

Appendix J

Detailed Emissions Calculations

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Dairyland Power Cooperative
Wabasha Relcoation Project
Appendix G: Construction Emission Calculations
Summary

Description	Emissions (tons per year)					
	Criteria Pollutants					
	NOx	CO	VOC	SO ₂	PM ₁₀	PM _{2.5}
Off-Road Engine Emissions	40.71	8.72	2.86	0.02	1.51	1.51
Unpaved Roads	--	--	--	--	4.77	0.48
Commuters and Delivery Vehicles	19.50	3.79	0.75	0.01	0.59	0.59
Earthmoving	--	--	--	--	12.18	1.29
TOTAL	60.20	12.51	3.61	0.03	19.05	3.86

Dairyland Power Cooperative
Wabasha Relcoation Project
Appendix G: Construction Emission Calculations
Emission Factors for Construction Engines

Equipment	Quantity ^a	Hours per Day	Days per Week	Number of Weeks	Total Hours Used ^b	Max Power (HP)	Load Factor ^c	Loaded Power (HP)	VOC	CO	Emission Factors ^{d,e} (g/hp hr)			
											NOx	PM ₁₀	PM _{2.5}	SO ₂
Air Compressor	1	10	6	21	1,260	80	1	80	0.367	2.366	4.700	0.240	0.240	0.002
ATV	4	10	6	56	13,440	20	0.5	10	0.438	2.161	4.440	0.267	0.267	0.002
Backhoe - line	2	10	6	16	1,920	75	0.8	60	0.367	2.366	4.700	0.240	0.240	0.002
Backhoe - substation	1	10	6	8	480	75	0.8	60	0.367	2.366	4.700	0.240	0.240	0.002
Bulldozer - line	2	10	6	16	1,920	250	1	250	0.309	0.748	4.000	0.132	0.132	0.002
Bulldozer - substation	1	10	6	8	480	250	1	250	0.309	0.748	4.000	0.132	0.132	0.002
Compactor - line	1	10	6	16	960	300	1	300	0.167	0.843	4.335	0.132	0.132	0.002
Compactor - substation	1	10	6	8	480	300	1	300	0.167	0.843	4.335	0.132	0.132	0.002
Compactor, Vibratory - line	1	10	6	16	960	100	1	100	0.338	0.867	4.100	0.180	0.180	0.002
Compactor, Vibratory - substation	1	10	6	8	480	100	1	100	0.338	0.867	4.100	0.180	0.180	0.002
Fork Lift - line	1	4	6	21	504	120	1	120	0.167	0.843	4.335	0.132	0.132	0.002
Fork Lift - substation	1	4	6	8	192	120	1	120	0.167	0.843	4.335	0.132	0.132	0.002
Concrete Mixer Truck	2	6	3	8	288	325	1	325	0.338	0.867	4.100	0.180	0.180	0.002
Concrete Pump	1	10	1	2	20	300	1	300	0.338	0.867	4.100	0.180	0.180	0.002
Dump Truck - line	3	10	6	41	7,380	325	0.8	260	0.338	0.867	4.100	0.180	0.180	0.002
