APPENDIX A

Air Quality and GHG Emissions Supplement

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A.1 Emission Factors

Locomotive Exhaust

Emissions within other Air Districts	Roundtrip Distance (miles)	Emissions (lbs/day)					
		ROG	NOx	CO	Sox	PM10	PM2.5
Locomotives - large line haul in Yolo-Solano AQMD	64	8.13	170.72	33.63	0.12	4.55	4.42
Locomotives - large line haul in Sacramento Metro AQMD	31	3.94	82.69	16.29	0.06	2.2	2.14

Emissions within other Air Districts	Roundtrip Distance (miles)	Emission Factor (lbs/(mile-day))					
		ROG	NOx	CO	Sox	PM10	PM2.5
Locomotives - large line haul in Yolo-Solano AQMD	64	0.127	2.668	0.525	0.002	0.071	0.069
Locomotives - large line haul in Sacramento Metro AQMD	31	0.127	2.667	0.525	0.002	0.071	0.069

Source: Pounds/day emissions are from Benica Valero CBR Draft EIR, Appendix E.5

Fugitive ROG Emissions from Railcars (see VALERO's FUGITIVE EMISSION ESTIMATES SHEET)

Railcar Evaporative Emissions	One-way Distance (miles)	(lbs/day)*	lbs/ (mile - day)
VOC emissions - YSAQMD	32	0.152	0.0048
VOC emissions - SMAQMD	15.5	0.073	0.0047
VOC emissions - PCAPCD	84.5	0.4	0.0047
VOC emissions - SFNA	132	0.623	0.0047
			0.0047

A.2 Criteria Pollutant Locomotive Exhaust and Rail Car Fugitive ROG Emission Estimates

Placerville Rail Yard Emissions

Source	ROG	NOx	CO	SOx	PM10	PM2.5
Locomotives (lbs/day)	3.38	57.91	8.34	0.03	1.34	1.33

Source: Benica Valero CBR EIR, 2014

Oregon to Roseville Alternative

District	Round Trip Distance (miles)	Emissions (lbs/day)					
		ROG	NOx	CO	SOx	PM10	PM2.5
Siskiyou County APCD	178	23.5	474.8	93.5	0.3	12.7	12.3
Shasta County AQMD	156	20.6	416.1	82.0	0.3	11.1	10.8
Tehama County APCD	80	10.5	213.4	42.0	0.2	5.7	5.5
Butte County AQMD	88	11.6	234.7	46.2	0.2	6.3	6.1
Feather River AQMD	52	6.9	138.7	27.3	0.1	3.7	3.6
Placer County APCD	40	5.3	106.7	21.0	0.1	2.8	2.8
Sacramento Metro AQMD	31	4.1	82.7	16.3	0.1	2.2	2.1
Total	594						

District	Round Trip Distance (miles)	Emissions (lbs/day)					
		ROG	NOx	CO	SOx	PM10	PM2.5
Siskiyou County APCD	178	23.5	474.8	93.5	0.3	12.7	12.3
Threshold of Significance		25	25	500	80	80	-
Exceed Threshold?		No	Yes	No	No	No	No
Shasta County AQMD	156	20.6	416.1	82.0	0.3	11.1	10.8
Threshold of Significance		25	25	500	80	80	-
Exceed Threshold?		No	Yes	No	No	No	No
Tehama County APCD	80	10.5	213.4	42.0	0.2	5.7	5.5
Threshold of Significance		25	25	-	-	80	-
Exceed Threshold?		No	Yes	No	No	No	No
Butte County AQMD	88	11.6	234.7	46.2	0.2	6.3	6.1
Threshold of Significance		25	25	500	80	80	-
Exceed Threshold?		No	Yes	No	No	No	No
Feather River AQMD	52	6.9	138.7	27.3	0.1	3.7	3.6
Threshold of Significance		25	25	-	-	80	-
Exceed Threshold?		No	Yes	No	No	No	No
Placer County APCD	40	8.7	164.6	29.4	0.1	4.2	4.1
Threshold of Significance		82	82	-	-	82	-
Exceed Threshold?		No	Yes	No	No	No	No
Sacramento Metro AQMD	31	4.1	82.7	16.3	0.1	2.2	2.1
Threshold of Significance		82	82	-	-	82	-
Exceed Threshold?		No	Yes	No	No	No	No

