Appendix E

Noise Modeling and Calculations

Existing Noise-Long-Term Noise Measurement Summary

KEY: Orange cells are for input.
Grey cells are intermediate calculations performed by the model.
Green cells are data to present in a written analysis (output).

Measurement Site: 27 yards West of Cabin Creek Road just south of entrance to the Placer County MRF
Measurement Date: Wednesday October 12 through Thursday October 13, 2011
Project Name: Placer Biomass

Computation of CNEL

Hour of Day (military time)	Sound Level Leq (dBA)	Sound Power =10*Log(dB A/10)	Period of 24-Hour Day (1=included, 0=not)			Sound Power Breakdown by Period of Day		
			Day	Evening	Night	Day	Evening	Night
0:00	32.3	1,698	0	0	1	0	0	1,698
1:00	31.8	1,514	0	0	1	0	0	1,514
2:00	32.3	1,698	0	0	1	0	0	1,698
3:00	32.9	1,950	0	0	1	0	0	1,950
4:00	39.7	9,333	0	0	1	0	0	9,333
5:00	50.8	120,226	0	0	1	0	0	120,226
6:00	56.6	457,088	0	0	1	0	0	457,088
7:00	58.5	707,946	1	0	0	707,946	0	0
8:00	56.3	426,580	1	0	0	426,580	0	0
9:00	58.3	676,083	1	0	0	676,083	0	0
10:00	54.6	288,403	1	0	0	288,403	0	0
11:00	56.0	398,107	1	0	0	398,107	0	0
12:00	55.6	363,078	1	0	0	363,078	0	0
13:00	56.0	398,107	1	0	0	398,107	0	0
14:00	57.9	616,595	1	0	0	616,595	0	0
15:00	57.0	501,187	1	0	0	501,187	0	0
16:00	51.0	125,893	1	0	0	125,893	0	0
17:00	43.7	23,442	1	0	0	23,442	0	0
18:00	44.2	26,303	1	0	0	26,303	0	0
19:00	42.6	18,197	0	1	0	0	18,197	0
20:00	40.8	12,023	0	1	0	0	12,023	0
21:00	37.2	5,248	0	1	0	0	5,248	0
22:00	37.1	5,129	0	0	1	0	0	5,129
23:00	32.9	1,950	0	0	1	0	0	1,950

	Day	Evening	Night
Sum of Sound Power during Period wo/penalty	4,551,724	35,468	600,586
Log Factor for CNEL Penalty (i.e., 10*log(x))	1	3	10
Sound Power during Period with penalty	4,551,724	106,403	6,005,855

Total Daily Sound Power, with penalties	10,663,982
Hours per Day	24
Average Hourly Sound Power, with penalties	444,333
CNEL	56.5

Ldn compu-tation on next page.

Computation of Ldn

Period of 24-Hour Day (1=included, 0=not)		Sound Power Breakdown by Period of Day	
Day	Night	Day	Night
0	1	0	1,698
0	1	0	1,514
0	1	0	1,698
0	1	0	1,950
0	1	0	9,333
0	1	0	120,226
0	1	0	457,088
1	0	707,946	0
1	0	426,580	0
1	0	676,083	0
1	0	288,403	0
1	0	398,107	0
1	0	363,078	0
1	0	398,107	0
1	0	616,595	0
1	0	501,187	0

1	0	125,893	0
1	0	23,442	0
1	0	26,303	0
1	0	18,197	0
1	0	12,023	0
1	0	5,248	0
0	1	0	5,129
0	1	0	1,950

Sum of Sound Power during Period wo/penalty	4,587,191	600,586
Log Factor for Penalty (i.e., 10*log(x))	1	10
Sound Power during Period with penalty	4,587,191	6,005,855

Total Daily Sound Power, with penalties	10,593,047
Hours per Day	24
Average Hourly Sound Power, with penalties	441,377
Ldn	56.4

Computation of Daytime (7am-10pm) Leq			Computation of Nighttime (10pm-7am) Leq		
Sound Power Sum	**Daytime Sound Power**	**Daytime Leq (dBA)**	**Sound Power Sum**	**Nighttime Sound Power Avg.**	**Nighttime Leq (dBA)**
4,592,320	287,020	54.6	595,457	74,432	48.7

Notes:

Computation of the CNEL based on 1-hour Leq measurements for each hour of a day are based on equation 2-27 on pg. 2-57 of

Computation of the Ldn based on 1-hour Leq measurements for each hour of a day are based on equation 2-26 on pg. 2-56 of

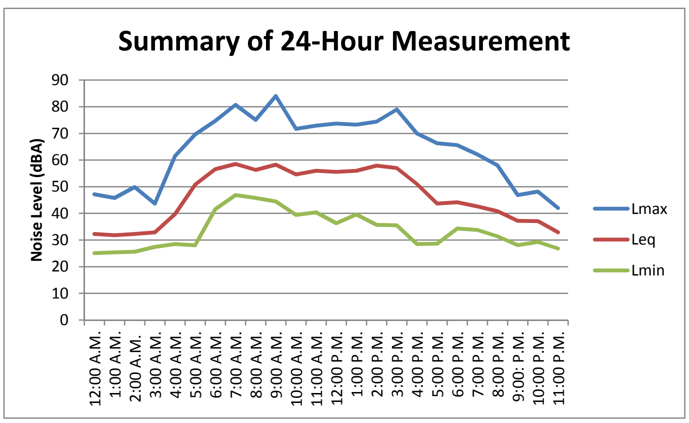
Log factors for the Ldn and CNEL penalties are provided in Table 2-12 on pg. 2-52 of Caltrans 2009.

Source:

California Deaprtment of Transportation (Caltrans), Divisiong of Environmental Analysis. 2009 (November). *2009 Technical Noise Supplement* . Sacramento, CA. Available: <http://www.dot.ca.gov/hq/env/noise/>. Accessed April 24, 2012.