Dump Truck - substation	1	10	6	8	480	325	0.8	260	0.338	0.867	4.100	0.180	0.180	0.002
Excavator - line	2	10	6	11	1,320	138	1	138	0.309	0.748	4.000	0.132	0.132	0.002
Excavator - substation	1	10	6	8	480	138	1	138	0.309	0.748	4.000	0.132	0.132	0.002
Front End Loader - line	2	10	6	16	1,920	196	1	196	0.309	0.748	4.000	0.132	0.132	0.002
Front End Loader - substation	1	10	6	8	480	196	1	196	0.309	0.748	4.000	0.132	0.132	0.002
Generator	2	10	6	51	6,120	250	0.5	125	0.167	0.843	4.335	0.132	0.132	0.002
Guided Bore Machine	0	0	0	0	0	150	0.8	120	0.637	2.366	4.700	0.240	0.240	0.002
Light Tower	1	4	6	6	144	50	1	50	0.309	0.748	4.000	0.132	0.132	0.002
Manlift	2	8	6	21	2,016	50	1	50	0.338	0.867	4.100	0.180	0.180	0.002
Pickup Truck	10	6	6	56	20,160	150	0.25	38	0.167	0.843	4.335	0.132	0.132	0.002
Piping Truck	2	10	6	18	2,160	300	1	300	0.309	0.748	4.000	0.132	0.132	0.002
Skid steer loader	8	8	6	41	15,744	50	1	50	0.309	0.748	4.000	0.132	0.132	0.002
Water truck	1	6	6	13	468	100	0.5	50	0.637	2.366	4.700	0.240	0.240	0.002
Welding machine	1	8	6	11	528	35	0.8	28	0.367	2.366	4.700	0.240	0.240	0.002
Grader	2	10	6	11	1,320	35	0.8	28	0.438	2.161	4.44	0.267	0.259	0.002
Large Crane	1	8	2	2	32	15	0.21	3	0.438	2.161	4.44	0.267	0.259	0.002
Medium Crane	4	6	6	16	2,304	450	0.7	315	0.3085	0.7475	4.0	0.132	0.128	0.002
Fuel Truck	1	2	2	39	156	200	0.59	118	0.3085	0.7475	4.0	0.132	0.128	0.002
Hydrovac Truck	1	4	3	16	192	200	0.59	118	0.3085	0.7475	4.0	0.132	0.128	0.002
Road Bore Machine	0	0	0	0	0	260	0.79	205	0.3085	0.7475	4.0	0.132	0.128	0.002
6-inch Water Pump	0	0	0	0	0	30	0.69	21	0.438	2.161	4.44	0.267	0.259	0.002
4-inch Water Pump	1	10	6	8	480	10	0.69	7	0.438	2.161	4.44	0.267	0.259	0.002
2-inch Water Pump	0	0	0	0	0	5	0.69	3	0.438	2.161	4.44	0.267	0.259	0.002
Pile Driver	0	0	0	0	0	49	1	49	0.2789	1.5323	4.7279	0.3389	0.3389	0.002
100 HP Tractor	1	10	3	6	180	100	0.21	100	0.338	0.867	4.1	0.18	0.18	0.002
Semitruck/Trailer	4	10	4	51	8,160	500	0.59	500	0.167	0.843	4.335	0.132	0.132	0.002
Boom Truck	5	8	6	41	9,840	50	1	50	0.338	0.867	4.1	0.18	0.18	0.002
Bucket Truck	6	10	6	31	11,160	50	1	50	0.338	0.867	4.1	0.18	0.18	0.002