Navada to Roseville (Feather River Canyon) Alternative

District	Round Trip Distance (miles)	Emissions (lbs/year)					
		ROG	NOx	CO	SOx	PM10	PM2.5
Butte County AQMD	106	14.0	282.8	55.7	0.2	7.5	7.3
Feather River AQMD	50	6.6	133.4	26.3	0.1	3.6	3.5
Placer County APCD	40	5.3	106.7	21.0	0.1	2.8	2.8
Sacramento Metro AQMD	31	4.1	82.7	16.3	0.1	2.2	2.1
Lassen County APCD	72	9.5	192.1	37.8	0.1	5.1	5.0
Northern Sierra AQMD	190	25.0	506.8	99.8	0.4	13.5	13.1
	458						

District	Round Trip Distance (miles)	Emissions (lbs/day)					
		ROG	NOx	CO	SOx	PM10	PM2.5
Butte County AQMD	106	14.0	282.8	55.7	0.2	7.5	7.3
Threshold of Significance		25	25	500	80	80	-
Exceed Threshold?		No	Yes	No	No	No	No
Feather River AQMD	50	6.6	133.4	26.3	0.1	3.6	3.5
Threshold of Significance		25	25	-	-	80	-
Exceed Threshold?		No	Yes	No	No	No	No
Placer County APCD	40	8.7	164.6	29.4	0.1	4.2	4.1
Threshold of Significance		82	82	-	-	82	-
Exceed Threshold?		No	Yes	No	No	No	No
Sacramento Metro AQMD	31	4.1	82.7	16.3	0.1	2.2	2.1
Threshold of Significance		82	82	-	-	82	-
Exceed Threshold?		No	Yes	No	No	No	No
Lassen County APCD	72	9.5	192.1	37.8	0.1	5.1	5.0
Threshold of Significance		25	25	500	80	80	-
Exceed Threshold?		No	Yes	No	No	No	No
Northern Sierra AQMD	190	25.0	506.8	99.8	0.4	13.5	13.1
Threshold of Significance		25	25	500	80	80	-
Exceed Threshold?		No	Yes	No	No	No	No

Navada to Roseville (Truckee) Alternative

District	Round Trip Distance (miles)	Emissions (lbs/year)					
		ROG	NOx	CO	SOx	PM10	PM2.5
Placer County APCD	176	23.19	469.48	92.48	0.33	12.51	12.16
Northern Sierra County AQMD	62	8.17	165.39	32.58	0.12	4.41	4.28
Sacramento Metro AQMD	31	4.08	82.69	16.29	0.06	2.20	2.14
	238						

District	Round Trip Distance (miles)	Emissions (lbs/day)					
		ROG	NOx	CO	SOx	PM10	PM2.5
Placer County APCD	176	26.6	527.4	100.8	0.4	13.9	13.5
Threshold of Significance		82	82	-	-	82	-
Exceed Threshold?		No	Yes	No	No	No	No
Northern Sierra AQMD	62	8.2	165.4	32.6	0.1	4.4	4.3
Threshold of Significance		25	25	500	80	80	-
Exceed Threshold?		No	Yes	No	No	No	No
Sacramento Metro AQMD	31	4.1	82.7	16.3	0.1	2.2	2.1
Threshold of Significance		82	82	-	-	82	-
Exceed Threshold?		No	Yes	No	No	No	No

A.3 GHG Emissions Estimate

Sources	Worst Case California CO_2e Emissions (metric tons/year)[a]	Average (of all three routes) California CO_2e Emissions (metric tons/year)[b]
Trains - Long Line Haul from California State Line to Roseville	20,041	14,508
Trains - Long Line Haul from Roseville to Refinery	4,589	4,589
Trains - Short Line Haul to Refinery	135	135
Trains - Switching at Refinery	351	351
Electricity Consumption[b]	180	180
Amortized Construction Emissions	20	20
Total Project Emissions	**25,316**	**19,783**
Marine Vessel Emissions Displaced (Baseline)	-11,707	-11,707
Total Net Emissions	**13,609**	**8,076**
Significance Threshold	10,000	10,000
Significant Impact?	Yes	No

[a] Train emissions from the state line to Roseville were estimated by ESA based on ERM, 2013b. The estimates assume all train travel on the longest route (California/Oregon border) to the Roseville Rail Yard, a round-trip distance of 594 miles per day.

