

APPENDIX J

AIR QUALITY CALCULATIONS

Air Quality Appendix

- Construction Emissions
 - Emissions Summary by Air Resource Area
 - Railway/Track Installation Emissions
 - Station/Parking Lot Construction Emissions
- Operations Criteria Pollutant and Greenhouse Gas Emissions
 - DEMU Technology Option
 - Calculation of DEMU Emissions Factors
 - DEMU Criteria Pollutant and GHG Emissions
 - Mobile-source GHG Emissions
 - EMU Technology Option
 - EMU Criteria Pollutant and GHG Emissions
 - Mobile-source GHG Emissions
- CO Hotspot Analysis

Summary of Railway/Track Installation Emissions

	ROC	CO	NOX	PM10	PM2.5
Total Emissions (tons/year)	5.87	7.22	76.19	3.2	1.5544
Emissions per Year	2.935	3.61	38.095	1.6	0.7772
CA Track Emissions	2.4	2.9	30.7	1.3	0.6
Station Emissions	2.6	4.5	6.0	5.0	1.0
Total Emissions	4.9	7.4	36.6	6.2	1.6
NV Track Emissions	0.6	0.7	7.4	0.3	0.2
Station Emissions	2.6	4.5	6.0	5.0	1.0
Total Emissions	3.1	5.2	13.4	5.3	1.1

Road Construction Emissions Model, Version 5.2

Emission Estimates for -> DesertXpress					Exhaust	Fugitive Dust	<-tons
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	
Grubbing/Land Clearing	15	258	3	12	2	10	
Grading/Excavation	30	309	63	16	6	10	
Drainage/Utilities/Sub-Grade	17	268	13	12	2	10	
Paving	15	259	2	2	2	0	
Maximum (pounds/day)	30	309	63	16	6	10	
Total (tons/construction project)	5.87	7.22	76.19	3.20	0.95	2.24	

Notes: Project Start Year -> 2011
 Project Length (months) -> 24
 Total Project Area (acres) -> 550
 Maximum Area Disturbed/Day (acres) -> 2
 Total Soil Imported/Exported (yd³/day)-> 150

PM10 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I.

Emission Estimates for -> DesertXpress					Exhaust	Fugitive Dust	<-megagrams
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	PM10 (kgs/day)	PM10 (kgs/day)	PM10 (kgs/day)	
Grubbing/Land Clearing	7	117	1	5	1	5	
Grading/Excavation	13	140	28	7	3	5	
Drainage/Utilities/Sub-Grade	8	122	6	6	1	5	
Paving	7	118	1	1	1	0	
Maximum (kilograms/day)	13	140	28	7	3	5	
Total (megagrams/construction project)	5.33	6.55	69.10	2.90	0.87	2.04	

Notes: Project Start Year -> 2011
 Project Length (months) -> 24
 Total Project Area (hectares) -> 223
 Maximum Area Disturbed/Day (hectares) -> 1
 Total Soil Imported/Exported (meters³/day)-> 115

PM10 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I.

Road Construction Emissions Model

Version 5.2

Data Entry Worksheet

Note: Required data input sections have a yellow background.

Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.

The user is required to enter information in cells C10 through C28.

SACRAMENTO METROPOLITAN



Input Type

Project Name	DesertXpress	
Construction Start Year	2011	WARNING: Start Year must be between 2000 and 2010 (inclusive).
Project Type	1	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction
Project Construction Time	24	months
Predominate Soil/Site Type: Enter 1, 2, or 3	2	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock
On-Road Emission Factors: Enter 1, 2, 3, or 4	4	1. Emfac7fv1.1 4. Emfac2002 (default) 2. Emfac7G 3. Emfac2001
Project Length	180	miles
Total Project Area	550	acres
Maximum Area Disturbed/Day	2	acres
Water Trucks Used?	1	1. Yes 2. No
Soil Imported	150	yd ³ /day
Soil Exported	0	yd ³ /day
Average Truck Capacity	14	yd ³ (assume 20 if unknown)

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Construction Periods		Program Calculated
	User Override of Construction Months	Months
Grubbing/Land Clearing		2.40
Grading/Excavation		10.80
Drainage/Utilities/Sub-Grade		7.20
Paving		3.60
Totals	0.00	24.00

Soil Hauling Emissions				
User Input		User Override of Soil Hauling Defaults		
		Default Values		
Miles/round trip			30	
Round trips/day			11	
Vehicle miles traveled/day (calculated)			321.4285714	
Hauling Emissions	ROG	NOx	CO	PM10
Emission rate (grams/mile)	0.65	7.23	6.11	0.24
Pounds per day	0.5	5.1	4.3	0.2
Tons per construction period	0.05	0.61	0.51	0.02

Worker commute default values can be overridden in cells C62 through C67.

Worker Commute Emissions				
		User Override of Worker Commute Default Values		
		Default Values		
Miles/ one-way trip			20	
One-way trips/day			2	
No. of employees: Grubbing/Land Clearing			453	
No. of employees: Grading/Excavation			455	
No. of employees: Drainage/Utilities/Sub-Grade			455	
No. of employees: Paving			454	
	ROG	NOx	CO	PM10
Emission rate (grams/mile)	0.24		5.10	0.04
Emission rate (grams/trip)	1.37	0.62	13.67	0.02
Pounds per day - Grubbing/Land Clearing	14.9	2.5	257.9	1.6
Tons per const. Period - Grub/Land Clear	0.4	0.1	6.8	0.0
Pounds per day - Grading/Excavation	15.0	2.5	259.4	1.6
Tons per const. Period - Grading/Excavation	1.8	0.3	30.8	0.2
Pounds per day - Drainage/Utilities/Sub-Grade	15.0	2.5	259.4	1.6
Tons per const. Period - Drain/Util/Sub-Grade	1.2	0.2	20.5	0.1
Pounds per day - Paving	14.9	2.5	258.7	1.6
Tons per const. Period - Paving	0.6	0.1	10.2	0.1
tons per construction period	3.9	0.7	68.4	0.4

Water Truck Emissions		Program Estimate of	User Override of Water	Default Values
	Number of Water Trucks	Number of Water Trucks	Truck Miles Traveled	Miles Traveled/Day
Grubbing/Land Clearing - Exhaust		1		40
Grading/Excavation - Exhaust		1		40
Drainage/Utilities/Subgrade		1		40
	ROG	NOx	CO	PM10
Emission rate (grams/mile)	0.65	7.23	6.11	0.24
Pounds per day - Grubbing/Land Clearing	0.1	0.6	0.5	0.0
Tons per const. Period - Grub/Land Clear	0.00	0.02	0.01	0.00
Pound per day - Grading/Excavation	0.1	0.6	0.5	0.0
Tons per const. Period - Grading/Excavation	0.01	0.08	0.06	0.00
Pound per day - Drainage/Utilities/Subgrade	0.1	0.6	0.5	0.0
Tons per const. Period - Drainage/Utilities/Subgrade	0.00	0.05	0.04	0.00

Fugitive dust default values can be overridden in cells C104 and C105.