Summary of Noise Measurement Data

	L_{max}	L_{eq}	L_{min}
12:00 A.M.	47.2	32.3	25.1
1:00 A.M.	45.8	31.8	25.4
2:00 A.M.	49.9	32.3	25.6
3:00 A.M.	43.7	32.9	27.4
4:00 A.M.	61.5	39.7	28.5
5:00 A.M.	69.6	50.8	28.0
6:00 A.M.	74.7	56.6	41.6
7:00 A.M.	80.7	58.5	46.9
8:00 A.M.	75.1	56.3	45.8
9:00 A.M.	84.0	58.3	44.5
10:00 A.M.	71.7	54.6	39.4
11:00 A.M.	72.9	56	40.4
12:00 P.M.	73.7	55.6	36.3
1:00 P.M.	73.3	56	39.6
2:00 P.M.	74.4	57.9	35.7
3:00 P.M.	79.0	57	35.5
4:00 P.M.	70.0	51	28.5
5:00 P.M.	66.3	43.7	28.6
6:00 P.M.	65.6	44.2	34.3
7:00 P.M.	62.1	42.6	33.8
8:00 P.M.	58.0	40.8	31.4
9:00: P.M.	46.9	37.2	28.1
10:00 P.M.	48.2	37.1	29.3
11:00 P.M.	42.0	32.9	26.8



Mechanical Equipment Reference Noise Level Calcs (Proposed Project)

Gasification Noise Sources	Hours of Day	reference noise level (dBA Leq)	reference distance (ft)	distance from proposed Site to onsite house (ft)	resultant noise level (dBA)[1]	Source of Reference Noise Levels
ICE (inside building)	24/7	50.2	20	50	39.6	1
transformer	24/7	23	197	50	38.8	2
exhaust fans (2)	24/7	83	6	50	58.6	5
pumps	24/7	74	50	50	74.0	7
Combined Equipment	24/7	74.1	50	775	42.6	Calculation

The combined Leq is calculated for each stationary noise source based on the hours of day it would operate, and 30 dBA attenuation is accounted for equipment that will be inside concrete building.

Resultant Noise Level at Sensitive Receptor from Gasification Biomass Facility at Proposed Project Site

Hourly Leq Noise Level by Noise Source Hour of Day	ICE (inside bldg)	Transformer	exhaust fans	pumps	combined hourly Leq
0:00	39.6	38.8	58.6	74.0	74.1
1:00	39.6	38.8	58.6	74.0	74.1
2:00	39.6	38.8	58.6	74.0	74.1
3:00	39.6	38.8	58.6	74.0	74.1
4:00	39.6	38.8	58.6	74.0	74.1
5:00	39.6	38.8	58.6	74.0	74.1
6:00	39.6	38.8	58.6	74.0	74.1
7:00	39.6	38.8	58.6	74.0	74.1
8:00	39.6	38.8	58.6	74.0	74.1
9:00	39.6	38.8	58.6	74.0	74.1
10:00	39.6	38.8	58.6	74.0	74.1
11:00	39.6	38.8	58.6	74.0	74.1
12:00	39.6	38.8	58.6	74.0	74.1
13:00	39.6	38.8	58.6	74.0	74.1
14:00	39.6	38.8	58.6	74.0	74.1
15:00	39.6	38.8	58.6	74.0	74.1
16:00	39.6	38.8	58.6	74.0	74.1
17:00	39.6	38.8	58.6	74.0	74.1
18:00	39.6	38.8	58.6	74.0	74.1
19:00	39.6	38.8	58.6	74.0	74.1
20:00	39.6	38.8	58.6	74.0	74.1
21:00	39.6	38.8	58.6	74.0	74.1
22:00	39.6	38.8	58.6	74.0	74.1
23:00	39.6	38.8	58.6	74.0	74.1

Notes:

1 Resultant noise levels are referenced from the "Attenuation Calc" worksheet

Source:

California Deaprtment of Transportation (Caltrans), Divisiong of Environmental Analysis. 2009 (November). *2009 Technical Noise Supplement* . Sacramento, CA. Available: <http://www.dot.ca.gov/hq/env/noise/>. Accessed April 24, 2012.

All Stationary Noise Sources-Proposed Project and Alternative 3 (Gasification Technology at Cabin Creek site and alternative site)

Gasification Noise Sources	Hours of Day	reference noise level (dBA Leq)	reference distance (ft)	distance from proposed Site to onsite house (ft)	resultant noise level (dBA)[1]	distance from Alternative Site to onsite house (ft)	resultant noise level (dBA)[1]	Source of Reference Noise Levels
ICE (inside building)	24/7	50.2	20	775	8.08	1500	0.48	1
transformer	24/7	23	197	775	7.23	1450	0.01	2
exhaust fans (2)	24/7	83	6	775	27.02	1500	19	5
pumps	24/7	74	50	775	42.43	1500	34.83	7
loader in delivery yard	8 daytime hrs	80	50	775	48.43	1500	40.83	8
truck activity in delivery yard	8 daytime hrs	60	50	775	28.43	1500	20.83	9

The combined Leq is calculated for each stationary noise source based on the hours of day it would operate, and 30 dBA attenuation is accounted for equipment that will be inside concrete building.

Resultant Noise Level at Sensitive Receptor from Gasification Biomass Facility at Proposed Project Site

Hourly Leq Noise Level by Noise Source Hour of Day	ICE (inside bldg)	Transformer	exhaust fans	pumps	loader	trucks	combined hourly Leq	Reduction from MRF building[2]
0:00	8.1	7.2	27.0	42.4	0.0	0.0	45.5	40.5
1:00	8.1	7.2	27.0	42.4	0.0	0.0	45.5	40.5
2:00	8.1	7.2	27.0	42.4	0.0	0.0	45.5	40.5
3:00	8.1	7.2	27.0	42.4	0.0	0.0	45.5	40.5
4:00	8.1	7.2	27.0	42.4	0.0	0.0	45.5	40.5
5:00	8.1	7.2	27.0	42.4	0.0	0.0	45.5	40.5
6:00	8.1	7.2	27.0	42.4	0.0	0.0	45.5	40.5
7:00	8.1	7.2	27.0	42.4	48.4	28.4	50.3	45.3
8:00	8.1	7.2	27.0	42.4	48.4	28.4	50.3	45.3
9:00	8.1	7.2	27.0	42.4	48.4	28.4	50.3	45.3
10:00	8.1	7.2	27.0	42.4	48.4	28.4	50.3	45.3
11:00	8.1	7.2	27.0	42.4	48.4	28.4	50.3	45.3
12:00	8.1	7.2	27.0	42.4	48.4	28.4	50.3	45.3
13:00	8.1	7.2	27.0	42.4	48.4	28.4	50.3	45.3
14:00	8.1	7.2	27.0	42.4	48.4	28.4	50.3	45.3
15:00	8.1	7.2	27.0	42.4	48.4	28.4	50.3	45.3
16:00	8.1	7.2	27.0	42.4	48.4	28.4	50.3	45.3
17:00	8.1	7.2	27.0	42.4	48.4	28.4	50.3	45.3
18:00	8.1	7.2	27.0	42.4	0.0	0.0	45.5	40.5
19:00	8.1	7.2	27.0	42.4	0.0	0.0	45.5	40.5
20:00	8.1	7.2	27.0	42.4	0.0	0.0	45.5	40.5
21:00	8.1	7.2	27.0	42.4	0.0	0.0	45.5	40.5
22:00	8.1	7.2	27.0	42.4	0.0	0.0	45.5	40.5
23:00	8.1	7.2	27.0	42.4	0.0	0.0	45.5	40.5