[b] Train emissions from the state line to Roseville were estimated by ESA based on ERM, 2013b. The estimates assume the average round trip travel distance for all three routes from California border to the Roseville Railyard, a round-trip distance of 430 miles per day.

Sources	Worst case	Average	north	south
Average CO2e for Long Line Haul from State Line to Roseville (round trip miles; from Valero DEIR, Appendix E-5)	390	390		
CO2e (metric tons per year), Valero DEIR, Appendix E-5	13158.45	13158.45		
CO2e (metric tons per mile)	0.09	0.09	0.09	0.09
Long Line Haul Distance from CA state line to Roseville (round trip miles)	594	430	458	238
CO2e (metric tons per year) for Worst Case Line Haul	20041.33	14508.03	15452.74	8030.03

Sources	CO2e (metric tons/year)
North	15,453
Trains - Long Line Haul from Roseville to Refinery	4,589
Trains - Short Line Haul to Refinery	135
Trains - Switching at Refinery	351
Electricity Consumption[b]	180
Amortized Construction Emissions	20
Total Project Emissions	**20,728**
Marine Vessel Emissions Displaced (Baseline)	-11,707
Total Net Emissions	**9,021**
Significance Threshold	10,000
Significant Impact?	No

South	8,030
Trains - Long Line Haul from Roseville to Refinery	4,589
Trains - Short Line Haul to Refinery	135
Trains - Switching at Refinery	351
Electricity Consumption[b]	180
Amortized Construction Emissions	20
Total Project Emissions	**13,305**
Marine Vessel Emissions Displaced (Baseline)	-11,707
Total Net Emissions	**1,598**
Significance Threshold	10,000
Significant Impact?	No

A.4 Rail Mileage for Uprail Routes

Air District	Miles from Oregon Border to Roseville Yard	Miles from Nevada Border to Roseville Yard (Feather River Canyon)	Miles from Nevada Border to Roseville Yard (Truckee)
Siskiyou County APCD	89	N/A	N/A
Shasta County AQMD	78	N/A	N/A
Tehama County APCD	40	N/A	N/A
Butte County AQMD	44	53	N/A
Feather River AQMD	26	25	N/A
Placer County APCD*	20	20	87
Lassen County APCD	N/A	36	N/A
Northern Sierra County AQMD	N/A	95	31
Total Distance (miles)	297	229	118
Round Trips	594	458	236

Average 429

A.5 Mitigated Uprail NOx Emissions

(Assumes a mitigation reduction rate of 76 percent for Tier 4 locomotives and 20 percent for switching locomotives compared to unmitigated emissions, per CARB, 2009)

California Air Resources Board (CARB), 2009. *Technical Options to Achieve Additional Emissions and Risk Reductions from California Locomotives and Railyards* . August.

Oregon to Roseville Alternative

District/Threshold	NOx
Siskiyou County APCD	114
Threshold of Significance	25
Exceed Threshold?	Yes
Shasta County AQMD	100
Threshold of Significance	25
Exceed Threshold?	Yes
Tehama County APCD	51
Threshold of Significance	25
Exceed Threshold?	Yes
Butte County AQMD	56
Threshold of Significance	25
Exceed Threshold?	Yes
Feather River AQMD	33
Threshold of Significance	25
Exceed Threshold?	Yes
Placer County APCD	72
Threshold of Significance	82
Exceed Threshold?	No
Sacramento Metro AQMD	20
Threshold of Significance	82
Exceed Threshold?	No

Navada to Roseville (Feather River Canyon) Alternative

District/Threshold	NOx
Butte County AQMD	68
Threshold of Significance	25
Exceed Threshold?	Yes
Feather River AQMD	32
Threshold of Significance	25
Exceed Threshold?	Yes
Placer County APCD	72
Threshold of Significance	82
Exceed Threshold?	No
Sacramento Metro AQMD	20
Threshold of Significance	82
Exceed Threshold?	No
Lassen County APCD	46
Threshold of Significance	25
Exceed Threshold?	Yes
Northern Sierra AQMD	122
Threshold of Significance	25
Exceed Threshold?	Yes

Navada to Roseville (Truckee) Alternative

District/Threshold	NOx
Placer County APCD	159
Threshold of Significance	82
Exceed Threshold?	Yes
Northern Sierra AQMD	40
Threshold of Significance	25
Exceed Threshold?	Yes
Sacramento Metro AQMD	20
Threshold of Significance	82
Exceed Threshold?	No

A.6 Valero's Fugitive ROG Railcar Emissions

Modified by ESA on 6/30/2015 to include consistent and conservative equipment counts per railcar for empty and full rail cars; Valero's total VOC content equation shown for tons per year was C6*F6*G6*H6*(1-I6)/1000/1.10231, but was changed to: =C6*F6*G6*H6*(1-I6)/1000*1.10231.