Fugitive PM10 Dust		User Override of Max	Default		
		Acrerage/Day	Maximum Acreage/Day	pounds/day	tons/per period
Fugitive Dust - Grubbing/Land Clearing			2	10.0	0.3
Fugitive Dust - Grading/Excavation			2	10.0	1.2
Fugitive Dust - Drainage/Utilities/Subgrade			2	10.0	0.8

Off-Road Equipment Emissions

Grubbing/Land Clearing	Default		ROG	CO	NOx	PM10
	Number of Vehicles	Type				
Override of Default Number of Vehicles	Program-estimate		pounds/day	pounds/day	pounds/day	pounds/day
		Backhoes	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00
		Compactor	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00
		Crawler Tractors	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00
	1	Dozer	0.00	0.00	0.00	0.00
		Excavator	0.00	0.00	0.00	0.00
		Forklifts, Rough Terrain	0.00	0.00	0.00	0.00
		Grader	0.00	0.00	0.00	0.00
		Loaders, Rubber Tired	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00
		Other Construction Equip.	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00
	1	Scraper	0.00	0.00	0.00	0.00
10	360	Signal Boards	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00
		Tractors	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00
pounds per day			0.0	0.0	0.0	0.0
tons per period			0.0	0.0	0.0	0.0

Grading/Excavation		Number of Vehicles	ROG	CO	NOx	PM10
Override of Default Number of Vehicles	Program-estimate	Type	pounds/day	pounds/day	pounds/day	pounds/day
		Backhoes	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00
		Compactor	0.00	0.00	0.00	0.00
	0	Cranes	0.00	0.00	0.00	0.00
		Crawler Tractors	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00
		Dozer	0.00	0.00	0.00	0.00
	1	Excavator	1.84	4.79	4.68	0.28
		Forklifts, Rough Terrain	0.00	0.00	0.00	0.00
	1	Grader	1.20	5.99	8.36	0.47
	1	Loaders, Rubber Tired	0.92	5.01	5.17	0.30
		Off-Highway Trucks	0.00	0.00	0.00	0.00
	0	Other Construction Equip.	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00
	1	Scraper	3.64	13.05	12.99	0.70
10	360	Signal Boards	6.51	15.62	23.10	2.07
		Skid Steer Loaders	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00
		Tractors	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00
max pounds per day			14.1	44.5	54.3	3.8
tons per period			1.7	5.3	6.4	0.5

Drainage/Utilities/Subgrade	Number of Vehicles		ROG	CO	NOx	PM10
Override of Default Number of Vehicles	Program-estimate	Type	pounds/day	pounds/day	pounds/day	pounds/day
		Backhoes	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00
	1	Compactor	0.35	1.31	1.23	0.07
		Cranes	0.00	0.00	0.00	0.00
		Crawler Tractors	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00
		Dozer	0.00	0.00	0.00	0.00
		Excavator	0.00	0.00	0.00	0.00
		Forklifts, Rough Terrain	0.00	0.00	0.00	0.00
	1	Grader	0.20	1.00	1.39	0.08
		Loaders, Rubber Tired	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00
		Other Construction Equip.	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00
	1	Scraper	0.61	2.18	2.17	0.12
10	360	Signal Boards	1.08	2.60	3.85	0.35
		Skid Steer Loaders	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00
		Tractors	0.00	0.00	0.00	0.00
	1	Trenchers	0.17	0.62	0.79	0.05
max pounds per day			2.4	7.7	9.4	0.7
tons per period			0.2	0.6	0.7	0.1

Paving	Number of Vehicles		ROG	CO	NOx	PM10
	Override of Default Number of Vehicles	Program-estimate Type	pounds/day	pounds/day	pounds/day	pounds/day
		Backhoes	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00
		Compactor	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00
		Crawler Tractors	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00
		Dozer	0.00	0.00	0.00	0.00
		Excavator	0.00	0.00	0.00	0.00
		Forklifts, Rough Terrain	0.00	0.00	0.00	0.00
		Grader	0.00	0.00	0.00	0.00
		Loaders, Rubber Tired	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00
		Other Construction Equip.	0.00	0.00	0.00	0.00
		1 Pavers	0.00	0.00	0.00	0.00
		1 Paving Equipment	0.00	0.00	0.00	0.00
		1 Rollers	0.00	0.00	0.00	0.00
		Scrapper	0.00	0.00	0.00	0.00
	10	360 Signal Boards	0.00	0.00	0.00	0.00
		Skid Steer Loaders	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00
		Tractors	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00
		pounds per day	0.0	0.0	0.0	0.0
		tons per period	0.0	0.0	0.0	0.0
Total Emissions (tons per construction period)			1.9	5.9	7.2	0.5

Equipment	Default Values		Default Values		Default Values	
		Horsepower		Load Factor		Hours/day
Bore/Drill Rigs		218		0.75		8
Concrete/Industrial Saws		84		0.73		8
Cranes		190		0.43		8
Crawler Tractors		143		0.575		8
Crushing/Proc. Equipment		154		0.78		8
Excavators		180		0.58		8
Graders		174		0.575		8
Off-Highway Tractors		255		0.41		8
Off-Highway Trucks		417		0.49		8
Other Construction Equipment		190		0.62		8
Pavers		132		0.59		8
Paving Equipment		111		0.53		8
Rollers		114		0.43		8
Rough Terrain Forklifts		94		0.475		8
Rubber Tired Dozers		352		0.59		8
Rubber Tired Loaders		165		0.465		8
Scrapers		313		0.66		8
Signal Boards		25		0.82		8
Skid Steer Loaders		62		0.515		8
Surfacing Equipment		437		0.49		8
Tractors/Loaders/Backhoes		79		0.465		8
Trenchers		82		0.695		8

Default load factors from SCAQMD CEQA Handbook, 1993.