^a Equipment counts based on experience with construction of a similar projects.

^b Generally assumes work will occur 7 am - 7 pm, Monday through Saturday, for a total of 72 work hours per week over 20 weeks

^c Load Factors from Appendix A of EPA 420_P 04 005, Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling , USEPA, April 2004.

^d EPA 420 P 04 009, Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling Compression Ignition, USEPA, April 2004 Tier 2 Engines.

^e GHG emission factors from Title 40 Subchapter C Part 98 Subpart C Table C-1 and C-2 to Subpart C.

Assumption:

393.5 hp-hr/MMBtu
453.6 g/lb

Dairyland Power Cooperative
Wabasha Relcoation Project
Appendix G: Construction Emission Calculations
Emission Estimates from Construction Engines

Equipment	Potential Emissions (ton/yr)					
	VOC	CO	NOx	PM ₁₀	PM _{2.5}	SO ₂
Air Compressor	4.08E-02	0.263	0.522	0.027	0.027	0.000
ATV	6.49E-02	0.320	0.658	0.039	0.039	0.000
Backhoe - line	4.66E-02	0.300	0.597	0.030	0.030	0.000
Backhoe - substation	1.17E-02	0.075	0.149	0.008	0.008	0.000
Bulldozer - line	1.63E-01	0.396	2.116	0.070	0.070	0.001
Bulldozer - substation	4.08E-02	0.099	0.529	0.017	0.017	0.000
Compactor - line	5.30E-02	0.267	1.376	0.042	0.042	0.001
Compactor - substation	2.65E-02	0.134	0.688	0.021	0.021	0.000
Compactor, Vibratory - line	3.58E-02	0.092	0.434	0.019	0.019	0.000
Compactor, Vibratory - substation	1.79E-02	0.046	0.217	0.010	0.010	0.000
Fork Lift - line	1.11E-02	0.056	0.289	0.009	0.009	0.000
Fork Lift - substation	4.24E-03	0.021	0.110	0.003	0.003	0.000
Concrete Mixer Truck	3.49E-02	0.089	0.423	0.019	0.019	0.000
Concrete Pump	2.24E-03	0.006	0.027	0.001	0.001	0.000
Dump Truck - line	7.16E-01	1.833	8.672	0.381	0.381	0.004
Dump Truck - substation	4.66E-02	0.119	0.564	0.025	0.025	0.000
Excavator - line	6.19E-02	0.150	0.803	0.026	0.026	0.000
Excavator - substation	2.25E-02	0.055	0.292	0.010	0.010	0.000
Front End Loader - line	1.28E-01	0.310	1.659	0.055	0.055	0.001
Front End Loader - substation	3.20E-02	0.078	0.415	0.014	0.014	0.000
Generator	1.41E-01	0.710	3.656	0.111	0.111	0.002
Guided Bore Machine	0.00E+00	0.000	0.000	0.000	0.000	0.000
Light Tower	2.45E-03	0.006	0.032	0.001	0.001	0.000
Manlift	3.76E-02	0.096	0.456	0.020	0.020	0.000
Pickup Truck	1.39E-01	0.702	3.613	0.110	0.110	0.002
Piping Truck	2.20E-01	0.534	2.857	0.094	0.094	0.001
Skid steer loader	2.68E-01	0.649	3.471	0.114	0.114	0.002
Water truck	1.64E-02	0.061	0.121	0.006	0.006	0.000
Welding machine	5.98E-03	0.039	0.077	0.004	0.004	0.000
Grader	1.78E-02	0.088	0.181	0.011	0.011	0.000
Large Crane	4.87E-05	0.000	0.000	0.000	0.000	0.000
Medium Crane	2.47E-01	0.598	3.200	0.106	0.102	0.002
Fuel Truck	6.26E-03	0.015	0.081	0.003	0.003	0.000
Hydrovac Truck	7.70E-03	0.019	0.100	0.003	0.003	0.000
Road Bore Machine	0.00E+00	0.000	0.000	0.000	0.000	0.000
6-inch Water Pump	0.00E+00	0.000	0.000	0.000	0.000	0.000
4-inch Water Pump.	1.60E-03	0.008	0.016	0.001	0.001	0.000
2-inch Water Pump	0.00E+00	0.000	0.000	0.000	0.000	0.000
Pile Driver	0.00E+00	0.000	0.000	0.000	0.000	0.000
100 HP Tractor	6.71E-03	0.017	0.081	0.004	0.004	0.000
Semitruck/Trailer	7.51E-01	3.791	19.496	0.594	0.594	0.009
Boom Truck	1.83E-01	0.470	2.224	0.098	0.098	0.001
Bucket Truck	2.08E-01	0.533	2.522	0.111	0.111	0.001
TOTAL	3.61	12.51	60.20	2.10	2.10	0.03

Global Warming Potentials		
CO ₂	CH ₄	N ₂ O
1	25	298

Source: Title 40 Part 98 Table A-1.

Dairyland Power Cooperative
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Appendix G: Construction Emission Calculations
Fugitive Dust Emissions from Unpaved Roads

