

APPENDIX I

HITC Vehicle Emissions Analysis

Hercules ITC Summary Emissions

Ferry Emissions

	Pollutants (lbs/day)				
	POC	NOx	CO	SOx	PM10
Proposed Ferry Emissions	11.72	46.85	26.48	0.47	1.32

Motor Vehicle Emissions Associated with Ferry Trips

	Pollutants (lbs/day)				
	POC	NOx	CO	SOx	PM10
Proposed Emissions	0.69	1.29	13.42	0.01	0.05
Current Emissions	2.88	4.96	50.81	0.04	0.12
Net Change in Emissions	-2.19	-3.67	-37.39	-0.02	-0.07

Motor Vehicle Emissions Associated with Rail Trips

	Pollutants (lbs/day)				
	POC	NOx	CO	SOx	PM10
Proposed Emissions	0.60	1.11	11.58	0.01	0.04
Current Emissions	4.70	8.08	82.79	0.06	0.20
Net Change in Emissions	-4.10	-6.97	-71.20	-0.05	-0.16

Net Total Emission Associated with Hercules ITC

	Pollutants (lbs/day)				
	POC	NOx	CO	SOx	PM10
Net Ferry Emissions	11.72	46.85	26.48	0.47	1.32
Net MV (Ferry)	-2.19	-3.67	-37.39	-0.02	-0.07
Net MV (Rail)	-4.10	-6.97	-71.20	-0.05	-0.16
Total Net Change	5.42	36.21	-82.11	0.39	1.09

proposed	13.01	49.25	51.48	0.49	1.41
current	7.58	13.04	133.60	0.10	0.33
	5.42	36.21	-82.11	0.39	1.09

Motor Vehicle Gallons of Fuel Used

2006		9812.7							
	VMT (1000 miles)	Gallons Gasoline (1000 gallons)	Gallons Diesel (1000 gallons)	Gasoline (gallons)	Diesel (gallons)	Total Btu	PMT		
LDA	85,018	3,946	11.78	277.70	0.83	32,043,358.69			
LDT1	20,917	1,152	26.79	81.09	1.89	9,571,938.94			
LDT2	33,499	1,882	3.61	132.42	0.25	15,261,632.83			
Total	139,434	6,980	42.18	491.21	2.97	56,876,930.46			
Btu/PMT						5,796.34	9812.566		
2010		2653.3							
	VMT (1000 miles)	Gallons Gasoline (1000 gallons)	Gallons Diesel (1000 gallons)	Gasoline (gallons)	Diesel (gallons)	Total Btu	PMT		
LDA	90,457	4,134	7.4	74.81	0.13	8,620,656.89			
LDT1	21,896	1,213	21.62	21.95	0.39	2,575,440.58			
LDT2	34,254	1,935	2.48	35.03	0.04	4,033,915.47			
Total	146,607	7,282	31.5	131.79	0.57	15,230,012.94	24650.01		
Ferry						253,964,249.26			
Btu/PMT						10,920.66			
Conversion									
	Gallon	Btu							
Gasoline	1	115000							
Diesel	1	130500							

Note:
http://bioenergy.ornl.gov/papers/misc/energy_conv.html

From EMFAC2007

Hercules ITC
2025 Mode of Access

Origin Mode	Destination Mode	
	Ferry	Rail
Rail	0%	0%
Fery	0%	0%
Bus	15%	2%
Park and Ride	48%	59%
Kiss and Ride	5%	7%
Bike or Walk	32%	32%
	100%	100%

Rail Terminal Trip Distribution

Existing		Relative Size	Total		Peak PR	Peak KR	Richmond/ San Jose		Richmond/ San Jose		Martinez Sacramento		Martinez Sacramento	
Geographical Demand Zone	Total PR		Total KR	Rail Station to Peak PR			Distance miles	Rail Station to Peak KR	Distance miles	Rail Station to Peak PR	Distance miles	Rail Station to Peak KR	Distance miles	
West Rodeo	5	20	2	20	2	4	9.8	0	9.8	16	12.6	2	12.6	
East Rodeo	5	20	2	20	2	4	9.8	0	9.8	16	12.4	2	12.4	
Waterfront Hercules	5	20	2	20	2	4	9.6	0	9.6	16	12.3	2	12.3	
West Hercules	1	4	0	4	0	1	8.6	0	8.6	3	12.5	0	12.5	
East Hercules	8	32	4	32	4	6	10.1	1	10.1	25	11.5	3	11.5	
West Pinole	2	8	1	8	1	2	6.9	0	6.9	6	13.2	1	13.2	
Central Pinole	2	8	1	8	1	2	6.5	0	6.5	6	14.2	1	14.2	
Pinole Valley	2	8	1	8	1	2	7.3	0	7.3	6	12.7	1	12.7	
S. Central Pinole	2	8	1	8	1	2	6.0	0	6.0	6	13.5	1	13.5	
East Pinole	4	16	2	16	2	3	8.5	0	8.5	13	14.2	1	14.2	
	36	143	16	143	16	29	9.0	3	9.0	114	12.6	13	12.6	