Default horsepower values from Appendix B, California Air Resources Board's Offroad Model (see also Appendix B of this spreadsheet).

Signal board horsepower based on: U.S. EPA, 1998. Final Regulatory Impact Analysis: Control of Emissions from Nonroad Diesel Engines (EPA420-R-98-016).

			Columns		Horsepower
Horsepower	Load Factor	Hours/Day	(LxMxN)	Class	
218	0.75	8.0	1306.0		4
84	0.73	8.0	489.0		2
190	0.43	8.0	655.1		4
143	0.575	8.0	659.6		3
154	0.78	8.0	963.0		3
180	0.58	8.0	835.5		4
174	0.575	8.0	800.3		3
255	0.41	8.0	836.6		4
417	0.49	8.0	1635.4		5
190	0.62	8.0	944.6		4
132	0.59	8.0	620.9		3
111	0.53	8.0	470.4		3
114	0.43	8.0	391.9		3
94	0.475	8.0	358.1		2
352	0.59	8.0	1663.7		5
165	0.465	8.0	615.1		3
313	0.66	8.0	1653.5		5
25	0.82	8.0	164.0		1
62	0.515	8.0	255.4		2
437	0.49	8.0	1712.9		5
79	0.465	8.0	295.7		2
82	0.695	8.0	455.6		2

Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: G:\3_Projects_Air Quality\DesertXpress\Impacts analysis\URBEMIS\stations.urb924

Project Name: DesertXpress - CA Portion

Project Location: San Bernadino County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

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Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
2011 TOTALS (tons/year unmitigated)	0.98	5.97	4.54	0.00	4.56	0.39	4.95	0.95	0.36	1.31	717.34
2012 TOTALS (tons/year unmitigated)	2.56	2.04	2.12	0.00	0.01	0.15	0.16	0.00	0.14	0.14	326.97

AREA SOURCE EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	0.25	0.24	0.48	0.00	0.00	0.00	292.51

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	3.43	5.60	39.18	0.04	5.94	1.20	3,527.62

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	3.68	5.84	39.66	0.04	5.94	1.20	3,820.13

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
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2011	0.98	5.97	4.54	0.00	4.56	0.39	4.95	0.95	0.36	1.31	717.34
Mass Grading 01/10/2011-03/14/2011	0.18	1.46	0.83	0.00	2.30	0.08	2.38	0.48	0.07	0.55	145.46
Mass Grading Dust	0.00	0.00	0.00	0.00	2.30	0.00	2.30	0.48	0.00	0.48	0.00
Mass Grading Off Road Diesel	0.18	1.45	0.77	0.00	0.00	0.08	0.08	0.00	0.07	0.07	138.34
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.12
Fine Grading 03/15/2011-05/16/2011	0.18	1.43	0.81	0.00	2.25	0.08	2.33	0.47	0.07	0.54	142.30
Fine Grading Dust	0.00	0.00	0.00	0.00	2.25	0.00	2.25	0.47	0.00	0.47	0.00
Fine Grading Off Road Diesel	0.18	1.42	0.76	0.00	0.00	0.08	0.08	0.00	0.07	0.07	135.34
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.96
Asphalt 05/17/2011-05/14/2012	0.34	1.75	1.04	0.00	0.00	0.14	0.14	0.00	0.13	0.13	167.42
Paving Off-Gas	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.25	1.50	0.85	0.00	0.00	0.13	0.13	0.00	0.12	0.12	116.34
Paving On Road Diesel	0.02	0.25	0.09	0.00	0.00	0.01	0.01	0.00	0.01	0.01	38.39
Paving Worker Trips	0.00	0.01	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.69
Building 06/13/2011-06/22/2012	0.29	1.33	1.85	0.00	0.01	0.09	0.10	0.00	0.08	0.09	262.15
Building Off Road Diesel	0.25	1.14	0.79	0.00	0.00	0.08	0.08	0.00	0.08	0.08	117.54
Building Vendor Trips	0.01	0.14	0.12	0.00	0.00	0.01	0.01	0.00	0.01	0.01	29.71
Building Worker Trips	0.03	0.05	0.95	0.00	0.01	0.00	0.01	0.00	0.00	0.00	114.91

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2012	2.56	2.04	2.12	0.00	0.01	0.15	0.16	0.00	0.14	0.14	326.97
Asphalt 05/17/2011-05/14/2012	0.19	0.97	0.60	0.00	0.00	0.08	0.08	0.00	0.07	0.07	97.99
Paving Off-Gas	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.14	0.83	0.49	0.00	0.00	0.07	0.07	0.00	0.07	0.07	68.10
Paving On Road Diesel	0.01	0.13	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.00	22.47
Paving Worker Trips	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.42
Building 06/13/2011-06/22/2012	0.23	1.08	1.50	0.00	0.01	0.07	0.08	0.00	0.07	0.07	225.89
Building Off Road Diesel	0.20	0.93	0.66	0.00	0.00	0.06	0.06	0.00	0.06	0.06	101.32
Building Vendor Trips	0.01	0.11	0.09	0.00	0.00	0.00	0.01	0.00	0.00	0.00	25.61
Building Worker Trips	0.02	0.04	0.75	0.00	0.00	0.00	0.01	0.00	0.00	0.00	98.95
Coating 01/09/2012-07/27/2012	2.14	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.09
Architectural Coating	2.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.09

Phase Assumptions

Phase: Fine Grading 3/15/2011 - 5/16/2011 - Default Fine Site Grading/Excavation Description

Total Acres Disturbed: 90

Maximum Daily Acreage Disturbed: 10

Fugitive Dust Level of Detail: Default

10 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

4 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

2 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

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Phase: Mass Grading 1/10/2011 - 3/14/2011 - Default Mass Site Grading/Excavation Description

Total Acres Disturbed: 90

Maximum Daily Acreage Disturbed: 10

Fugitive Dust Level of Detail: Default

10 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

4 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

2 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Paving 5/17/2011 - 5/14/2012 - Default Paving Description

Acres to be Paved: 80

Off-Road Equipment:

1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day

2 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day

2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 6/13/2011 - 6/22/2012 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 1/9/2012 - 7/27/2012 - Default Architectural Coating Description

Rule: Residential Interior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 100

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Rule: Residential Interior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 50

Rule: Residential Exterior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 100