Assuming EPA Average Marketing Terminal Factors (Table IV-1b)

Full Rail Cars

Yolo Solano AQMD	t Count Per	Average mph	Traveled (one	Traveling /Railcar/y	Rail Cars	Factor (kg/hr/so	Methane Content	content (tons/yr)	content (lbs/day)
Pressure Relief Valves (Gas)	2	35	32	333.7	100	0.00012	0	0.009	0.048
Valves (light liquid)	1	35	32	333.7	100	0.000043	0	0.002	0.009
Valves (gas)	3	35	32	333.7	100	0.000013	0	0.001	0.008
Connectors (gas)	9	35	32	333.7	100	0.000042	0	0.014	0.076
Connectors (light liquid)	2	35	32	333.7	100	0.000008	0	0.001	0.003
Total								**0.026**	**0.144**

Sacramento Metro District	Equipment Count Per Railcar	Average mph	Miles Traveled (one way)**	Hours Traveling /Railcar/yr	Rail Cars	Emission Factor (kg/hr/source)*	Methane Content	Total VOC content (tons/yr)	Total VOC content (lbs/day)
Pressure Relief Valves (Gas)	2	35	15.5	161.6	100	0.00012	0	0.004	0.023
Valves (light liquid)	1	35	15.5	161.6	100	0.000043	0	0.001	0.004
Valves (gas)	3	35	15.5	161.6	100	0.000013	0	0.001	0.004
Connectors (gas)	9	35	15.5	161.6	100	0.000042	0	0.007	0.037
Connectors (light liquid)	2	35	15.5	161.6	100	0.000008	0	0.000	0.002
Total								**0.0128**	**0.070**

Placer County APCD	Equipment Count Per Railcar	Average mph	Miles Traveled (one way)**	Hours Traveling /Railcar/yr	Rail Cars	Emission Factor (kg/hr/source)*	Methane Content	Total VOC content (tons/yr)	Total VOC content (lbs/day)
Pressure Relief Valves (Gas)	2	35	84.5	881.2	100	0.00012	0	0.023	0.128
Valves (light liquid)	1	35	84.5	881.2	100	0.000043	0	0.004	0.023
Valves (gas)	3	35	84.5	881.2	100	0.000013	0	0.004	0.021
Connectors (gas)	9	35	84.5	881.2	100	0.000042	0	0.037	0.201
Connectors (light liquid)	2	35	84.5	881.2	100	0.000008	0	0.002	0.009
Total								**0.0696**	**0.381**

SFNA	Equipment Count Per Railcar	Average mph	Miles Traveled (one way)**	Hours Traveling /Railcar/yr	Rail Cars	Emission Factor (kg/hr/source)*	Methane Content	Total VOC content (tons/yr)	Total VOC content (lbs/day)
Pressure Relief Valves (Gas)	2	35	132	1376.6	100	0.00012	0	0.036	0.200
Valves (light liquid)	1	35	132	1376.6	100	0.000043	0	0.007	0.036
Valves (gas)	3	35	132	1376.6	100	0.000013	0	0.006	0.032
Connectors (gas)	9	35	132	1376.6	100	0.000042	0	0.057	0.314
Connectors (light liquid)	2	35	132	1376.6	100	0.000008	0	0.002	0.013
Total								**0.1086**	**0.595**

* Emission Factors based from CAPCOA , 1999. CALIFORNIA IMPLEMENTATION GUIDELINES FOR ESTIMATING MASS EMISSIONS OF FUGITIVE HYDROCARBON LEAKS AT PETROLEUM FACILITIES http://www.arb.ca.gov/fugitive/impl_doc.pdf

** Travels one way with crude, then loads rail cars with air.

*** travel from the eastern border.

Assuming EPA Average Marketing Terminal Factors (Table IV-1b)