Resultant Noise Level at Distance From Alternative Site that complies with County Noise Standards

Hourly Leq Noise Level by Noise Source	ICE (inside bldg)	Transformer	exhaust fans	pumps	loader	trucks	combined hourly Leq
Hour of Day							
0:00	0.5	0.0	19.4	34.8	0.0	0.0	37.9
1:00	0.5	0.0	19.4	34.8	0.0	0.0	37.9
2:00	0.5	0.0	19.4	34.8	0.0	0.0	37.9
3:00	0.5	0.0	19.4	34.8	0.0	0.0	37.9
4:00	0.5	0.0	19.4	34.8	0.0	0.0	37.9
5:00	0.5	0.0	19.4	34.8	0.0	0.0	37.9
6:00	0.5	0.0	19.4	34.8	0.0	0.0	37.9
7:00	0.5	0.0	19.4	34.8	40.8	20.8	42.6
8:00	0.5	0.0	19.4	34.8	40.8	20.8	42.6
9:00	0.5	0.0	19.4	34.8	40.8	20.8	42.6
10:00	0.5	0.0	19.4	34.8	40.8	20.8	42.6
11:00	0.5	0.0	19.4	34.8	40.8	20.8	42.6
12:00	0.5	0.0	19.4	34.8	40.8	20.8	42.6
13:00	0.5	0.0	19.4	34.8	40.8	20.8	42.6
14:00	0.5	0.0	19.4	34.8	40.8	20.8	42.6
15:00	0.5	0.0	19.4	34.8	40.8	20.8	42.6
16:00	0.5	0.0	19.4	34.8	40.8	20.8	42.6
17:00	0.5	0.0	19.4	34.8	40.8	20.8	42.6
18:00	0.5	0.0	19.4	34.8	0.0	0.0	37.9
19:00	0.5	0.0	19.4	34.8	0.0	0.0	37.9
20:00	0.5	0.0	19.4	34.8	0.0	0.0	37.9
21:00	0.5	0.0	19.4	34.8	0.0	0.0	37.9
22:00	0.5	0.0	19.4	34.8	0.0	0.0	37.9
23:00	0.5	0.0	19.4	34.8	0.0	0.0	37.9

Notes:

1 Resultant noise levels are referenced from the "Attenuation Calc" worksheet

2 Structures in direct noise path reduce noise levels up to 5 dB (Caltrans 2009)

Source:

California Deaprtment of Transportation (Caltrans), Divisiong of Environmental Analysis. 2009 (November). *2009 Technical Noise Supplement* . Sacramento, CA. Available: <http://www.dot.ca.gov/hq/env/noise/>. Accessed April 24, 2012.

All Stationary Noise Sources-Alternative 2 (Direct Combustion Technology at Cabin Creek Site)

Direct Combustion Noise Sources	Hours of Day	reference noise level (dBA Leq)	reference distance (ft)	distance from noise source (ft)	resultant noise level (dBA)[1]	Source of Reference Noise
ICE (inside building)	24/7	50.2	20	775	8.08	1
transformer (outside)	24/7	23	197	775	7.23	2
baghouse valves (outside)	24/7	104	3	775	40.03	3
baghouse blower fan (outside)	24/7	53	250	775	39.97	4
cooling tower exhaust fans (4-outside)	24/7	86	6	775	30.02	5
Air Intake Fan (outside)	24/7	83	3	775	19.03	6
Pumps (outside)	24/7	74	50	775	42.43	7
loader in delivery yard (outside)	8 daytime hrs	80	50	775	48.43	8
truck activity in delivery yard (outside)	8 daytime hrs	60	50	775	28.43	9

The combined Leq is calculated for each stationary noise source based on the hours of day it would operate, and 30 dBA attenuation is accounted for equipment that will be inside concrete building.

Hourly Leq Noise Level by Noise Source	ICE	Transformer	baghouse valves (outside)	baghouse blower fan (outside)	cooling tower exhaust fans (4-outside)	air intake fan	pump	loader	trucks	combined hourly Leq	Reduction from MRF building[2]
Hour of Day											
0:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	0.0	0.0	46.6	41.6
1:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	0.0	0.0	46.6	41.6
2:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	0.0	0.0	46.6	41.6
3:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	0.0	0.0	46.6	41.6
4:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	0.0	0.0	46.6	41.6
5:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	0.0	0.0	46.6	41.6
6:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	0.0	0.0	46.6	41.6
7:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	48.4	28.4	50.7	45.7
8:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	48.4	28.4	50.7	45.7
9:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	48.4	28.4	50.7	45.7
10:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	48.4	28.4	50.7	45.7
11:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	48.4	28.4	50.7	45.7
12:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	48.4	28.4	50.7	45.7
13:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	48.4	28.4	50.7	45.7
14:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	48.4	28.4	50.7	45.7
15:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	48.4	28.4	50.7	45.7
16:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	48.4	28.4	50.7	45.7
17:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	48.4	28.4	50.7	45.7
18:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	0.0	0.0	46.6	41.6
19:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	0.0	0.0	46.6	41.6
20:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	0.0	0.0	46.6	41.6
21:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	0.0	0.0	46.6	41.6
22:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	0.0	0.0	46.6	41.6
23:00	8.1	7.2	40.0	40.0	30.0	19.0	42.4	0.0	0.0	46.6	41.6

Notes: Typical attenuation of 30 dBA is assumed for the ICE since it will be located within a concrete building

Projected Daily 24-hour Noise Level with Gasification Biomass Facility

KEY: Orange cells are for input.
Grey cells are intermediate calculations performed by the model.
Green cells are data to present in a written analysis (output).