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

DesertXpress -- DEMU Emission Factor Derivation

DAE

09/25/08

Criteria Pollutants

Emissions per Trip (model year 2011 DEMU)		NOx+HC	PM	CO
EU Stage IIIA emission factor (g/KWh)		4.0	0.2	3.5
Energy used per trip (KWh)	14711.3			
Emissions per trip (g)		58,845	2,942	51,490
Source: JSA, DEMU Emissions Profile Table.doc				

Break out NOx vs. HC assuming same proportions as in US Tier 2 standards:

US Tier 2 Standard for line-haul locos.		NOx	HC	NOx+HC	PM	CO
Standard (g/bhp-hr)		5.5	0.30	5.8	0.10	1.50
Convert to g/KWh (@ 1.3412 bhp-hr/KWh)	1.3412	7.38	0.40	7.78	0.13	2.01
% NOx vs. HC		94.8%	5.2%	100.0%		
Source: 40 CFR 1033.101, Table 1						

Emissions per Trip with NOx and HC Separated		NOx	HC	PM	CO
Emissions per trip (g)		55,801	3,044	2,942	51,490

Fuel Usage	DEMU in 2012
Fleet Mileage Total* (train-miles/year)	4,420,547
Trip Distance (round trip miles)	366
Round trips/yr*	12,078
Diesel Fuel Consumption* (gal/yr)	13,847,000
Fuel used per trip* (gal/round trip)	1,146
* Includes 5% buffer.	

Source: JSA, DXE Operating Statistics 2007 EMU and DEMU 28 Nov 07 IW TB.doc

Fuel-Based Emission Factors Derived from Above	NOx	HC	PM	CO
(g/gal) diesel fuel	48.7	2.7	2.6	44.9

Greenhouse Gases

Fuel-Based Emission Factors (g/gal)	CO2	CH4	N2O
CA low-sulfur diesel (for fueling in Victorville)	9,960	1.4	0.1
Non-CA diesel/diesel #2 fuel (for fueling in Las Vegas)	10,050	1.4	0.1
Average	10,005	1.4	0.1

CO2 source: US Energy Information Admin., as cited in California Climate Action Registry, *General Reporting Protocol*, version 2.2, March 2007, Table C.3.

CH4 & N2O source: Intergovernmental Panel on Climate Change, *Revised IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual*, 1996, as cited in California Climate Action Registry, *General Reporting Protocol*, version 2.2, March 2007, Table C.6.

DEMU Criteria Pollutant Emissions

Analysis Year	Fuel Use (Gall/Year)	Criteria Pollutant Emissions (tons/year)						Criteria Pollutant Emissions (lbs/day)					
		CO 44.90	ROC 2.70	NOx 48.70	PM10 2.60	PM2.5 2.39	SOx 3.40	CO	ROC	NOx	PM10	PM2.5	SOx
Year 2013	14,371,733.333	711	43	772	41	38	54	3,898	234	4,227	226	208	295
California Portion		573	34	621	33	31	43	3,138	189	3,403	182	167	238
Nevada Portion		139	8	150	8	7	11	760	46	824	44	40	58

Analysis Year	Fuel Use (Gall/Year)	Criteria Pollutant Emissions (tons/year)						Criteria Pollutant Emissions (lbs/day)					
		CO 44.90	ROC 2.70	NOx 48.70	PM10 2.60	PM2.5 2.39	SOx 3.40	CO	ROC	NOx	PM10	PM2.5	SOx
Year 2030	23,292,200.000	1,153	69	1,250	67	61	87	6,317	380	6,851	366	337	479
California Portion		928	56	1,007	54	49	70	5,085	306	5,515	294	271	385
Nevada Portion		225	14	244	13	12	17	1,232	74	1,336	71	66	93

DEMU GHG Emissions

	Greenhouse Gas		
	CO ₂	CH ₄	N ₂ O
Grams per gallon content	10,005.00	1.40	0.10

Analysis Year	Estimated Fuel Use	Annual Emissions (kg)		
		CO ₂	CH ₄	N ₂ O
2013	14,371,733	143,789,192	20,120	1,437
2030	23,292,200	233,038,461	32,609	2,329

		CO ₂ e Emissions (metric tons/year)			
Analysis Year		CO ₂	CH ₄	N ₂ O	CO ₂ e
2013		143,789	423	446	144,657
	CA Portion	115,750	340	359	116,449
	NV Portion	28,039	82	87	28,208
2030		233,038	685	722	234,445
	CA Portion	187,596	551	581	188,728
	NV Portion	45,442	134	141	45,717

		CO ₂ e Emissions (lbs/day)			
Analysis Year		CO ₂	CH ₄	N ₂ O	CO ₂ e
2013		1,055,463	3,102	3,270	1,061,835
	CA Portion	849,648	2,497	2,633	854,777
	NV Portion	205,815	605	638	207,058
2030		1,710,585	5,027	5,300	1,720,911
	CA Portion	1,377,021	4,046	4,267	1,385,334
	NV Portion	333,564	980	1,034	335,578

Year 2013 DEMU Alternative

Mobile-source GHG Emissions

Mobile Sources

California <u>Vehicle Type</u>	<u>Percent</u>	<u>VMT by Type</u>	<u>Emission Factors (grams/mile) ^a</u>			<u>Emissions from Mobile Sources (lbs/day)</u>			
	100	(1,330,950)	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O	CO ₂ e ^b
Light Auto	49.0	(652,165)	1.14	0.06	0.08	(1,638.26)	(86.27)	(115.02)	(39,107)
Light Truck < 3750 lbs	10.9	(145,074)	1.14	0.11	0.14	(364.43)	(35.18)	(44.78)	(14,984)
Light Truck 3751-5750 lbs	21.7	(288,816)	1.14	0.11	0.14	(725.52)	(70.04)	(89.14)	(29,830)
Med Truck 5751-8500 lbs	9.5	(126,440)	1.14	0.12	0.20	(317.62)	(33.45)	(55.75)	(18,303)
Lite-Heavy Truck 8501-10,000 lbs	1.6	(21,295)	1.14	0.12	0.20	(53.49)	(5.63)	(9.39)	(3,083)
Lite-Heavy Truck 10,001-14,000 lbs	0.6	(7,986)	1.14	0.12	0.20	(20.06)	(2.11)	(3.52)	(1,156)
Med-Heavy Truck 14,001-33,000 lbs	1.0	(13,309)	1.14	0.08	0.05	(33.43)	(2.35)	(1.47)	(538)
Heavy-Heavy Truck 33,001-60,000 lbs	0.9	(11,979)	1.14	0.08	0.05	(30.09)	(2.11)	(1.32)	(484)
Other Bus	0.1	(1,331)	1.14	0.08	0.05	(3.34)	(0.23)	(0.15)	(54)
Urban Bus	0.1	(1,331)	1.14	0.08	0.05	(3.34)	(0.23)	(0.15)	(54)
Motorcycle	3.5	(46,583)	1.14	0.42	0.01	(117.02)	(43.13)	(1.03)	(1,341)
School Bus	0.1	(1,331)	1.14	0.08	0.05	(3.34)	(0.23)	(0.15)	(54)
Motor Home	1.0	(13,309)	1.14	0.11	0.14	(33.43)	(3.23)	(4.11)	(1,375)
Total CA Emissions						(3,343)	(284)	(326)	(110,361)