Equipment	Quantity ^a	Total Days		W	Emission Factor (lb/VMT) ^c		Emissions (ton/yr)	
		Used	VMT ^b		PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
ATV	4	1,344	672	20	1.73	0.17	0.58	0.06
Backhoe - line	2	192	96	50	2.62	0.26	0.13	0.01
Backhoe - substation	1	48	24	51	2.64	0.26	0.03	0.00
Bulldozer - line	2	192	96	20	1.73	0.17	0.08	0.01
Bulldozer - substation	1	48	24	21	1.77	0.18	0.02	0.00
Fork Lift - line	1	126	63	20	1.73	0.17	0.05	0.01
Fork Lift - substation	1	48	24	21	1.77	0.18	0.02	0.00
Concrete Mixer Truck	2	48	24	20	1.73	0.17	0.02	0.00
Dump Truck - line	3	738	369	21	1.77	0.18	0.33	0.03
Dump Truck - substation	1	48	24	22	1.81	0.18	0.02	0.00
Excavator - line	2	132	66	22	1.81	0.18	0.06	0.01
Excavator - substation	1	48	24	23	1.85	0.18	0.02	0.00
Front End Loader - line	2	192	96	23	1.85	0.18	0.09	0.01
Front End Loader - substation	1	48	24	24	1.88	0.19	0.02	0.00
Boom Truck	5	1,230	615	24	1.88	0.19	0.58	0.06
Pickup Truck	10	3,360	1,680	24	1.88	0.19	1.58	0.16
Piping Truck	2	216	108	25	1.92	0.19	0.10	0.01
Skid steer loader	8	1,968	984	26	1.95	0.20	0.96	0.10
Water truck	1	78	39	20	1.73	0.17	0.03	0.00
Welding Machine	1	66	33	20	1.73	0.17	0.03	0.00
Grader	2	132	66	20	1.73	0.17	0.06	0.01
Large Crane	1	4	2	50	2.62	0.26	0.00	0.00
Medium Crane	4	384	192	25	1.92	0.19	0.18	0.02
Semitruck/Trailer	4	816	408	25	1.92	0.19	0.39	0.04
Bucket Truck	6	1,116	558	24	1.88	0.19	0.53	0.05
4-inch Water Pump	1	48	24	25	1.92	0.19	0.02	0.00
TOTAL	--	--	--	--	--	--	4.77	0.48

^a Equipment counts are estimated based current construction plan.

^b Each vehicle is assumed to travel 0.5 mile per day on site.

^c AP-42 Section 13.2.2 Unpaved Roads, dated November 2006, Equations 1a and 2 TOTALS 11.19 1.12 Surface Silt content based on Table 13.2.2 1 construction sites.

Eq 1a: $E = k * (s/12)^a * (W/3)^b$

Eq 2: $E_{ext} = E * [(365-P)/365]$

where:

VMT = Vehicle Miles Traveled

W = Mean Vehicle Weight, tons

S = Mean Vehicle Speed, mph

P = 120 days with at least 0.01 inches rain, EPA's AP-42 Figure 13.2.2-1

s = 8.5 surface material silt content (%) for construction sites, EPA's AP-42 Table 13.2.2-1

E = size-specific emission factor, lb/ VMT

E_{ext} = annual size-specific emission factor extrapolated for natural migration, lb/VMT

Constants	PM	PM ₁₀	PM _{2.5}
k (lb/VMT)	4.9	1.5	0.15
a	0.7	0.9	0.9
b	0.45	0.45	0.45

Miles traveled per day 0.5 0.5

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Appendix G: Construction Emission Calculations
Fugitive Dust Emissions from Earthmoving Activities

Summary of Fugitive Dust Emissions From Earthmoving Activities							
Construction Activity	Daily Material Handling		Average Exposed Area (acres)	Emission Factors ^{a - c} (lb/ton)		Emissions (ton)	
	Construction Rate	Handling Time		PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
	(ton/day)	(days)					
Topsoil removed by scraper ^d	903.4	384	---	0.058	0.0061	10.06	1.06
Topsoil replacement	903.4	384	---	0.012	0.0013	2.08	0.23
Wind erosion of exposed areas	--	384	172.01	0.38	0.03999	0.03	0.00
TOTAL						12.18	1.29

Notes and Assumptions:

^a As worst case, PM₁₀ is set equal to Total Particulate Matter. PM_{2.5} is set to 0.105 times PM₁₀ per Table 11.9 1.

^b Emission factor: AP 42 Section 11.9 Western Surface Coal Mining, Table 11.9 4, July 1998, topsoil removal by scraper.

^c Wind Erosion Exposed Areas emission factor: AP 42 Section 11.9 Western Surface Coal Mining, Table 11.9 4, July 1998, wind erosion of exposed areas (ton/year/acre).

^d Assumes the entire workspace is cleared to 1 foot deep, 1.25 tons per cubic yard, for the entire duration of the project. This is highly conservative, as only areas required for construction will be disturbed.