Noise Source:
Receptor:
Measurement Date: NA - This worksheet is being used to estimate CNEL with hourly Leq inputs.
Project Name:

Computation of CNEL

Hour of Day (military time)	Sound Level Leq (dBA)	Sound Power =10*Log(dBA/10)	Period of 24-Hour Day (1=included, 0=not)			Sound Power Breakdown by Period of Day		
			Day	Evening	Night	Day	Evening	Night
0:00	45.5	35,554	0	0	1	0	0	35,554
1:00	45.5	35,554	0	0	1	0	0	35,554
2:00	45.5	35,554	0	0	1	0	0	35,554
3:00	45.5	35,554	0	0	1	0	0	35,554
4:00	45.5	35,554	0	0	1	0	0	35,554
5:00	45.5	35,554	0	0	1	0	0	35,554
6:00	45.5	35,554	0	0	1	0	0	35,554
7:00	50.3	105,991	1	0	0	105,991	0	0
8:00	50.3	105,991	1	0	0	105,991	0	0
9:00	50.3	105,991	1	0	0	105,991	0	0
10:00	50.3	105,991	1	0	0	105,991	0	0
11:00	50.3	105,991	1	0	0	105,991	0	0
12:00	50.3	105,991	1	0	0	105,991	0	0
13:00	50.3	105,991	1	0	0	105,991	0	0
14:00	50.3	105,991	1	0	0	105,991	0	0
15:00	50.3	105,991	1	0	0	105,991	0	0
16:00	50.3	105,991	1	0	0	105,991	0	0
17:00	50.3	105,991	1	0	0	105,991	0	0
18:00	45.5	35,554	1	0	0	35,554	0	0
19:00	45.5	35,554	0	1	0	0	35,554	0
20:00	45.5	35,554	0	1	0	0	35,554	0
21:00	45.5	35,554	0	1	0	0	35,554	0
22:00	45.5	35,554	0	0	1	0	0	35,554
23:00	45.5	35,554	0	0	1	0	0	35,554

	Day	Evening	Night
Sum of Sound Power during Period wo/penalty	1,201,458	106,661	319,983
Log Factor for CNEL Penalty (i.e., 10*log(x))	1	3	10
Sound Power during Period with penalty	1,201,458	319,983	3,199,835

Total Daily Sound Power, with penalties	4,721,276
Hours per Day	24
Average Hourly Sound Power, with penalties	196,720

CNEL	52.9

Computation of Ldn

Period of 24-Hour Day	Night	Sound Power Breakdown by Day	Night
0	1	0	35,554
0	1	0	35,554
0	1	0	35,554
0	1	0	35,554
0	1	0	35,554
0	1	0	35,554
0	1	0	35,554
1	0	105,991	0
1	0	105,991	0
1	0	105,991	0
1	0	105,991	0
1	0	105,991	0
1	0	105,991	0
1	0	105,991	0
1	0	105,991	0
1	0	105,991	0
1	0	105,991	0
1	0	105,991	0
1	0	35,554	0
1	0	35,554	0
1	0	35,554	0
1	0	35,554	0
0	1	0	35,554
0	1	0	35,554

	Day	Night
Sum of Sound Power during Period wo/penalty	1,308,119	319,983
Log Factor for Penalty (i.e., 10*log(x))	1	10
Sound Power during Period with penalty	1,308,119	3,199,835

Total Daily Sound Power, with penalties	4,507,954
Hours per Day	24
Average Hourly Sound Power, with penalties	187,831
Ldn	52.7

Notes:
Computation of the CNEL based on 1-hour Leq measurements for each hour of a day are based on equation 2-27 on pg. 2-57 of Caltrans
Computation of the Ldn based on 1-hour Leq measurements for each hour of a day are based on equation 2-26 on pg. 2-56 of Caltrans
Log factors for the Ldn and CNEL penalties are provided in Table 2-12 on pg. 2-52 of Caltrans 2009.

Source:
California Deaprtment of Transportation (Caltrans), Divisiong of Environmental Analysis. 2009 (November). *2009 Technical Noise Supplement* . Sacramento, CA. Available: <http://www.dot.ca.gov/hq/env/noise/>. Accessed September 24, 2010.

Projected Daily 24-hour Noise Level with Direct Combustion Biomass Facility

KEY: Orange cells are for input.
Grey cells are intermediate calculations performed by the model.
Green cells are data to present in a written analysis (output).

Noise Source:
Receptor:
Measurement Date: NA - This worksheet is being used to estimate CNEL with hourly Leq inputs.
Project Name:

Computation of CNEL

Hour of Day (military time)	Sound Level Leq (dBA)	Sound Power =10*Log(dB A/10)	Period of 24-Hour Day (1=included, 0=not)			Sound Power Breakdown by Period of Day		
			Day	Evening	Night	Day	Evening	Night
0:00	46.6	46,054	0	0	1	0	0	46,054
1:00	46.6	46,054	0	0	1	0	0	46,054
2:00	46.6	46,054	0	0	1	0	0	46,054
3:00	46.6	46,054	0	0	1	0	0	46,054
4:00	46.6	46,054	0	0	1	0	0	46,054
5:00	46.6	46,054	0	0	1	0	0	46,054
6:00	46.6	46,054	0	0	1	0	0	46,054
7:00	50.7	116,492	1	0	0	116,492	0	0
8:00	50.7	116,492	1	0	0	116,492	0	0
9:00	50.7	116,492	1	0	0	116,492	0	0
10:00	50.7	116,492	1	0	0	116,492	0	0
11:00	50.7	116,492	1	0	0	116,492	0	0
12:00	50.7	116,492	1	0	0	116,492	0	0
13:00	50.7	116,492	1	0	0	116,492	0	0
14:00	50.7	116,492	1	0	0	116,492	0	0
15:00	50.7	116,492	1	0	0	116,492	0	0
16:00	50.7	116,492	1	0	0	116,492	0	0
17:00	50.7	116,492	1	0	0	116,492	0	0
18:00	46.6	46,054	1	0	0	46,054	0	0
19:00	46.6	46,054	0	1	0	0	46,054	0
20:00	46.6	46,054	0	1	0	0	46,054	0
21:00	46.6	46,054	0	1	0	0	46,054	0
22:00	46.6	46,054	0	0	1	0	0	46,054
23:00	46.6	46,054	0	0	1	0	0	46,054

	Day	Evening	Night
Sum of Sound Power during Period wo/penalty	1,327,465	138,163	414,489
Log Factor for CNEL Penalty (i.e., 10*log(x))	1	3	10
Sound Power during Period with penalty	1,327,465	414,489	4,144,887