Nevada <u>Vehicle Type</u>	<u>Percent</u>	<u>VMT by Type</u>	<u>Emission Factors (grams/mile) ^a</u>			<u>Emissions from Mobile Sources (lbs/day)</u>			
	100	(513,795)	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O	CO ₂ e ^b
Light Auto	49.0	(251,759)	1.03	0.06	0.08	(573.26)	(33.30)	(44.40)	(15,037)
Light Truck < 3750 lbs	10.9	(56,004)	1.03	0.11	0.14	(127.52)	(13.58)	(17.29)	(5,771)
Light Truck 3751-5750 lbs	21.7	(111,493)	1.03	0.11	0.14	(253.87)	(27.04)	(34.41)	(11,489)
Med Truck 5751-8500 lbs	9.5	(48,810)	1.03	0.12	0.20	(111.14)	(12.91)	(21.52)	(7,054)
Lite-Heavy Truck 8501-10,000 lbs	1.6	(8,221)	1.03	0.12	0.20	(18.72)	(2.17)	(3.62)	(1,188)
Lite-Heavy Truck 10,001-14,000 lbs	0.6	(3,083)	1.03	0.12	0.20	(7.02)	(0.82)	(1.36)	(446)
Med-Heavy Truck 14,001-33,000 lbs	1.0	(5,138)	1.03	0.08	0.05	(11.70)	(0.91)	(0.57)	(206)
Heavy-Heavy Truck 33,001-60,000 lbs	0.9	(4,624)	1.03	0.08	0.05	(10.53)	(0.82)	(0.51)	(186)
Other Bus	0.1	(514)	1.03	0.08	0.05	(1.17)	(0.09)	(0.06)	(21)
Urban Bus	0.1	(514)	1.03	0.08	0.05	(1.17)	(0.09)	(0.06)	(21)
Motorcycle	3.5	(17,983)	1.03	0.42	0.01	(40.95)	(16.65)	(0.40)	(514)
School Bus	0.1	(514)	1.03	0.08	0.05	(1.17)	(0.09)	(0.06)	(21)
Motor Home	1.0	(5,138)	1.03	0.11	0.14	(11.70)	(1.25)	(1.59)	(529)
Total NV Emissions						(1,170)	(110)	(126)	(42,483)

^a CH₄ and N₂O Emission factors, in grams per mile, from Table C.4, [General Reporting Protocol](#), California Climate Action Registry, March 2007; CO₂ emissions factors are fleet average gram per mile factors from the Mobile 6 and Emfac 2007 models for NV and CA, respectively.

^b Global Warming Potential, used to convert CH₄ and N₂O emissions to CO₂ equivalent (CO₂e) is 21 for CH₄ and 310 for N₂O; [General Reporting Protocol](#), California Climate Action Registry, March 2007.

Yr_2013_DEMU_Mobile-source GHG Emissions

California VMT					
	Length (miles)	2013 Daily Trips		2030 Daily Trips	
Segment		EMU	DEMU	EMU	DEMU
1	31.5	(11,563)	(9,363)	(27,860)	(21,960)
2	112.0	(11,450)	(9,250)	(27,860)	(21,960)
Seg-1 VMT		(364,250)	(294,950)	(877,590)	(691,740)
Seg-2 VMT		(1,282,400)	(1,036,000)	(3,120,320)	(2,459,520)
Project-related CA VMT		(1,646,650)	(1,330,950)	(3,997,910)	(3,151,260)
Nevada VMT					
	Length (miles)	2013 Daily Trips		2030 Daily Trips	
Segment		EMU	DEMU	EMU	DEMU
3	25.5	(15,734)	(13,534)	(27,860)	(21,960)
4	9.3	(20,338)	(18,138)	(27,860)	(21,960)
Seg-3 VMT		(401,215)	(345,115)	(710,430)	(559,980)
Seg-4 VMT		(189,140)	(168,680)	(259,098)	(204,228)
Project-related NV VMY		(590,355)	(513,795)	(969,528)	(764,208)

Year 2030 DEMU Alternative

Mobile-source GHG Emissions

Mobile Sources

California <u>Vehicle Type</u>	<u>Percent</u>	<u>VMT by Type</u>	<u>Emission Factors (grams/mile) ^a</u>			<u>Emissions from Mobile Sources (lbs/day)</u>			
	100	(3,151,260)	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O	CO ₂ e ^b
Light Auto	49.0	(1,544,117)	1.15	0.04	0.04	(3,928.06)	(136.17)	(136.17)	(49,000)
Light Truck < 3750 lbs	10.9	(343,487)	1.15	0.05	0.06	(873.79)	(37.86)	(45.44)	(15,754)
Light Truck 3751-5750 lbs	21.7	(683,823)	1.15	0.05	0.06	(1,739.57)	(75.38)	(90.45)	(31,363)
Med Truck 5751-8500 lbs	9.5	(299,370)	1.15	0.12	0.20	(761.56)	(79.20)	(132.00)	(43,345)
Lite-Heavy Truck 8501-10,000 lbs	1.6	(50,420)	1.15	0.12	0.20	(128.26)	(13.34)	(22.23)	(7,300)
Lite-Heavy Truck 10,001-14,000 lbs	0.6	(18,908)	1.15	0.12	0.20	(48.10)	(5.00)	(8.34)	(2,738)
Med-Heavy Truck 14,001-33,000 lbs	1.0	(31,513)	1.15	0.06	0.05	(80.16)	(4.17)	(3.47)	(1,245)
Heavy-Heavy Truck 33,001-60,000 lbs	0.9	(28,361)	1.15	0.06	0.05	(72.15)	(3.75)	(3.13)	(1,120)
Other Bus	0.1	(3,151)	1.15	0.06	0.05	(8.02)	(0.42)	(0.35)	(124)
Urban Bus	0.1	(3,151)	1.15	0.06	0.05	(8.02)	(0.42)	(0.35)	(124)
Motorcycle	3.5	(110,294)	1.15	0.09	0.01	(280.58)	(21.88)	(2.43)	(1,494)
School Bus	0.1	(3,151)	1.15	0.06	0.05	(8.02)	(0.42)	(0.35)	(124)
Motor Home	1.0	(31,513)	1.15	0.05	0.06	(80.16)	(3.47)	(4.17)	(1,445)
Total CA Emissions						(8,016)	(381)	(449)	(155,176)