Construction Schedule		
Work Days per week	6	Monday through Saturday
Weeks	64	
Total Days	384	

Topsoil Removed by Scraper				
Facility	Total ^a	Soil Volume ^b	Soil Weight ^c	Daily Material Handling Rate
	(Acres)	(yd ³)	(ton)	(ton/day)
Substation	10.8	17,424	21,780	57
Replacement line (13.3 miles)	161.2	260,089	325,111	847
TOTAL	172.0	277,513	346,891	903

^a Conservatively assumes the entire 100-foot route width is disturbed.

^b Assumes the top 12 inches of topsoil is removed.

^c Assumes soil density: 1.25 tons per yard

Conversions:

1 acre	43560 ft ²
Depth of topsoil removed	12 inches
Depth of topsoil removed	1 feet
1 yd ³	27 ft ³
1 mile	5280 feet

Route width	100 ft
Route length	13.3 miles
	70224 feet
Route area	7022400 ft ²
	161.2121212 acres

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Appendix G: Construction Emission Calculations
Summary

Greenhouse Gas Emissions From Construction Engines				
Description	CO ₂	CH ₄	N ₂ O	CO ₂ e ^a
Off-Road Engine Emissions	2,697.87	0.11	0.02	2,707.20
Commuters and Delivery Vehicles	188.09	0.00	0.00	188.09
TOTAL	2,885.96	0.11	0.02	2,895.30

^a CO₂e = carbon dioxide equivalent. Includes global warming potentials from 40 CFR 98 Table A-1.

Global Warming Potentials		
CO ₂	CH ₄	N ₂ O
1	25	298

Source: 40 CFR 98 Table A-1: <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98#Table-A-1-to-Subpart-A-of-Part-98>

Dairyland Power Cooperative
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Appendix G: Construction Emission Calculations
Greenhouse Gas Emissions from On Road Construction Traffic

On-Road Vehicles					
	Vehicles per day	Miles per vehicle	Number of Days	Fuel Used (gallons)	CO ₂ Emissions ^a (tons)
Commuter Vehicles - Gasoline ^{b,c}	10	60	384	9,600	94
Delivery Trucks - Diesel ^d	4	60	204.0	7,532	84.5
Concrete Mixer Trucks - Diesel ^e	2	60	24.0	847	9.5

^a Assumes 1 gallon of gasoline = 8,887 grams CO₂ and 1 gallon of diesel = 10,180 g CO₂, per US EPA's "Greenhouse Gas Emissions from a Typical Passenger Vehicle," available online at: <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100U8YT.pdf>

^b Assumes commuters travel 30 miles each way (60 miles round trip) per day, with a fuel economy of 24 miles per gallon, per US EPA and US Department of Energy Fuel Economy data for combined city and highway driving in 2023, available online at: <https://www.fueleconomy.gov/feg/download.shtml>.

^c Assumes commuters will travel for 44 weeks, 6 days a week.

^d Assumes delivery trucks travel 30 miles each way (60 miles round trip) per day, with a fuel economy of 6.5 miles per gallon, industry average.

^e Assumes concrete mixer trucks travel 30 miles each way (60 miles round trip) per day, with a fuel economy of 3.4 miles per gallon, industry average.

<http://ascpro0.ascweb.org/archives/cd/2012/paper/CPRT221002012.pdf#:~:text=The%20National%20Ready%20Mix%20Concrete%20Association%20%28NRMCA%29%20in,average%203.4%20miles%20per%20gallon%20of%20diesel%20fuel.>

1 short ton =	907,185	grams
1 gal gasoline =	8,887	g CO ₂
1 gal diesel =	10,182	g CO ₂

Commuter Vehicle MPG=	24
Delivery Trucks (Diesel) MPG=	6.5
Concrete Mixer Truck MPG=	3.4

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Appendix G: Construction Emission Calculations
Emission Factors for Construction Engines