Yolo Solano AQMD	Equipment Count Per Railcar	Average mph	Miles Traveled (one way)**	Hours Traveling /Railcar/yr	Rail Cars	Emission Factor (kg/hr/source)*	Methane Content	Dilution factor	Total VOC content (tons/yr)	Total VOC content (lbs/day)	Total VOC content Full + Empty (lbs/day)
Pressure Relief Valves (Gas)	2	35	32	333.7	100	0.00012	0	5%	0.000	0.002	
Valves (light liquid)	1	35	32	333.7	100	0.000043	0	5%	0.000	0.000	
Valves (gas)	3	35	32	333.7	100	0.000013	0	5%	0.000	0.000	
Connectors (gas)	9	35	32	333.7	100	0.000042	0	5%	0.001	0.004	
Connectors (light liquid)	2	35	32	333.7	100	0.000008	0	5%	0.000	0.000	
Total									**0.001**	**0.007**	**0.007**

Sacramento Metro District	Equipment Count Per Railcar	Average mph	Miles Traveled (one way)**	Hours Traveling /Railcar/yr	Rail Cars	Emission Factor (kg/hr/source)*	Methane Content	Dilution factor	Total VOC content (tons/yr)	Total VOC content (lbs/day)	Total VOC content Full + Empty (lbs/day)
Pressure Relief Valves (Gas)	2	35	15.5	161.6	100	0.00012	0	5%	0.000	0.001	
Valves (light liquid)	1	35	15.5	161.6	100	0.000043	0	5%	0.000	0.000	
Valves (gas)	3	35	15.5	161.6	100	0.000013	0	5%	0.000	0.000	
Connectors (gas)	9	35	15.5	161.6	100	0.000042	0	5%	0.000	0.002	
Connectors (light liquid)	2	35	15.5	161.6	100	0.000008	0	5%	0.000	0.000	
Total									**0.0006**	**0.003**	**0.003**

Placer County APCD	Equipment Count Per Railcar	Average mph	Miles Traveled (one way)**	Hours Traveling /Railcar/yr	Rail Cars	Emission Factor (kg/hr/source)*	Methane Content	Dilution factor	Total VOC content (tons/yr)	Total VOC content (lbs/day)	Total VOC content Full + Empty (lbs/day)
Pressure Relief Valves (Gas)	2	35	84.5	881.2	100	0.00012	0	5%	0.001	0.006	
Valves (light liquid)	1	35	84.5	881.2	100	0.000043	0	5%	0.000	0.001	
Valves (gas)	3	35	84.5	881.2	100	0.000013	0	5%	0.000	0.001	
Connectors (gas)	9	35	84.5	881.2	100	0.000042	0	5%	0.002	0.010	
Connectors (light liquid)	2	35	84.5	881.2	100	0.000008	0	5%	0.000	0.000	
Total									**0.0035**	**0.019**	**0.019**

SFNA	Equipment Count Per Railcar	Average mph	Miles Traveled (one way)**	Hours Traveling /Railcar/yr	Rail Cars	Emission Factor (kg/hr/source)*	Methane Content	Dilution factor	Total VOC content (tons/yr)	Total VOC content (lbs/day)	Total VOC content Full + Empty (lbs/day)
Pressure Relief Valves (Gas)	2	35	132	1376.6	100	0.00012	0	5%	0.002	0.010	
Valves (light liquid)	0	35	132	1376.6	100	0.000043	0	5%	0.000	0.000	
Valves (gas)	3	35	132	1376.6	100	0.000013	0	5%	0.000	0.002	
Connectors (gas)	9	35	132	1376.6	100	0.000042	0	5%	0.003	0.016	
Connectors (light liquid)	0	35	132	1376.6	100	0.000008	0	5%	0.000	0.000	
Total									**0.0050**	**0.027**	**0.027**

* MASS EMISSIONS OF FUGITIVE HYDROCARBON LEAKS AT PETROLEUM FACILITIES
http://www.arb.ca.gov/fugitive/impl_doc.pdf

** Travels one way with crude, then loads rail cars with air. Assume returning railcar remaining vapor concentration is diluted 95% with air.

*** the eastern border.

RDEIR APPENDIX A (HEALTH RISK ASSESSMENT PORTION)

A.7. Cumulative Chronic Hazard Index Calculations - Fairfield

This section evaluates the cumulative chronic hazard index in Fairfield resulting from the Project plus existing sources. The Project's maximum chronic hazard index value would occur at a residence (maximum exposed individual residence or MEIR) 90 feet northwest of the train tracks in Fairfield (at UTM coordinates 585145 East, 4234384 North) (ERM, 2015a). This cumulative assessment evaluates the total cumulative chronic index at the MEIR from the Project and from existing stationary and mobile sources located within 1,000 feet of the MEIR.