Total Daily Sound Power, with penalties	5,886,841
Hours per Day	24
Average Hourly Sound Power, with penalties	245,285

CNEL	53.9

Computation of Ldn

Period of 24-Hour		Sound Power	
Day	Night	Day	Night
0	1	0	46,054
0	1	0	46,054
0	1	0	46,054
0	1	0	46,054
0	1	0	46,054
0	1	0	46,054
0	1	0	46,054
1	0	116,492	0
1	0	116,492	0
1	0	116,492	0
1	0	116,492	0
1	0	116,492	0
1	0	116,492	0
1	0	116,492	0
1	0	116,492	0
1	0	116,492	0
1	0	116,492	0
1	0	116,492	0
1	0	46,054	0
1	0	46,054	0
1	0	46,054	0
1	0	46,054	0
0	1	0	46,054
0	1	0	46,054

Sum of Sound Power during Period wo/penalty	1,465,628	414,489
Log Factor for Penalty (i.e., 10*log(x))	1	10
Sound Power during Period with penalty	1,465,628	4,144,887

Total Daily Sound Power, with penalties	5,610,515
Hours per Day	24
Average Hourly Sound Power, with penalties	233,771
Ldn	53.7

Notes:

Computation of the CNEL based on 1-hour Leq measurements for each hour of a day are based on equation 2-27 on pg. 2-57

Computation of the Ldn based on 1-hour Leq measurements for each hour of a day are based on equation 2-26 on pg. 2-56

Log factors for the Ldn and CNEL penalties are provided in Table 2-12 on pg. 2-52 of Caltrans 2009.

Source:

California Deaprtment of Transportation (Caltrans), Divisiong of Environmental Analysis. 2009 (November). *2009 Technical*

Attenuation Calculations for Stationary Noise Sources

ASCENT ENVIRONMENTAL

KEY: Orange cells are for input for Direct Combustion Technology.
Grey cells are intermediate calculations performed by model
Green cells are for input for the gasification technology

Noise Source/ID	Reference Noise Level noise level (dBA)	@	distance (ft)	Receptor	Attenuation Characteristics Ground Type (soft/hard)	Source Height (ft)	Receiver Height (ft)	Ground Factor	Attenuated Noise Level noise level (dBA)	@	distance (ft)
Direct Combustion											
ICE (indoor)	50	@	20	Onsite house	soft	6	5	0.65	8.08	@	775
Transformer	23	@	197	Onsite house	soft	6	5	0.65	7.23	@	775
baghouse valves	104	@	3	Onsite house	soft	6	5	0.65	40.03	@	775
baghouse blower fan	53	@	250	Onsite house	soft	6	5	0.65	39.97	@	775
cooling tower exhaust fan	86	@	6	Onsite house	soft	6	5	0.65	30.02	@	775
air intake fan	83	@	3	Onsite house	soft	6	5	0.65	19.03	@	775
pumps	74	@	50	Onsite house	soft	6	5	0.65	42.43	@	775
loader in delivery yard	80	@	50	Onsite house	soft	6	5	0.65	48.43	@	775
truck activity in delivery yard	60	@	50	Onsite house	soft	6	5	0.65	28.43	@	775
Gasification (Proposed Project Site)											
ICE (indoor)	50	@	20	Onsite house	soft	6	5	0.65	8.08	@	775
Transformer	23	@	197	Onsite house	soft	6	5	0.65	7.23	@	775
pumps	74	@	50	Onsite house	soft	6	5	0.65	42.43	@	775
exhaust fans (2)	83	@	6	Onsite house	soft	6	5	0.65	27.02	@	775
loader in delivery yard	80	@	50	Onsite house	soft	6	5	0.65	48.43	@	775
truck activity in delivery yard	60	@	50	Onsite house	soft	6	5	0.65	28.43	@	775
Gasification (Alternative Project Site)											
ICE (indoor)	50	@	20	Onsite house	soft	6	5	0.65	0.48	@	1,500
Transformer	23	@	197	Onsite house	soft	6	5	0.65	0.01	@	1,450
pumps	74	@	50	Onsite house	soft	6	5	0.65	34.83	@	1,500
exhaust fans (2)	83	@	6	Onsite house	soft	6	5	0.65	19.41	@	1,500
loader in delivery yard	80	@	50	Onsite house	soft	6	5	0.65	40.83	@	1,500
truck activity in delivery yard	60	@	50	Onsite house	soft	6	5	0.65	20.83	@	1,500
Mechanical Equipment Reference Noise Levels											
ICE (indoor)	50	@	20	Onsite house	soft	6	5	0.65	39.65	@	50
Transformer	23	@	197	Onsite house	soft	6	5	0.65	38.79	@	50
pumps	74	@	50	Onsite house	soft	6	5	0.65	74.00	@	50
exhaust fans (2)	83	@	6	Onsite house	soft	6	5	0.65	58.58	@	50
Combined	74	@	50	Onsite house	soft	6	5	0.65	42.56	@	775

Notes:
Estimates of attenuated noise levels do not account for reductions from intervening barriers, including walls, trees, vegetation, or structures of any type.

Computation of the attenuated noise level is based on the equation presented on pg. 12-3 and 12-4 of FTA 2006.

Computation of the ground factor is based on the equation presentd in Figure 6-23 on pg. 6-23 of FTA 2006, where the distance of the reference noise leve can be adjusted and the usage factor is not applied (i.e., the usage factor is equal to 1).

Sources:
Federal Transit Association (FTA). 2006 (May). Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. Washington, D.C. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: September 24, 2010.

Sources for Reference Noise Levels

Ref #	
1	The reference noise level is based on the acoustical evaulation performed for the Kings Beach Diesel Generator Replacement Project. The combined, unmitigated noise level of the 6 gensets was 80.2 dBA at 20 feet. It is assumed that the combined noise level of the turbine and ICE would also be 80.2 at 20 feet, or 77.2 dBA each
2	Noise Navigator Sound Level Database 2010
3	Mike Gerardi via email 5/9/2011
4	Mike Gerardi via email 5/9/2011
5	Perscom from AMCOT 4/11/2012 for a 15 HP Cooling Fan. It Is expected that 4 of these could be required which result in a combined noise level of 86 dBA
6	Perscom from Myron Baker with Robinson Fans for a 300 HP induced draft fan on April 19, 2012
7	Construction Source Noise Prediction Model.
8	Construction Source Noise Prediction Model.
9	Reference noise level from Buena Vista EIR.