Equipment	Quantity ^a	Hours per	Days per	Number of	Total Hours	Max Power	Load	Loaded	Emission Factors ^{d,e} (g/hp hr)		
		Day	Week	Weeks	Used ^b	(HP)	Factor ^c	Power (HP)	CO ₂	CH ₄	N ₂ O
Air Compressor	1	10	6	21	1,260	80	1	80	188.262	0.008	0.002
ATV	4	10	6	56	13,440	20	0.5	10	188.262	0.008	0.002
Backhoe - line	2	10	6	16	1,920	75	0.8	60	188.262	0.008	0.002
Backhoe - substation	1	10	6	8	480	75	0.8	60	188.262	0.008	0.002
Bulldozer - line	2	10	6	16	1,920	250	1	250	188.262	0.008	0.002
Bulldozer - substation	1	10	6	8	480	250	1	250	188.262	0.008	0.002
Compactor - line	1	10	6	16	960	300	1	300	188.262	0.008	0.002
Compactor - substation	1	10	6	8	480	300	1	300	188.262	0.008	0.002
Compactor, Vibratory - line	1	10	6	16	960	100	1	100	188.262	0.008	0.002
Compactor, Vibratory - substation	1	10	6	8	480	100	1	100	188.262	0.008	0.002
Fork Lift - line	1	4	6	21	504	120	1	120	188.262	0.008	0.002
Fork Lift - substation	1	4	6	8	192	120	1	120	188.262	0.008	0.002
Concrete Mixer Truck	2	6	3	8	288	325	1	325	188.262	0.008	0.002
Concrete Pump	1	10	1	2	20	300	1	300	188.262	0.008	0.002
Dump Truck - line	3	10	6	41	7,380	325	0.8	260	188.262	0.008	0.002
Dump Truck - substation	1	10	6	8	480	325	0.8	260	188.262	0.008	0.002
Excavator - line	2	10	6	11	1,320	138	1	138	188.262	0.008	0.002
Excavator - substation	1	10	6	8	480	138	1	138	188.262	0.008	0.002
Front End Loader - line	2	10	6	16	1,920	196	1	196	188.262	0.008	0.002
Front End Loader - substation	1	10	6	8	480	196	1	196	188.262	0.008	0.002
Generator	2	10	6	51	6,120	250	0.5	125	188.262	0.008	0.002
Guided Bore Machine	0	0	0	0	0	150	0.8	120	188.262	0.008	0.002
Light Tower	1	4	6	6	144	50	1	50	188.262	0.008	0.002
Manlift	2	8	6	21	2,016	50	1	50	188.262	0.008	0.002
Pickup Truck	10	6	6	56	20,160	150	0.25	38	188.262	0.008	0.002
Piping Truck	2	10	6	18	2,160	300	1	300	188.262	0.008	0.002
Skid steer loader	8	8	6	41	15,744	50	1	50	188.262	0.008	0.002
Water truck	1	6	6	13	468	100	0.5	50	188.262	0.008	0.002
Welding machine	1	8	6	11	528	35	0.8	28	188.262	0.008	0.002
Grader	2	10	6	11	1,320	35	0.8	28	188.262	0.008	0.002
Large Crane	1	8	2	2	32	15	0.21	3	188.262	0.008	0.002
Medium Crane	4	6	6	16	2,304	450	0.7	315	188.262	0.008	0.002
Fuel Truck	1	2	2	39	156	200	0.59	118	188.262	0.008	0.002
Hydrovac Truck	1	4	3	16	192	200	0.59	118	188.262	0.008	0.002
Road Bore Machine	0	0	0	0	0	260	0.79	205	188.262	0.008	0.002
6-inch Water Pump	0	0	0	0	0	30	0.69	21	188.262	0.008	0.002
4-inch Water Pump.	1	10	6	8	480	10	0.69	7	188.262	0.008	0.002
2-inch Water Pump	0	0	0	0	0	5	0.69	3	188.262	0.008	0.002
Pile Driver	0	0	0	0	0	49	1	49	188.262	0.008	0.002
100 HP Tractor	1	10	3	6	180	100	0.21	100	188.262	0.008	0.002
Semitruck/Trailer	4	10	4	51	8,160	500	0.59	500	188.262	0.008	0.002
Boom Truck	5	8	6	41	9,840	50	1	50	188.262	0.008	0.002
Bucket Truck	6	10	6	31	11,160	50	1	50	188.262	0.008	0.002

^a Equipment counts based on experience with construction of a similar projects.

^b Generally assumes work will occur 7 am - 7 pm, Monday through Saturday, for a total of 72 work hours per week over 20 weeks

^c Load Factors from Appendix A of EPA 420_P 04 005, Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling , USEPA, April 2004.