Table HRA-1 shows stationary sources located within 1,000 feet of MEIR. These sources were obtained from BAAQMD's Google Earth stationary source database for Solano County. The six businesses within 1,000 feet of the MEIR have a combined hazard index of 0.071.

Table HRA-2 shows the risk from existing locomotives. The chronic hazard for existing locomotives equals 0.007 at 100 feet from the railroad. The combined stationary source and locomotive chronic hazard index at the MEIR equals 0.078.

The chronic hazard index from the Project equals 0.004 (ERM, 2015a). The combined chronic hazard index from the Project (0.004) plus from existing sources (0.078) equals 0.082. This value is substantially less than the BAAQMD's cumulative chronic threshold of 10.0.

Table HRA-1. Chronic Hazard Index Values from Stationary Sources within 1,000 Feet of the Maximum Exposed Individual Residence in Fairfield Obtained from BAAQMD Google Earth Data

	Commercial Business	Commercial Business	Commercial Business	Commercial Business	Commercial Business	Commercial Business
Address	744 N Texas St., Fairfield	1350 N Texas St., Fairfield	110 Railroad Ave, Suite G, Suisun City	106 Railroad Ave, Suisun City	890 E. Travis Blvd., Fairfield	409 Railroad Ave., Suite B, Suisun City
East UTM Coordinate	584489	584598.388	584768	585018.981	585723	585870
North UTM Coordinate	4234104	4234294.921	4233988	4234204.101	4234917	4233770
Chronic Hazard Index Value	0	6.60E-05	0	0.005749	0.025561	0.04

Table HRA-2. Chronic Hazard Index from Existing Locomotives Traveling on Railways in Fairfield (includes age sensitivity factor)

Link 564 (6ft elevation)

	PM2.5	Risk	Chron.HI	Acute.HI
10 ft N	0.082	47.298	0.017	0
25 ft N	0.065	37.371	0.013	0
50 ft N	0.050	28.810	0.010	0
75 ft N	0.041	23.755	0.008	0
100 ft N	0.035	20.381	0.007	0
200 ft N	0.023	13.456	0.004	0
300 ft N	0.017	10.285	0.003	0
400 ft N	0.014	8.430	0.003	0
500 ft N	0.012	7.157	0.002	0
750 ft N	0.009	5.247	0.001	0
1000 ft N	0.007	4.160	0.001	0
10 ft S	0.139	80.176	0.029	0
25 ft S	0.114	66.021	0.024	0
50 ft S	0.091	52.724	0.019	0
75 ft S	0.077	44.487	0.016	0
100 ft S	0.067	38.830	0.014	0
200 ft S	0.046	26.877	0.009	0
300 ft S	0.036	21.141	0.007	0
400 ft S	0.030	17.675	0.006	0
500 ft S	0.026	15.303	0.005	0
750 ft S	0.020	11.568	0.004	0
1000 ft S	0.016	9.305	0.003	0

A.8 Cumulative Chronic Hazard Index Calculations – Near Refinery

This section evaluates the cumulative chronic hazard index near the refinery from the Project and existing sources. Table HRA-3 shows that the highest chronic hazard index resulting from the Project equals 0.0003 at the maximum sensitive receptor [MSR], an elementary school located at UTM coordinates 574900 East, 4212500 North) (ERM, 2015a).

For existing sources, the highest chronic index value from I-680 at 1,000 feet equals 0.003, based on BAAQMD's Google Earth mobile source (freeway) database. The chronic risk from existing locomotives operating on the UPRR track at 1,000 feet equals 0.000 using BAAQMD's Google Earth railroad database. Finally, the chronic hazard from the VIP project equals 0.011246. This value represents the sum of the chronic index values from:

- Table 4.7-9 of the VIP Draft EIR (chronic hazard value of 0.00962 for the maximum nonresidential location),
- Table 3.1.8-2 of the VIP Amendments – Environmental Analysis (chronic hazard index value of 0.00161 for maximum stationary source off-site) and
- Table 3.1.8-3 of the VIP Amendments – Environmental Analysis (chronic hazard index value of 0.000016 for maximum mobile source).

The resulting total cumulative chronic hazard index of 0.014546 is less than the BAAQMD's chronic hazard index threshold of 10.0.