Nevada <u>Vehicle Type</u>	<u>Percent</u>	<u>VMT by Type</u>	<u>Emission Factors (grams/mile) ^a</u>			<u>Emissions from Mobile Sources (lbs/day)</u>			
	100	(764,208)	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O	CO ₂ e ^b
Light Auto	49.0	(374,462)	1.03	0.04	0.04	(853.37)	(33.02)	(33.02)	(11,784)
Light Truck < 3750 lbs	10.9	(83,299)	1.03	0.05	0.06	(189.83)	(9.18)	(11.02)	(3,798)
Light Truck 3751-5750 lbs	21.7	(165,833)	1.03	0.05	0.06	(377.92)	(18.28)	(21.94)	(7,562)
Med Truck 5751-8500 lbs	9.5	(72,600)	1.03	0.12	0.20	(165.45)	(19.21)	(32.01)	(10,492)
Lite-Heavy Truck 8501-10,000 lbs	1.6	(12,227)	1.03	0.12	0.20	(27.87)	(3.23)	(5.39)	(1,767)
Lite-Heavy Truck 10,001-14,000 lbs	0.6	(4,585)	1.03	0.12	0.20	(10.45)	(1.21)	(2.02)	(663)
Med-Heavy Truck 14,001-33,000 lbs	1.0	(7,642)	1.03	0.06	0.05	(17.42)	(1.01)	(0.84)	(300)
Heavy-Heavy Truck 33,001-60,000 lbs	0.9	(6,878)	1.03	0.06	0.05	(15.67)	(0.91)	(0.76)	(270)
Other Bus	0.1	(764)	1.03	0.06	0.05	(1.74)	(0.10)	(0.08)	(30)
Urban Bus	0.1	(764)	1.03	0.06	0.05	(1.74)	(0.10)	(0.08)	(30)
Motorcycle	3.5	(26,747)	1.03	0.09	0.01	(60.96)	(5.31)	(0.59)	(355)
School Bus	0.1	(764)	1.03	0.06	0.05	(1.74)	(0.10)	(0.08)	(30)
Motor Home	1.0	(7,642)	1.03	0.05	0.06	(17.42)	(0.84)	(1.01)	(348)
Total NV Emissions						(1,742)	(93)	(109)	(37,429)

^a CH₄ and N₂O Emission factors, in grams per mile, from Table C.4, [General Reporting Protocol](#), California Climate Action Registry, March 2007; CO₂ emissions factors are fleet average gram per mile factors from the Mobile 6 and Emfac 2007 models for NV and CA, respectively.

^b Global Warming Potential, used to convert CH₄ and N₂O emissions to CO₂ equivalent (CO₂e) is 21 for CH₄ and 310 for N₂O; [General Reporting Protocol](#), California Climate Action Registry, March 2007.

Yr_2030_DEMU_Mobile-source GHG Emissions

California VMT					
	Length (miles)	2013 Daily Trips		2030 Daily Trips	
Segment		EMU	DEMU	EMU	DEMU
1	31.5	(11,563)	(9,363)	(27,860)	(21,960)
2	112.0	(11,450)	(9,250)	(27,860)	(21,960)
Seg-1 VMT		(364,250)	(294,950)	(877,590)	(691,740)
Seg-2 VMT		(1,282,400)	(1,036,000)	(3,120,320)	(2,459,520)
Project-related CA VMT		(1,646,650)	(1,330,950)	(3,997,910)	(3,151,260)
Nevada VMT					
	Length (miles)	2013 Daily Trips		2030 Daily Trips	
Segment		EMU	DEMU	EMU	DEMU
3	25.5	(15,734)	(13,534)	(27,860)	(21,960)
4	9.3	(20,338)	(18,138)	(27,860)	(21,960)
Seg-3 VMT		(401,215)	(345,115)	(710,430)	(559,980)
Seg-4 VMT		(189,140)	(168,680)	(259,098)	(204,228)
Project-related NV VMY		(590,355)	(513,795)	(969,528)	(764,208)

EMU Criteria Pollutant and GHG Emissions

Analysis Year	Total Electricity Usage		Criteria Pollutant Emissions (pounds/day)						GHG Emissions (pounds/day)			
	<u>(KWh\year)</u>	<u>(MWh\Day)</u>	<u>CO</u> <u>0.2</u>	<u>ROC</u> <u>0.01</u>	<u>NOx</u> <u>1.15</u>	<u>PM10</u> <u>0.04</u>	<u>PM2.5</u> <u>0.0368</u>	<u>SOx</u> <u>0.12</u>	<u>CO₂</u> <u>804.54</u>	<u>CH₄</u> <u>0.0067</u>	<u>N₂O</u> <u>0.0037</u>	<u>CO₂e</u>
Year 2013	161,305,390	441.933	88	4	508	18	16	53	355,552	3	2	356,122
Year 2030	255,308,070	699.474	140	7	804	28	26	84	562,755	5	3	563,656
			Tons/Year Emissions						Metric Tons/Year Emissions			
Year 2013			16.1	0.8	92.8	3.2	3.0	9.7	58,866	0.5	0.3	58,960
	CA Portion		13	1	75	3	2	8	47,387	0	0	47,463
	NV Portion		3	0	18	1	1	2	11,479	0	0	11,497
Year 2030			25.5	1.3	146.8	5.1	4.7	15.3	93,170	0.8	0.4	93,320
	CA Portion		21	1	118	4	4	12	75,002	1	0	75,122
	NV Portion		5	0	29	1	1	3	18,168	0	0	18,197

