

APPENDIX F
AIR QUALITY

Past planning documents identified a “Chicago to Omaha” corridor, so for the purposes of this appendix, the corridor reference will remain as previously designated; however, the project name includes “Council Bluffs” in the title.

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Build Alternative Emission Calculations													
Pollutant	Additional passenger train emissions			Automobile Emissions Diverted			Airline Emissions Diverted			Bus Emissions Diverted			Net Change (ton/yr)
	Emission Factor ^{[1],[4]} (g/gal) (lb/gal) CO2	Emissions Added (lb/yr)	Emissions Added (ton/yr)	Emission Factor ^[2] (g/mile) (lb/gal) CO2	Emissions Diverted (lb/yr)	Emissions Diverted (ton/yr)	Emission Factor ^{[3],[4]} (g/kg) (lb/gal) CO2	Emissions Diverted (lb/yr)	Emissions Diverted (ton/yr)	Emission Factor ^[2] (g/mile) (lb/gal) CO2	Emissions Diverted (lb/yr)	Emissions Diverted (ton/yr)	
Hydrocarbons	5.8	146,911	73.46	0.4272	245,782	122.89	0.7	1,129	0.56	0.1581	90,938	45.47	-95.47
Carbon monoxide (CO)	38.1	965,054	482.53	3.3467	1,925,529	962.76	4.4	7,096	3.55	1.2706	731,020	365.51	-849.30
Nitrogen oxides (NO _x)	131	3,318,166	1,659.08	3.4469	1,983,165	991.58	14.1	22,739	11.37	1.2978	746,697	373.35	282.78
PM ₁₀	3.4	86,120	43.06	0.1698	97,702	48.85				0.0644	37,036	18.52	-24.31
PM _{2.5}	3.298	83,537	41.77	0.1411	81,190	40.60				0.0545	31,384	15.69	-14.52
SO ₂ ^[5]	0.096	2,432	1.22	0.0071	4,093	2.05	0.4	645	0.32	0.0024	1,376	0.69	-1.84
Carbon dioxide ^[4] (CO ₂)	22.377	257,326,517	128,663.26	17.681	212,216,475	106,108.24	21.098	5,149,656	2,575	22.377	71,608,494	35,804.25	-15,824.05

^[1] Except CO₂, emission factors from EPA document EPA420-F-09-025; Emission Factors for Locomotives; Dated April 2009. Emission factors are projected calendar year 2015 emission factors for passenger/commuter locomotives (Tier 4).

^[2] Emission factors from data output from EPA Moves2010b model run for 2015.

^[3] Except CO₂, emission factors from US Department of Transportation Federal Highway Administration document "Assessing the Effects of Freight Movement on Air Quality at the National and Regional Level; Final Report; April 2005". Emission factors are projected for 2015.

^[4] CO₂ Emission factors from US Department of Transportation Energy Information Administration Voluntary Reporting of Greenhouse Gases Program - Coefficients webpage. Emission factors are in units of lb/gal.

^[5] Train SO₂ emission factor calculated based on 15 ppm (weight basis) diesel fuel sulfur content: (15 ppm S/1,000,000) x (7.05 lb/gal) x (454 g/lb) x (2 lb SO₂/lb S) = 0.096 g/gal

Chicago to Omaha Intercity Passenger Rail Service - Estimate of Diverted Trips		
Service C	Quantity	Source
Total Annual Ridership	1,294,000	AECOM Ridership Forecast 9/17/12
New Trips from induced growth	128,500	AECOM Ridership Forecast 9/17/12
Amount of Diverted Trips	1,165,500	AECOM Ridership Forecast 9/17/12
Auto Percent of Diverted Trips	78.9%	919,500
Bus Percent of Diverted Trips	18.7%	218,500
Air Percent of Diverted Trips	2.4%	27,500
Auto		
Auto miles one way	473	miles - Google Earth Pro
Nationwide % passenger cars	60.3%	Percent ^a
Nationwide % passenger trucks	39.7%	Percent ^a
Average passenger car energy intensity	3,538	Btu/passenger mile
Average passenger truck energy intensity	3,663	Btu/passenger mile
Average passengers per car	1.55	passengers/vehicle ^a
Average passengers per truck	1.84	passengers/vehicle ^a
Total diverted auto passenger miles per year	434,924,000	passenger-miles/year
Annual diverted auto fuel consumption	1,560,327	MMBtu/yr
Gasoline heating value	130,000	Btu/gal - USEPA AP-42 Appendix A
Annual auto fuel consumption diverted	12,002,515	gallons per year
Annual auto miles diverted	261,209,725	miles per year
Bus		
Intercity passenger bus energy intensity ^a	4,242	Btu/passenger mile
One-way distance	473	miles - Google Earth Pro
Total diverted bus passenger miles per year	103,350,500	passenger-miles/year
Annual diverted bus fuel consumption	438,413	MMBtu/yr
Diesel fuel heating value	137,000	Btu/gal - USEPA AP-42 Appendix A
Annual diverted bus fuel consumption	3,200,094	gallons per year
Train		
Intercity passenger train energy intensity ^a	2,435	Btu/passenger mile
One-way distance	500	miles
Total new train passenger miles per year	647,000,000	passenger-miles/year
Annual new passenger train fuel consumption	1,575,445	MMBtu/yr
Diesel fuel heating value	137,000	Btu/gal - USEPA AP-42 Appendix A
Annual new passenger train fuel consumption	11,499,599	gallons per year
Air		
Air transportation energy intensity ^a	2,826	Btu/passenger mile
One-way distance	424	miles - Google Earth Pro
Total diverted air passenger miles per year	11,660,000	passenger-miles/year
Jet fuel heating value	135,000	Btu/gal ^a
Jet fuel density	6.60	lb/gal
Annual air fuel consumption diverted	32,951	MMBtu/yr
Annual air fuel consumption diverted	244,083	gal/yr
Annual air fuel consumption diverted	731,369	kg/yr

^a US Department of Energy Transportation Energy Data Book: Edition 30-2011.

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