Construction Source Noise Prediction Model (Leq Calculation)

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
Threshold	1,109	55.0
Residence 1	775	53.3

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Grader	85	0.4
Backhoe	80	0.4
Dozer	85	0.4

Ground Type	soft
Source Height	8
Receiver Height	5
Ground Factor[2]	0.63

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Grader	81.0
Backhoe	76.0
Dozer	81.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
84.7

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Figure 6-5 from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 6-23).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 12-3).

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2006: pg 6-23); and

D = Distance from source to receiver.

Construction Source Noise Prediction Model (Lmax Calculation)

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
Threshold	1,109	55.0
Residence 1	775	57.3

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Grader	85	1
Backhoe	80	1
Dozer	85	1

Ground Type	soft
Source Height	8
Receiver Height	5
Ground Factor[2]	0.63

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Grader	85.0
Backhoe	80.0
Dozer	85.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
88.6

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Figure 6-5 from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 6-23).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 12-3).

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2006: pg 6-23); and

D = Distance from source to receiver.

Equipment Description	Acoustical Usage Factor (%)	Spec 721.560 Lmax @ 50ft (dBA slow)	Actual Measured Lmax @ 50ft (dBA slow)	No. of Actual Data Samples (count)	Spec 721.560 LmaxCalc	Spec 721.560 Leq	Distance	Actual Measured LmaxCalc	Actual Measured Leq
Auger Drill Rig	20	85	84	36	79.0	72.0	100	78.0	71.0
Backhoe	40	80	78	372	74.0	70.0	100	72.0	68.0
Bar Bender	20	80	na	0	74.0	67.0	100		
Blasting	na	94	na	0	88.0		100		
Boring Jack Power Unit	50	80	83	1	74.0	71.0	100	77.0	74.0
Chain Saw	20	85	84	46	79.0	72.0	100	78.0	71.0
Clam Shovel (dropping)	20	93	87	4	87.0	80.0	100	81.0	74.0
Compactor (ground)	20	80	83	57	74.0	67.0	100	77.0	70.0
Compressor (air)	40	80	78	18	74.0	70.0	100	72.0	68.0
Concrete Batch Plant	15	83	na	0	77.0	68.7	100		
Concrete Mixer Truck	40	85	79	40	79.0	75.0	100	73.0	69.0
Concrete Pump Truck	20	82	81	30	76.0	69.0	100	75.0	68.0
Concrete Saw	20	90	90	55	84.0	77.0	100	84.0	77.0
Crane	16	85	81	405	79.0	71.0	100	75.0	67.0
Dozer	40	85	82	55	79.0	75.0	100	76.0	72.0
Drill Rig Truck	20	84	79	22	78.0	71.0	100	73.0	66.0
Drum Mixer	50	80	80	1	74.0	71.0	100	74.0	71.0
Dump Truck	40	84	76	31	78.0	74.0	100	70.0	66.0
Excavator	40	85	81	170	79.0	75.0	100	75.0	71.0
Flat Bed Truck	40	84	74	4	78.0	74.0	100	68.0	64.0
Front End Loader	40	80	79	96	74.0	70.0	100	73.0	69.0
Generator	50	82	81	19	76.0	73.0	100	75.0	72.0
Generator (<25KVA, VMS si	50	70	73	74	64.0	61.0	100	67.0	64.0
Gradall	40	85	83	70	79.0	75.0	100	77.0	73.0
Grader	40	85	na	0	79.0	75.0	100		
Grapple (on Backhoe)	40	85	87	1	79.0	75.0	100	81.0	77.0
Horizontal Boring Hydr. Jac	25	80	82	6	74.0	68.0	100	76.0	70.0
Hydra Break Ram	10	90	na	0	84.0	74.0	100		
Impact Pile Driver	20	95	101	11	89.0	82.0	100	95.0	88.0
Jackhammer	20	85	89	133	79.0	72.0	100	83.0	76.0
Man Lift	20	85	75	23	79.0	72.0	100	69.0	62.0
Mounted Impact Hammer (	20	90	90	212	84.0	77.0	100	84.0	77.0

Equipment Description	Acoustical Usage Factor (%)	Spec 721.560 Lmax @ 50ft (dBA slow)	Actual Measured Lmax @ 50ft (dBA slow)	No. of Actual Data Samples (count)	Spec 721.560 LmaxCalc	Spec 721.560 Leq	Distance	Actual Measured LmaxCalc	Actual Measured Leq
Pavement Scarafier	20	85	90	2	79.0	72.0	100	84.0	77.0
Paver	50	85	77	9	79.0	76.0	100	71.0	68.0
Pickup Truck	40	55	75	1	49.0	45.0	100	69.0	65.0
Pneumatic Tools	50	85	85	90	79.0	76.0	100	79.0	76.0
Pumps	50	77	81	17	71.0	68.0	100	75.0	72.0
Refrigerator Unit	100	82	73	3	76.0	76.0	100	67.0	67.0
Rivit Buster/chipping gun	20	85	79	19	79.0	72.0	100	73.0	66.0
Rock Drill	20	85	81	3	79.0	72.0	100	75.0	68.0
Roller	20	85	80	16	79.0	72.0	100	74.0	67.0
Sand Blasting (Single Nozzle	20	85	96	9	79.0	72.0	100	90.0	83.0
Scraper	40	85	84	12	79.0	75.0	100	78.0	74.0
Shears (on backhoe)	40	85	96	5	79.0	75.0	100	90.0	86.0
Slurry Plant	100	78	78	1	72.0	72.0	100	72.0	72.0
Slurry Trenching Machine	50	82	80	75	76.0	73.0	100	74.0	71.0
Soil Mix Drill Rig	50	80	na	0	74.0	71.0	100		
Tractor	40	84	na	0	78.0	74.0	100		
Vacuum Excavator (Vac-tru	40	85	85	149	79.0	75.0	100	79.0	75.0
Vacuum Street Sweeper	10	80	82	19	74.0	64.0	100	76.0	66.0
Ventilation Fan	100	85	79	13	79.0	79.0	100	73.0	73.0
Vibrating Hopper	50	85	87	1	79.0	76.0	100	81.0	78.0
Vibratory Concrete Mixer	20	80	80	1	74.0	67.0	100	74.0	67.0
Vibratory Pile Driver	20	95	101	44	89.0	82.0	100	95.0	88.0
Warning Horn	5	85	83	12	79.0	66.0	100	77.0	64.0
Welder / Torch	40	73	74	5	67.0	63.0	100	68.0	64.0

Source:
FHWA Roadway Construction Noise Model, January 2006. Table 9.1
U.S. Department of Transportation
CA/T Construction Spec. 721.560

Distance Propagation Calculations for Stationary Sources of Ground Vibration

ASCENT ENVIRONMENTAL

KEY: Orange cells are for input.