Table HRA-3. Risk from Existing Locomotives Traveling on Railways in Fairfield (includes age sensitivity factor)

	Crude by Rail	I-680 at 1,000 ft	Rail Tracks at 1,000 ft	VIP Project	Total
Chronic Risk	0.0003	0.003	0.000	0.011246	0.014546

A.9 Qualitative Assessment of Cumulative Health Impacts near Dixon, Sacramento, and Roseville, California

The RDEIR summarizes the Project's cumulative health risks within the Bay Area Air Quality Management District (BAAQMD). Those risks are based on a separate report prepared for the Project (ERM, 2015a). RDEIR also summarizes the Project's cumulative health risks between Roseville and the Oregon and Nevada borders (uprail). Those risks are also based on a separate report prepared for the Project (ERM, 2015c).

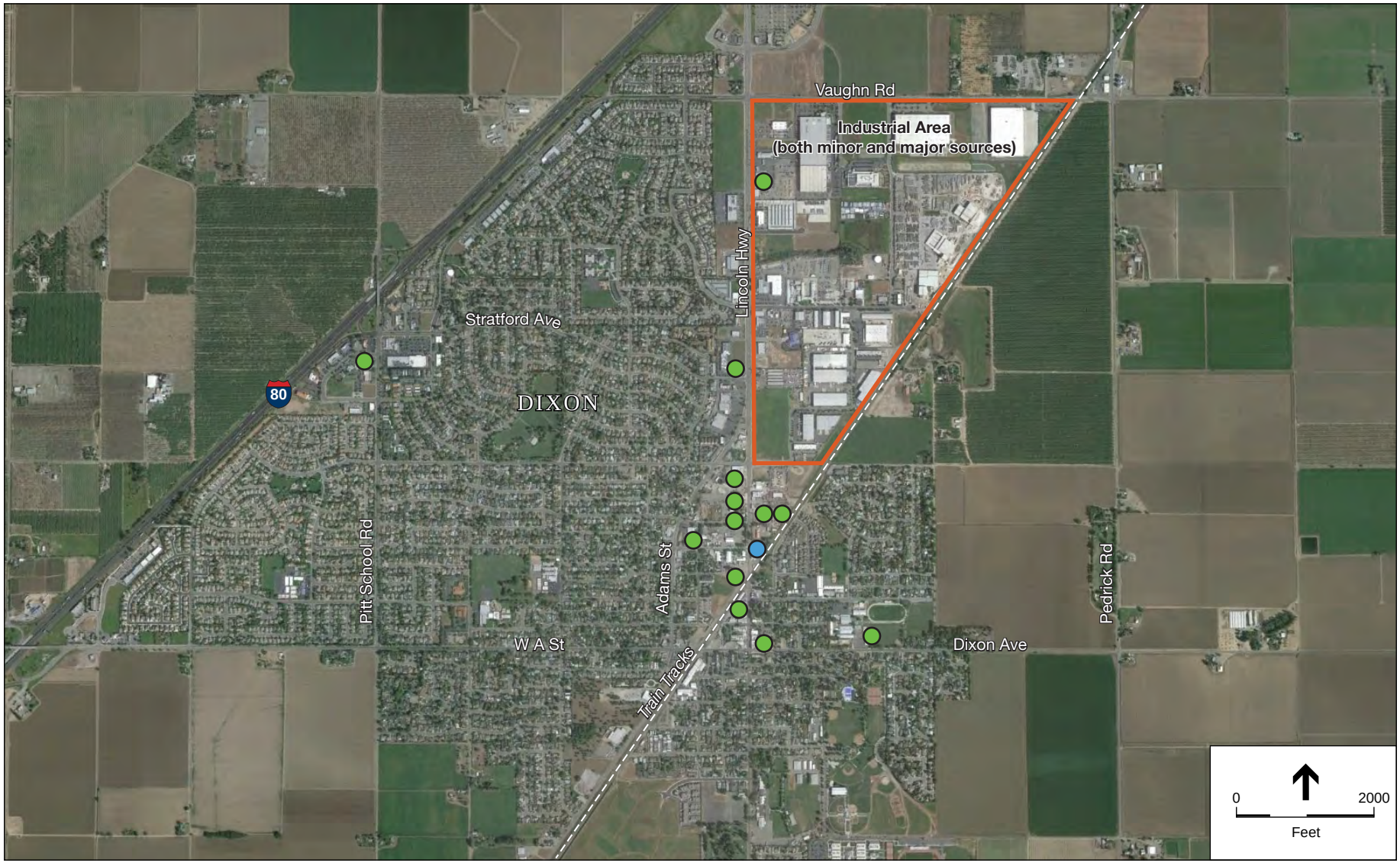
This analysis focuses on the Project's cumulative health risks from trains traveling between the Bay Area Air Quality Management District (BAAQMD)/Yolo-Solano County Air Quality Management District (YSAQMD) border and Roseville. This HRA focuses on Dixon, Sacramento, and Roseville. These represent populated areas that have sensitive receptors located close to the rail lines and for which Project specific health risk modeling was conducted (ERM, 2015a). Table 4.1-10 of the DEIR summarizes Project specific health risks for Dixon, Sacramento, and Roseville. The Project's incremental increase in locomotive emissions would not result in significant cancer risks, chronic or acute health hazards, or PM2.5 concentrations.

