vehicle mix at 70 degrees F and average speed of 30 miles per hour (MPH). Recreational train emissions based on two 225-horsepower engines operating at 60% capacity at 15 MPH. Freight train emissions based on line-haul engines, two engines of 3,500 horsepower operating at 60% capacity with an average speed of 10 MPH.

Emissions are also dependent on fuel type. The above emissions are based on standard diesel fuel. Various fuel options are available that could reduce emissions below the levels presented in Table III.A.2. Alternative diesel fuels can be used in diesel engines without any modification to the existing fuel system. Alternative diesel fuels include water-diesel-emulsified fuel, biodiesel fuel, and ethanol-diesel-emulsified fuels. Other fuel options may be available in the future.

[5] It is the nature of locomotives that emission factors are expressed in grams per brake-horsepower-hour or grams per gallon of fuel consumed. Because both horsepower generated and rate of fuel consumption varies so much with the throttle setting rather than with speed, estimating emissions requires an assumption regarding the load factor or operating capacity. The 60% assumption was intended as a conservative estimate of the power requirement for operating the train at an average speed of 15 miles per hour

All of these alternative fuels provide a reduction in PM_{10} emissions and all but biodiesel reduce nitrogen oxide (NOx) emissions.[6] Each is currently being tested by the state to determine practicality, performance and emissions-reduction effectiveness. Several commercially available brands of biodiesel, water-diesel-emulsified fuels and ethanol-diesel-emulsified fuels have been tested and verified by the CARB to have emission benefits.

The use of California diesel reduces emissions of particulate matter by 25% and nitrogen oxides by 7%.[7] Alternative diesel fuels are available that have air quality benefits verified by the CARB. Water-emulsified fuels have been demonstrated to reduce emissions of nitrogen oxides by 14-16 % while reducing particulate matter emissions by 58-63%. The CARB has also certified an ethanol-diesel fuel as reducing nitrogen oxide emissions by 1.6% and particulate matter emissions by 20%.

Compressed natural gas (CNG) is another alternative fuel for heavy-duty vehicles. Tests conducted by the CARB on heavy duty transit buses show that CNG-powered vehicles can provide up to a 50 percent reduction in the emission of NOx compared to a diesel engine and a 40 percent reduction in PM_{10} emissions. All other emissions would be substantially the same as a diesel engine.

Screening Level Health Risk Assessment

In 1998, the California Air Resources Board (CARB) identified particulate matter from diesel-fueled engines as a toxic air contaminant (TAC). CARB has completed a risk management process that identified potential cancer risks for a range of activities using diesel-fueled engines. [8]

High volume freeways, stationary diesel engines and facilities attracting heavy and constant diesel vehicle traffic (distribution centers, truckstops) were identified as having the highest associated risk. The greatest diesel particulate risks from new development are generally associated with stationary diesel engines and locations where diesel engines are allowed to idle for extended periods. The MBUAPCD has developed guidelines for diesel risk assessments within its *CEQA Air Quality Guidelines*.

In compliance with the MBUAPCD guidelines, a screening health risk assessment was conducted for the new train service to identify potential risk to residents living along the rail corridor. The nearest homes are located 25 feet from the centerline of the right-of-way. Exposure to diesel exhaust was determined to be a maximum near proposed train stations due to the stationary idling that would occur at these locations.

The analysis was performed according to MBUAPCD's CEQA Air Quality Guidelines Appendix C.[9] The analysis used the very conservative SCREEN-3 program to estimate maximum annual and maximum hourly concentrations of diesel particulate and acrolein (a component of diesel exhaust) at locations very close to the station platforms where idling of the train would occur. The conservative nature of the screening program is reflected in the assumptions used in the model, such as the assumption that a person

[6] NOx are a family of highly reactive poisonous gases that form when fuel is burned at high temperatures. Autos, trucks, and various non-road vehicles and machinery (e.g. construction equipment, industrial plants) produce NOx.
[7] California Air Resources Board, *California Diesel Fuel Fact Sheet*, October 6, 2000.
[8] California Air Resources Board. 2000. Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles.
[9] Monterey Bay Unified Air Pollution Control District, *Diesel Health Risk Assessment Guidance for Analyzing Health Risks near Truck Stops, Warehouse/Distribution Center, Transit Center, Train Idling for CEQA Air Quality Analysis Requirements,* October 2003.

would remain at the same location continuously for a period of 70 years while receiving the maximum exposure to diesel emissions.