Grey cells are intermediate calculations performed by the model.

Green cells are data to present in a written analysis (output).

STEP 1: Determine units in which to perform calculation.

— If vibration decibels (VdB), then use Table A and proceed to Steps 2A and 3A.

— If peak particle velocity (PPV), then use Table B and proceed to Steps 2B and 3B.

STEP 2A: Identify the vibration source and enter the reference vibration level (VdB) and distance.

STEP 3A: Select the distance to the receiver.

Table A. Propagation of vibration decibels (VdB) with distance

Noise Source/ID	Reference Noise Level vibration level (VdB)	@	Reference Noise Level distance (ft)	Attenuated Noise Level at Receptor vibration level (VdB)	@	Attenuated Noise Level at Receptor distance (ft)
blasting	109	@	25	64.3	@	775
truck	86	@	25	56.5	@	240

STEP 2B: Identify the vibration source and enter the reference peak particle velocity (PPV) and distance.

STEP 3B: Select the distance to the receiver.

Table B. Propagation of peak particle velocity (PPV) with distance

Noise Source/ID	Reference Noise Level vibration level (PPV)	@	Reference Noise Level distance (ft)	Attenuated Noise Level at Receptor vibration level (PPV)	@	Attenuated Noise Level at Receptor distance (ft)
blasting	1.130	@	25	0.038	@	240
truck	0.076	@	25	0.003	@	240

Notes:

Computation of propagted vibration levels is based on the equations presented on pg. 12-11 of FTA 2006. Estimates of attenuated vibration levels do not account for reductions from intervening underground barriers or other underground structures of any type, or changes in soil type.

Sources:

Federal Transit Association (FTA). 2006 (May). Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. Washington, D.C. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: September 24, 2010.

Traffic Noise-Gasification

Project: **Placer Biomass**

Number	Name	Segment Description and Location Location	Existing Conditions	Existing + Project Conditions	Δ Existing – Existing + Project
Summary of Net Changes					
1	Cabin Creek Road	West of SR 89	51.5	52.3	0.8
2	SR 89	Squaw Valley Road	64.3	64.3	0.0
3	SR 89	Placer/Nevada County Line	66.7	66.7	0.0

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Traffic Noise-Gasification

Project: **Placer Biomass**

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

Segment Description and Location			Input										Output				
				Speed	Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	Location	ADT	(mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
Existing Conditions																	
1	Cabin Creek Road	West of SR 89	626	20	100	100	49.5%	45.2%	5.0%	76.4%	11.8%	11.8%	51.5	6	13	27	58
2	SR 89	Squaw Valley Road	10,600	45	100	100	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	64.3	42	90	193	416
3	SR 89	Placer/Nevada County Line	18,400	45	100	100	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	66.7	60	129	279	600

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Traffic Noise-Gasification

Project: Placer Biomass

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

			Input										Output				
				Speed	Distance to Directional Centerline, (feet)4		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)3			
Number	Name	Location	ADT	(mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA)5,6,7	70 dBA	65 dBA	60 dBA	55 dBA
Existing + Project Conditions																	
1	Cabin Creek Road	West of SR 89	662	20	100	100	48.7%	42.8%	8.4%	76.4%	11.8%	11.8%	52.3	7	14	31	66
2	SR 89	Squaw Valley Road	10,610	45	100	100	92.5%	5.2%	2.3%	76.4%	11.8%	11.8%	64.3	42	90	194	417
3	SR 89	Placer/Nevada County Line	18,426	45	100	100	92.5%	5.2%	2.3%	76.4%	11.8%	11.8%	66.7	60	130	280	604

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Cabin Creek Road

Traffic Totals	
East	West
414	451
409	454
195	201
49	49
427	483
1494	1638

ADT Calculation

Combined Directional Traffic	3132
ADT	626.4

Notes

Values obtained from traffic study conducted for project (Fehr & Peers 2012)

Traffic volumes were counted for a total of 5 days.

Truck Distrubution of Project Affected Roadways

Existing

	Segment	ADT	Auto %	Medium %	Heavy %	Auto #	Medium #	Heavy #
cc	1	626	49.5%	45.2%	5.0%	310	283	31
squaw	2	10,600	92.6%	5.2%	2.2%	9816	551	233
placer	3	18,400	92.6%	5.2%	2.2%	17038	957	405

Proejct Trips	Daily	%
Truck	24	67%
Employee	12	33%
Total	36	

Existing+ Project

	Segment							
cc	1	662	48.7%	42.8%	8.4%	322	283	55
squaw	2	10,610	92.5%	5.2%	2.3%	9819	551	240
placer	3	18,426	92.5%	5.2%	2.3%	17047	957	422

Trip Distribution	Total Trips	Trucks %	Auto %	truck #	auto #
Cabin Creek	36	67%	33%	24	12
89 squaw valley rd	10	67%	33%	7	3
89 placer/nevada county	26	67%	33%	17	9

Notes:

Trip rates for proposed project (gasification technology) are provided in the traffic and transportation section and traffic appendix

Traffic Noise Summary-Direct Combustion

Project: **Placer Biomass**

Number	Name	Segment Description and Location Location	Existing Conditions	Existing + Project Conditions	Δ Existing – Existing + Project
Summary of Net Changes					
1	Cabin Creek Road	West of SR 89	51.5	52.5	1.0
2	SR 89	Squaw Valley Road	64.3	64.3	0.0
3	SR 89	Placer/Nevada County Line	66.7	66.7	0.0

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Traffic Noise-Direct Combustion

Project: Placer Biomass

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

Number	Name	Location	ADT	Speed (mph)	Distance to Directional Centerline, (feet)4 Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	CNEL, (dBA)5,6,7	Distance to Contour, (feet)3 70 dBA	65 dBA	60 dBA	55 dBA
	Segment Description and Location		Input				Traffic Distribution Characteristics						Output				
#REF!																	
1	Cabin Creek Road	West of SR 89	626	20	100	100	49.5%	45.2%	5.0%	76.4%	11.8%	11.8%	51.5	6	13	27	58
2	SR 89	Squaw Valley Road	10,600	45	100	100	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	64.3	42	90	193	416
3	SR 89	Placer/Nevada County Line	18,400	45	100	100	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	66.7	60	129	279	600