Proposed		Relative Size	Total		Peak PR	ITC		Peak KR	ITC	
Geographical Demand Zone	Total PR		Distance Miles	Total KR		Distance Miles	Peak PR		Distance Miles	Peak KR
West Rodeo	5	20	2.6	2	2.6	20	2.6	2	2.6	
East Rodeo	5	20	2.7	2	2.7	20	2.7	2	2.7	
Waterfront Hercules	5	20	1.2	2	1.2	20	1.2	2	1.2	
West Hercules	1	4	1.9	0	1.9	4	1.9	0	1.9	
East Hercules	8	32	2.5	4	2.5	32	2.5	4	2.5	
West Pinole	2	8	2.1	1	2.1	8	2.1	1	2.1	
Central Pinole	2	8	2.1	1	2.1	8	2.1	1	2.1	
Pinole Valley	2	8	1.9	1	1.9	8	1.9	1	1.9	
S. Central Pinole	2	8	2.4	1	2.4	8	2.4	1	2.4	
East Pinole	4	16	3.8	2	3.8	16	3.8	2	3.8	
	36	143	2.4	16	2.4	143	2.4	16	2.4	

Current Trips

Emission Factor		g/mi	POC	NOx	CO	SOx	PM10
	New Destination	VMT/day	0.351	0.603	6.176	0.005	0.015
Hercules to SF	Ferry	2,168.5	1.68	2.88	29.52	0.02	0.07
Hercules to HTC	Ferry	774.2	0.60	1.03	10.54	0.01	0.03
Hercules to BART	Ferry	789.1	0.61	1.05	10.74	0.01	0.03
Hercules to Martinez/Sacramento	Rail	5,158.7	3.99	6.85	70.23	0.05	0.17
Hercules to Richmond/San Jose	Rail	922.2	0.71	1.23	12.55	0.01	0.03
Total		9,812.6	7.58	13.04	133.60	0.10	0.33

**2006 EMFAC2007 Results
San Francisco Bay Area Air Basin Simple Average**

Reactive Organic Compounds

		Light-Duty Autos	Light Duty Trucks 1	Light-Duty Trucks 2	Light-Duty Trucks	Light-Duty Autos and Trucks
VMT	1000 mi/day	85018	20917	33498	54415	139433
ROC	tons/day	32.410	11.042	10.432	21.474	53.884
	g/mi	0.35	0.48	0.28	0.36	0.35

Oxides of Nitrogen

		Light-Duty Autos	Light Duty Trucks 1	Light-Duty Trucks 2	Light-Duty Trucks	Light-Duty Autos and Trucks
VMT	1000 mi/day	85018	20917	33498	54415	139433
NOx	tons/day	46.971	18.639	27.005	45.644	92.615
	g/mi	0.50	0.81	0.73	0.76	0.60

Carbon Monoxide

		Light-Duty Autos	Light Duty Trucks 1	Light-Duty Trucks 2	Light-Duty Trucks	Light-Duty Autos and Trucks
VMT	1000 mi/day	85018	20917	33498	54415	139433
CO	tons/day	536.792	206.498	205.880	412.378	949.170
	g/mi	5.73	8.96	5.58	6.88	6.18

Sulfur Dioxide

		Light-Duty Autos	Light Duty Trucks 1	Light-Duty Trucks 2	Light-Duty Trucks	Light-Duty Autos and Trucks
VMT	1000 mi/day	85018	20917	33498	54415	139433
SOx	tons/day	0.382	0.135	0.18	0.315	0.697
	g/mi	0.00	0.01	0.00	0.01	0.005

Particulate Matter

		Light-Duty Autos	Light Duty Trucks 1	Light-Duty Trucks 2	Light-Duty Trucks	Light-Duty Autos and Trucks
VMT	1000 mi/day	85018	20917	33498	54415	139433
PM10	tons/day	1.129	0.377	0.829	1.206	2.335
	g/mi	0.012	0.02	0.02	0.02	0.02