Year 2013 EMU Alternative

Mobile-source GHG Emissions

Mobile Sources

California <u>Vehicle Type</u>	<u>Percent</u>	<u>VMT by Type</u>	<u>Emission Factors (grams/mile) ^a</u>			<u>Emissions from Mobile Sources (lbs/day)</u>			
	100	(1,646,650)	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O	CO ₂ e ^b
Light Auto	49.0	(806,858)	1.14	0.06	0.08	(2,026.86)	(106.73)	(142.31)	(48,383)
Light Truck < 3750 lbs	10.9	(179,485)	1.14	0.11	0.14	(450.87)	(43.53)	(55.40)	(18,538)
Light Truck 3751-5750 lbs	21.7	(357,323)	1.14	0.11	0.14	(897.61)	(86.65)	(110.29)	(36,906)
Med Truck 5751-8500 lbs	9.5	(156,432)	1.14	0.12	0.20	(392.96)	(41.38)	(68.97)	(22,644)
Lite-Heavy Truck 8501-10,000 lbs	1.6	(26,346)	1.14	0.12	0.20	(66.18)	(6.97)	(11.62)	(3,814)
Lite-Heavy Truck 10,001-14,000 lbs	0.6	(9,880)	1.14	0.12	0.20	(24.82)	(2.61)	(4.36)	(1,430)
Med-Heavy Truck 14,001-33,000 lbs	1.0	(16,466)	1.14	0.08	0.05	(41.36)	(2.90)	(1.82)	(665)
Heavy-Heavy Truck 33,001-60,000 lbs	0.9	(14,820)	1.14	0.08	0.05	(37.23)	(2.61)	(1.63)	(599)
Other Bus	0.1	(1,647)	1.14	0.08	0.05	(4.14)	(0.29)	(0.18)	(67)
Urban Bus	0.1	(1,647)	1.14	0.08	0.05	(4.14)	(0.29)	(0.18)	(67)
Motorcycle	3.5	(57,633)	1.14	0.42	0.01	(144.78)	(53.36)	(1.27)	(1,659)
School Bus	0.1	(1,647)	1.14	0.08	0.05	(4.14)	(0.29)	(0.18)	(67)
Motor Home	1.0	(16,466)	1.14	0.11	0.14	(41.36)	(3.99)	(5.08)	(1,701)
Total CA Emissions						(4,136)	(352)	(403)	(136,538)

Nevada <u>Vehicle Type</u>	<u>Percent</u>	<u>VMT by Type</u>	<u>Emission Factors (grams/mile) ^a</u>			<u>Emissions from Mobile Sources (lbs/day)</u>			
	100	(590,355)	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O	CO ₂ e ^b
Light Auto	49.0	(289,274)	1.03	0.06	0.08	(658.68)	(38.26)	(51.02)	(17,278)
Light Truck < 3750 lbs	10.9	(64,349)	1.03	0.11	0.14	(146.52)	(15.61)	(19.86)	(6,631)
Light Truck 3751-5750 lbs	21.7	(128,107)	1.03	0.11	0.14	(291.70)	(31.07)	(39.54)	(13,201)
Med Truck 5751-8500 lbs	9.5	(56,084)	1.03	0.12	0.20	(127.70)	(14.84)	(24.73)	(8,105)
Lite-Heavy Truck 8501-10,000 lbs	1.6	(9,446)	1.03	0.12	0.20	(21.51)	(2.50)	(4.16)	(1,365)
Lite-Heavy Truck 10,001-14,000 lbs	0.6	(3,542)	1.03	0.12	0.20	(8.07)	(0.94)	(1.56)	(512)
Med-Heavy Truck 14,001-33,000 lbs	1.0	(5,904)	1.03	0.08	0.05	(13.44)	(1.04)	(0.65)	(237)
Heavy-Heavy Truck 33,001-60,000 lbs	0.9	(5,313)	1.03	0.08	0.05	(12.10)	(0.94)	(0.59)	(213)
Other Bus	0.1	(590)	1.03	0.08	0.05	(1.34)	(0.10)	(0.07)	(24)
Urban Bus	0.1	(590)	1.03	0.08	0.05	(1.34)	(0.10)	(0.07)	(24)
Motorcycle	3.5	(20,662)	1.03	0.42	0.01	(47.05)	(19.13)	(0.46)	(590)
School Bus	0.1	(590)	1.03	0.08	0.05	(1.34)	(0.10)	(0.07)	(24)
Motor Home	1.0	(5,904)	1.03	0.11	0.14	(13.44)	(1.43)	(1.82)	(608)
Total NV Emissions						(1,344)	(126)	(145)	(48,813)

^a CH₄ and N₂O Emission factors, in grams per mile, from Table C.4, [General Reporting Protocol](#), California Climate Action Registry, March 2007; CO₂ emissions factors are fleet average gram per mile factors from the Mobile 6 and Emfac 2007 models for NV and CA, respectively.

^b Global Warming Potential, used to convert CH₄ and N₂O emissions to CO₂ equivalent (CO₂e) is 21 for CH₄ and 310 for N₂O; [General Reporting Protocol](#), California Climate Action Registry, March 2007.

Yr_2013_EMU_Mobile-source GHG Emissions

California VMT					
	Length (miles)	2013 Daily Trips		2030 Daily Trips	
Segment		EMU	DEMU	EMU	DEMU
1	31.5	(11,563)	(9,363)	(27,860)	(21,960)
2	112.0	(11,450)	(9,250)	(27,860)	(21,960)
Seg-1 VMT		(364,250)	(294,950)	(877,590)	(691,740)
Seg-2 VMT		(1,282,400)	(1,036,000)	(3,120,320)	(2,459,520)
Project-related CA VMT		(1,646,650)	(1,330,950)	(3,997,910)	(3,151,260)
Nevada VMT					
	Length (miles)	2013 Daily Trips		2030 Daily Trips	
Segment		EMU	DEMU	EMU	DEMU
3	25.5	(15,734)	(13,534)	(27,860)	(21,960)
4	9.3	(20,338)	(18,138)	(27,860)	(21,960)
Seg-3 VMT		(401,215)	(345,115)	(710,430)	(559,980)
Seg-4 VMT		(189,140)	(168,680)	(259,098)	(204,228)
Project-related NV VMY		(590,355)	(513,795)	(969,528)	(764,208)