^d EPA 420 P 04 009, Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling Compression Ignition, USEPA, April 2004 Tier 2 Engines.

^e GHG emission factors from Title 40 Subchapter C Part 98 Subpart C Table C-1 and C-2 to Subpart C.

Assumption:

393.5 hp-hr/MMBtu

453.6 g/lb

Dairyland Power Cooperative
Wabasha Relcoation Project
Appendix G: Construction Emission Calculations
Emission Estimates from Construction Engines

Equipment	Potential Emissions (ton/yr)			
	CO ₂	CH ₄	N ₂ O	CO ₂ e
Air Compressor	20.92	8.5E-04	1.7E-04	20.99
ATV	27.89	1.1E-03	2.3E-04	27.99
Backhoe - line	23.91	9.7E-04	1.9E-04	23.99
Backhoe - substation	5.98	2.4E-04	4.8E-05	6.00
Bulldozer - line	99.61	4.0E-03	8.1E-04	99.95
Bulldozer - substation	24.90	1.0E-03	2.0E-04	24.99
Compactor - line	59.77	2.4E-03	4.8E-04	59.97
Compactor - substation	29.88	1.2E-03	2.4E-04	29.99
Compactor, Vibratory - line	19.92	8.1E-04	1.6E-04	19.99
Compactor, Vibratory - substation	9.96	4.0E-04	8.1E-05	10.00
Fork Lift - line	12.55	5.1E-04	1.0E-04	12.59
Fork Lift - substation	4.78	1.9E-04	3.9E-05	4.80
Concrete Mixer Truck	19.42	7.9E-04	1.6E-04	19.49
Concrete Pump	1.25	5.1E-05	1.0E-05	1.25
Dump Truck - line	398.20	1.6E-02	3.2E-03	399.56
Dump Truck - substation	25.90	1.1E-03	2.1E-04	25.99
Excavator - line	37.80	1.5E-03	3.1E-04	37.93
Excavator - substation	13.75	5.6E-04	1.1E-04	13.79
Front End Loader - line	78.10	3.2E-03	6.3E-04	78.36
Front End Loader - substation	19.52	7.9E-04	1.6E-04	19.59
Generator	158.76	6.4E-03	1.3E-03	159.30
Guided Bore Machine	0.00	0.0E+00	0.0E+00	0.00
Light Tower	1.49	6.1E-05	1.2E-05	1.50
Manlift	20.92	8.5E-04	1.7E-04	20.99
Pickup Truck	156.89	6.4E-03	1.3E-03	157.43
Piping Truck	134.48	5.5E-03	1.1E-03	134.94
Skid steer loader	163.36	6.6E-03	1.3E-03	163.92
Water truck	4.86	2.0E-04	3.9E-05	4.87
Welding machine	3.07	1.2E-04	2.5E-05	3.08
Grader	7.67	3.1E-04	6.2E-05	7.70
Large Crane	0.02	8.5E-07	1.7E-07	0.02
Medium Crane	150.61	6.1E-03	1.2E-03	151.13
Fuel Truck	3.82	1.5E-04	3.1E-05	3.83
Hydrovac Truck	4.70	1.9E-04	3.8E-05	4.72
Road Bore Machine	0.00	0.0E+00	0.0E+00	0.00
6-inch Water Pump	0.00	0.0E+00	0.0E+00	0.00
4-inch Water Pump.	0.69	2.8E-05	5.6E-06	0.69
2-inch Water Pump	0.00	0.0E+00	0.0E+00	0.00
Pile Driver	0.00	0.0E+00	0.0E+00	0.00
100 HP Tractor	3.74	1.5E-04	3.0E-05	3.75
Semitruck/Trailer	846.70	3.4E-02	6.9E-03	849.60
Boom Truck	102.10	4.3E-03	1.1E-03	102.53
Bucket Truck	115.80	4.9E-03	1.2E-03	116.29
TOTAL	2,697.87	1.1E-01	2.2E-02	2,707.20

Global Warming Potentials		
CO ₂	CH ₄	N ₂ O
1	25	298

Source: Title 40 Part 98 Table A-1.