Hercules Intermodal Transit Center
Existing Trips Diverted to Ferries

Peak Hour

% Hercules Transit Center	Hercules Transit Center Trips	% Hercules to San Francisco	Hercules to San Francisco Trips	% Richmond and El Cerrito del Norte BART	Richmond and El Cerrito del Norte BART Trips	Total Trips
70%	197	15%	42	15%	42	281

Daily

% Hercules Transit Center	Hercules Transit Center Trips	% Hercules to San Francisco	Hercules to San Francisco Trips	% Richmond and El Cerrito del Norte BART	Richmond and El Cerrito del Norte BART Trips	Total Trips
70%	786	15%	169	15%	169	1124

Hercules Intermodal Transit Center
Existing Trips Diverted to Rail

Peak Hour

% Martinez Rail Station	Martinez Rail Station Trips	% Richmond Rail Station	Richmond Rail Station Trips	Total Trips
80%	193	20%	48	241

Daily

% Hercules Transit Center	Hercules Transit Center Trips	% Richmond Rail Station	Richmond Rail Station Trips	Total Trips
80%	619	20%	155	774

Proposed Trips

		POC	NOx	CO	SOx	PM10	
Emission Factor	g/mi	0.220	0.410	4.274	0.004	0.016	
	Destination	VMT/day					
Hercules to ITC	Ferry	1,424.1	0.69	1.29	13.42	0.01	0.05
Hercules to ITC	Rail	1,229.2	0.60	1.11	11.58	0.01	0.04
Total		2,653.3	1.29	2.40	25.00	0.02	0.10

**2010 EMFAC2007 Results
San Francisco Bay Area Air Basin Simple Average**

Reactive Organic Compounds

		Light-Duty Autos	Light Duty Trucks 1	Light-Duty Trucks 2	Light-Duty Trucks	Light-Duty Autos and Trucks
VMT	1000 mi/day	90457	21896	34254	56150	146607
ROC	tons/day	20.184	7.663	7.675	15.338	35.522
	g/mi	0.20	0.32	0.20	0.25	0.22

Oxides of Nitrogen

		Light-Duty Autos	Light Duty Trucks 1	Light-Duty Trucks 2	Light-Duty Trucks	Light-Duty Autos and Trucks
VMT	1000 mi/day	90457	21896	34254	56150	146607
NOx	tons/day	31.853	13.833	20.496	34.329	66.182
	g/mi	0.32	0.57	0.54	0.55	0.41

Carbon Monoxide

		Light-Duty Autos	Light Duty Trucks 1	Light-Duty Trucks 2	Light-Duty Trucks	Light-Duty Autos and Trucks
VMT	1000 mi/day	90457	21896	34254	56150	146607
CO	tons/day	371.150	155.034	164.579	319.613	690.763
	g/mi	3.72	6.42	4.36	5.16	4.27

Sulfur Dioxide

		Light-Duty Autos	Light Duty Trucks 1	Light-Duty Trucks 2	Light-Duty Trucks	Light-Duty Autos and Trucks
VMT	1000 mi/day	90457	21896	34254	56150	146607
SOx	tons/day	0.388	0.116	0.181	0.297	0.685
	g/mi	0.00	0.00	0.00	0.00	0.004

Particulate Matter

		Light-Duty Autos	Light Duty Trucks 1	Light-Duty Trucks 2	Light-Duty Trucks	Light-Duty Autos and Trucks
VMT	1000 mi/day	90457	21896	34254	56150	146607
PM10	tons/day	1.225	0.409	1.020	1.429	2.654
	g/mi	0.012	0.02	0.03	0.02	0.02

Peak Hour

	Peak Hour Ridership	% Transit Access	Transit Trips	% Pedestrian or Bicycle Access	Pedestrian or Bicycle Trips	% Park and Ride Access	Park and Ride Trips	Park and Ride Vehicles	% Kiss and Ride Access	Kiss and Ride Trips	Total Trips
Ferry	281	15%	42	32%	90	48%	134	85	5%	15	281
Rail	241	2%	5	32%	77	59%	143	143	7%	16	241

Daily

	Peak Hour Ridership	% Transit Access	Transit Trips	% Pedestrian or Bicycle Access	Pedestrian or Bicycle Trips	% Park and Ride Access	Park and Ride Trips	Park and Ride Vehicles	% Kiss and Ride Access	Kiss and Ride Trips	Total Trips
Ferry	1124	15%	169	32%	360	48%	539	343	5%	57	1124
Rail	964	2%	19	32%	308	59%	569	569	7%	67	964