Year 2030 EMU Alternative

Mobile-source GHG Emissions

Mobile Sources

California <u>Vehicle Type</u>	<u>Percent</u>	<u>VMT by Type</u>	<u>Emission Factors (grams/mile) ^a</u>			<u>Emissions from Mobile Sources (lbs/day)</u>			
	100	(3,997,910)	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O	CO ₂ e ^b
Light Auto	49.0	(1,958,976)	1.15	0.04	0.04	(4,983.41)	(172.75)	(172.75)	(62,164)
Light Truck < 3750 lbs	10.9	(435,772)	1.15	0.05	0.06	(1,108.56)	(48.04)	(57.64)	(19,987)
Light Truck 3751-5750 lbs	21.7	(867,546)	1.15	0.05	0.06	(2,206.94)	(95.63)	(114.76)	(39,790)
Med Truck 5751-8500 lbs	9.5	(379,801)	1.15	0.12	0.20	(966.17)	(100.48)	(167.46)	(54,990)
Lite-Heavy Truck 8501-10,000 lbs	1.6	(63,967)	1.15	0.12	0.20	(162.72)	(16.92)	(28.20)	(9,261)
Lite-Heavy Truck 10,001-14,000 lbs	0.6	(23,987)	1.15	0.12	0.20	(61.02)	(6.35)	(10.58)	(3,473)
Med-Heavy Truck 14,001-33,000 lbs	1.0	(39,979)	1.15	0.06	0.05	(101.70)	(5.29)	(4.41)	(1,579)
Heavy-Heavy Truck 33,001-60,000 lbs	0.9	(35,981)	1.15	0.06	0.05	(91.53)	(4.76)	(3.97)	(1,421)
Other Bus	0.1	(3,998)	1.15	0.06	0.05	(10.17)	(0.53)	(0.44)	(158)
Urban Bus	0.1	(3,998)	1.15	0.06	0.05	(10.17)	(0.53)	(0.44)	(158)
Motorcycle	3.5	(139,927)	1.15	0.09	0.01	(355.96)	(27.76)	(3.08)	(1,895)
School Bus	0.1	(3,998)	1.15	0.06	0.05	(10.17)	(0.53)	(0.44)	(158)
Motor Home	1.0	(39,979)	1.15	0.05	0.06	(101.70)	(4.41)	(5.29)	(1,834)
Total CA Emissions						(10,170)	(484)	(569)	(196,868)

Nevada <u>Vehicle Type</u>	<u>Percent</u>	<u>VMT by Type</u>	<u>Emission Factors (grams/mile) ^a</u>			<u>Emissions from Mobile Sources (lbs/day)</u>			
	100	(969,528)	CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O	CO ₂ e ^b
Light Auto	49.0	(475,069)	1.03	0.04	0.04	(1,082.65)	(41.89)	(41.89)	(14,950)
Light Truck < 3750 lbs	10.9	(105,679)	1.03	0.05	0.06	(240.83)	(11.65)	(13.98)	(4,819)
Light Truck 3751-5750 lbs	21.7	(210,388)	1.03	0.05	0.06	(479.46)	(23.19)	(27.83)	(9,594)
Med Truck 5751-8500 lbs	9.5	(92,105)	1.03	0.12	0.20	(209.90)	(24.37)	(40.61)	(13,311)
Lite-Heavy Truck 8501-10,000 lbs	1.6	(15,512)	1.03	0.12	0.20	(35.35)	(4.10)	(6.84)	(2,242)
Lite-Heavy Truck 10,001-14,000 lbs	0.6	(5,817)	1.03	0.12	0.20	(13.26)	(1.54)	(2.56)	(841)
Med-Heavy Truck 14,001-33,000 lbs	1.0	(9,695)	1.03	0.06	0.05	(22.09)	(1.28)	(1.07)	(380)
Heavy-Heavy Truck 33,001-60,000 lbs	0.9	(8,726)	1.03	0.06	0.05	(19.89)	(1.15)	(0.96)	(342)
Other Bus	0.1	(970)	1.03	0.06	0.05	(2.21)	(0.13)	(0.11)	(38)
Urban Bus	0.1	(970)	1.03	0.06	0.05	(2.21)	(0.13)	(0.11)	(38)
Motorcycle	3.5	(33,933)	1.03	0.09	0.01	(77.33)	(6.73)	(0.75)	(451)
School Bus	0.1	(970)	1.03	0.06	0.05	(2.21)	(0.13)	(0.11)	(38)
Motor Home	1.0	(9,695)	1.03	0.05	0.06	(22.09)	(1.07)	(1.28)	(442)
Total NV Emissions						(2,209)	(117)	(138)	(47,485)

^a CH₄ and N₂O Emission factors, in grams per mile, from Table C.4, [General Reporting Protocol](#), California Climate Action Registry, March 2007; CO₂ emissions factors are fleet average gram per mile factors from the Mobile 6 and Emfac 2007 models for NV and CA, respectively.

^b Global Warming Potential, used to convert CH₄ and N₂O emissions to CO₂ equivalent (CO₂e) is 21 for CH₄ and 310 for N₂O; [General Reporting Protocol](#), California Climate Action Registry, March 2007.

Yr_2030_EMU_Mobile-source GHG Emissions

California VMT					
	Length (miles)	2013 Daily Trips		2030 Daily Trips	
Segment		EMU	DEMU	EMU	DEMU
1	31.5	(11,563)	(9,363)	(27,860)	(21,960)
2	112.0	(11,450)	(9,250)	(27,860)	(21,960)
Seg-1 VMT		(364,250)	(294,950)	(877,590)	(691,740)
Seg-2 VMT		(1,282,400)	(1,036,000)	(3,120,320)	(2,459,520)
Project-related CA VMT		(1,646,650)	(1,330,950)	(3,997,910)	(3,151,260)
Nevada VMT					
	Length (miles)	2013 Daily Trips		2030 Daily Trips	
Segment		EMU	DEMU	EMU	DEMU
3	25.5	(15,734)	(13,534)	(27,860)	(21,960)
4	9.3	(20,338)	(18,138)	(27,860)	(21,960)
Seg-3 VMT		(401,215)	(345,115)	(710,430)	(559,980)
Seg-4 VMT		(189,140)	(168,680)	(259,098)	(204,228)
Project-related NV VMY		(590,355)	(513,795)	(969,528)	(764,208)