The predicted concentrations were compared to the MBUAPCD's thresholds of significance for toxic air contaminants, as shown in Table III.A.5. The calculated cancer risk was 0.30 per million for the Business Plan Project Alternative and 1.67 per million for the Original Project (*whose calculated risk is shown italicized in parenthesis*) well below the MBUAPCD's threshold of significance of 10 per million. Both chronic and acute hazard indexes were calculated, and found to be well below the MBUAPCD's thresholds of significance.[10]

Table III.A.5: Calculated Risk at Point of Greatest Concentration

Pollutant	Risk Factor	Maximum Concentration (ug/m^3)	Calculated Risk	MBUAPCD Threshold of Significance
Diesel Exhaust Particulate	Excess Lifetime Cancer Risk	0.00099 *(0.00559)*	0.298/ million *(1.67/million)*	10/million
Diesel Exhaust Particulate	Chronic Hazard	0.0099 *(0.00559)*	HI= 0.002 *(HI= 0.001)*	HI = 1.0
Acrolein	Acute Hazard	0.0026 *(0.0026)*	HI = 0.0137 *(HI = 0.0137)*	HI = 1.0

3. Impacts and Mitigation

a. Standards of Significance

The proposed project would have a significant impact if any of the following criteria is met:

Criterion 1: The project would conflict or obstruct implementation of the applicable Air Quality Plan;

Criterion 2: The project would violate any air quality standard or contribute substantially to an existing or projected air quality violation;

Criterion 3: The project would result in a cumulatively considerable net increase of any criteria pollutant for which the region is in non-attainment under federal or state air quality standards (including releasing emissions that exceed qualitative thresholds for ozone precursors);

Criterion 4: The project would expose sensitive receptors to substantial pollutant concentrations; or

Criterion 5: The project would create objectionable odors affecting a substantial number of people.

[10] *Air Quality Impact of Recreational Rail Service*, Don Ballanti, January 2005

b. Less-Than-Significant Impacts

Criteria 1 and 2: The proposed project would not conflict with or obstruct implementation of the Air Quality Attainment Plan or violate any air quality standards. The project would provide an alternative mode of transportation for residents and visitors by serving key locations near public attractions and other transit oriented services. As a result, the project could reduce automobile trips in the project area which would promote better air quality. Due to the small size and low speed of the train, the potential for increased dust emissions from train operations would be minimal.

The construction of low platforms to allow for passengers boarding and disembarking from trains would not substantially degrade the existing air quality of the site even during construction. The standard MBUAPCD dust control measures have been incorporated into the project description and would be implemented during construction to minimize the generation of dust. These measures are set forth in Chapter II Project Description.

Criterion 3: The Monterey Bay Unified APCD's *CEQA Air Quality Guidelines* (Table 5-1, page 5-12) states that this criterion would be exceeded by any project that is inconsistent with the Air Quality Management Plan. The proposed project is listed in the 2004 AQMP as a project listed in the draft *FY 2004/05 through FY 2006/07* Metropolitan Transportation Improvement Program (MTIP) that is appropriate to the livable communities Transportation Control Measure of the AQMP. Since the project is included with an AQMP Transportation Control Measure it would be consistent with the AQMP. Therefore, neither the Original Project nor the Business Plan Project Alternative would result in a cumulatively considerable net increase of any criteria pollutant for which the region is in non-attainment under federal or state air quality standards.

Criterion 4: The screening level health risk assessment prepared for the project demonstrates that the project would not result in an exceedence of either the chronic or acute hazard indexes. As shown in table III.A.4 the calculated risk of the project is well below the thresholds of significance established by the MBUAPCD.

Criterion 5: The proposed project would result in a temporary increase in diesel fuel odors during the period of time that the train passes by. This increase would not be considered significant because the emission source is mobile and the diesel odor emitted would dissipate and would not be a constant source of odor.

c. Significant Impacts

As discussed above, the project would not result in any potentially significant air quality impacts.