The cumulative evaluation of health risk must consider other sources of TACs. These include stationary sources, roadways, and existing rail traffic. The U.S. EPA Federal Report System contains the location and facility identification numbers of facilities that could potentially pose health risks. The EPA system was queried to identify sources within 1,000 feet of the rail lines in locations near the Dixon, Sacramento, and Roseville maximum exposed individual residences (MEIR).

In addition to stationary sources, existing rail traffic and major roadways contribute to cumulative impacts for sensitive receptors. Rail traffic generates diesel particulate matter emissions from diesel fuel combustion. Motor vehicles emit a variety of TACs from the combustion of gasoline and diesel fuel. The level of health risks pose by rail traffic and roadways depends on the volume of traffic and the distance to sensitive receptors.

Figures HRA-1 through HRA-3 show emission sources that could contribute to cumulative health risks near the Dixon, Sacramento, and Roseville MEIRs. In Dixon, the point of maximum exposed individual residential (MEIR) impact from the Project is located north of the railroad tracks and just east of the Lincoln Highway (State Route 113). Several minor stationary sources are shown in the immediate vicinity of the MEIR. In addition, several minor and major sources are located due north of the project in an industrially zoned area. In addition, emissions from the existing railroad and from vehicles traveling on SR 113 would contribute to cumulative health risks.

In Sacramento, the MEIR is located in the North Highlands area of Sacramento County. As shown in Figure HRA-2, only two minor sources plus the existing railroad track are located near the MEIR.



Minor Sources

Point of Maximum Residential Cancer and Non-Cancer Health Risk

SOURCE: Google Earth; ESA

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Figure HRA-1

Point of Maximum Residential Health Risks and Surrounding Sources in Dixon, California

Minor Sources

Point of Maximum Residential Cancer and Non-Cancer Health Risk

SOURCE: Google Earth; ESA

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Figure HRA-2

Point of Maximum Residential Health Risks and Surrounding Sources in Sacramento County, California

Major Source Minor Source Point of Maximum Residential Cancer and Non-Cancer Health Risk

SOURCE: Google Earth; ESA

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Figure HRA-3

Point of Maximum Residential Health Risks and Surrounding Sources in Roseville, California

In Roseville, the MEIR is located just north of the Roseville Railyards. Figure HRA-3 shows a few minor sources near the MEIR. The Roseville Railyards represents the major source of emissions that would contribute to cumulative health risks at the MEIR.

Project emissions plus emissions from existing point sources, roadways, and locomotives would all contribute to cumulative health risks. However, unlike the BAAQMD, information needed to quantify cumulative risk from existing sources is not currently available within the YSAQMD, SMAQMD, or PCAPCD. In addition, none of these agencies have developed cumulative health risk thresholds.

As shown in Table 4.1-10 of the RDEIR, the Project's proposed increase in rail activity in Dixon, Sacramento, and Roseville would contribute less than 10 in one million to any cumulative cancer risk, and less than 1.0 to chronic risks at sensitive receptors near the rail lines. Therefore, the Project would not make a significant contribute to a cumulatively considerable health risk impact. However, an assessment of the cumulative impacts of the Project plus other sources is not possible due to a lack of relevant data on existing emission sources. This analysis assumes that the combined effects of the Project with other existing sources described above and shown in Figures HRA-1, HRA-2, and HRA-3 could have a potentially significant and unavoidable cumulative health risk.