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Traffic Noise-Direct Combustion

Project: Placer Biomass

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

			Input											Output				
					Distance to Directional Centerline, (feet)4		Traffic Distribution Characteristics							CNEL,	Distance to Contour, (feet)3			
Number	Name	Location	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night		(dBA)5,6,7	70 dBA	65 dBA	60 dBA	55 dBA
#REF!																		
1	Cabin Creek Road	West of SR 89	669	20	100	100	48.3%	42.5%	9.2%	76.4%	11.8%	11.8%		52.5	7	15	32	68
2	SR 89	Squaw Valley Road	10,612	45	100	100	92.5%	5.2%	2.3%	76.4%	11.8%	11.8%		64.3	42	90	194	418
3	SR 89	Placer/Nevada County Line	18,429	45	100	100	92.5%	5.2%	2.3%	76.4%	11.8%	11.8%		66.7	60	130	281	604

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Existing ADT on Cabin Creek Road

Cabin Creek Road

Traffic Totals

East	West
414	451
409	454
195	201
49	49
427	483
1494	1638

ADT Calculation

Combined Directional Traffic	3132
ADT	626.4

Notes

Values obtained from traffic study conducted for project (Fehr & Peers 2012)

Traffic volumes were counted for a total of 5 days.

Trip Rate Calculations Direct Combustion Alternative

Fuel Load Data-Direct Combustion

Total Material	20000	BDT
Total Delivery	120	days
Truck Size	12.5	BDT
Total Loads	1600	per year

Total Trip Summary

Truck Loads	13	per day
Biochar hauls	2	per day
Truck Trips	27	per day
Biochar hauls	4	per day
Employee Trips	12	per day
Total Trips/Day	43	

Data based on assumptions provided in the traffic study conducted for the project (Fehr & Peers 2011)

Projec Trip Distribution Calculations on Affected Roadways

Existing

	Segment	ADT	Auto %	Medium %	Heavy %	Auto #	Medium #	Heavy #
cc	1	626	49.5%	45.2%	5.0%	310	283	31
squaw	2	10,600	92.6%	5.2%	2.2%	9816	551	233
placer	3	18,400	92.6%	5.2%	2.2%	17038	957	405

Existing+ Project

	Segment							
cc	1	667	48.3%	42.5%	9.2%	322	283	61
squaw	2	10,612	92.5%	5.2%	2.3%	9819	551	242
placer	3	18,429	92.5%	5.2%	2.3%	17047	957	426

Proejct Trips	Daily	%
Truck	30	71%
Employee	12	29%
Total	42	

Trip Distribution	Total Trips	Trucks %	Auto %	truck #	auto #
Cabin Creek	42	71%	29%	30	12
89 squaw valley rd	12	71%	29%	9	3
89 placer/nevada county	29	71%	29%	21	8

Citation	Reference
1	Caltrans Technical Noise Supplement. 2009 (November). Table (5-11), Pg 5-60.
2	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-26), Pg 5-60.
3	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-16), Pg 2-32.
4	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-11), Pg 5-47, 48.
5	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-26), Pg 2-55, 56.
6	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-27), Pg 2-57.
7	Caltrans Technical Noise Supplement. 2009 (November). Pg 2-53.
8	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-7), Pg 5-45.
9	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-8), Pg 5-45.
10	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-9), Pg 5-45.
11	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-13), Pg 5-49.
12	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-14), Pg 5-49.
13	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (16), Pg 67
14	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (20), Pg 69
15	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (18), Pg 69

Truck/Loader Lmax Calculation

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
Threshold	1,310	50.0
Residence 1	650	56.1
Residence 2	650	56.1

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Front End Loader	80	1
Dump Truck	84	1

Ground Type	soft
Source Height	8
Receiver Height	5
Ground Factor[2]	0.63

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Front End Loader	80.0
Dump Truck	84.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
85.5

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Figure 6-5 from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 6-23).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 12-3).

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2006: pg 6-23); and

D = Distance from source to receiver.

Truck/Loader Leq Calculation

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
Threshold	775	50.0
Residence 1	775	50.1
Residence 2	775	50.1

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Front End Loader	80	0.4
Dump Truck	84	0.4

Ground Type	soft
Source Height	8
Receiver Height	5
Ground Factor[2]	0.63

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Front End Loader	76.0
Dump Truck	80.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
81.5

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Figure 6-5 from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 6-23).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 12-3).

L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2006: pg 6-23); and

D = Distance from source to receiver.

Equipment Description	Acoustical Usage Factor (%)	Spec 721.560 Lmax @ 50ft (dBA slow)	Actual Measured Lmax @ 50ft (dBA slow)	No. of Actual Data Samples (count)	Spec 721.560 LmaxCalc	Spec 721.560 Leq	Distance	Actual Measured LmaxCalc	Actual Measured Leq
Auger Drill Rig	20	85	84	36	79.0	72.0	100	78.0	71.0
Backhoe	40	80	78	372	74.0	70.0	100	72.0	68.0
Bar Bender	20	80	na	0	74.0	67.0	100		
Blasting	na	94	na	0	88.0		100		
Boring Jack Power Unit	50	80	83	1	74.0	71.0	100	77.0	74.0
Chain Saw	20	85	84	46	79.0	72.0	100	78.0	71.0
Clam Shovel (dropping)	20	93	87	4	87.0	80.0	100	81.0	74.0
Compactor (ground)	20	80	83	57	74.0	67.0	100	77.0	70.0
Compressor (air)	40	80	78	18	74.0	70.0	100	72.0	68.0
Concrete Batch Plant	15	83	na	0	77.0	68.7	100		
Concrete Mixer Truck	40	85	79	40	79.0	75.0	100	73.0	69.0
Concrete Pump Truck	20	82	81	30	76.0	69.0	100	75.0	68.0
Concrete Saw	20	90	90	55	84.0	77.0	100	84.0	77.0
Crane	16	85	81	405	79.0	71.0	100	75.0	67.0
Dozer	40	85	82	55	79.0	75.0	100	76.0	72.0
Drill Rig Truck	20	84	79	22	78.0	71.0	100	73.0	66.0
Drum Mixer	50	80	80	1	74.0	71.0	100	74.0	71.0
Dump Truck	40	84	76	31	78.0	74.0	100	70.0	66.0
Excavator	40	85	81	170	79.0	75.0	100	75.0	71.0
Flat Bed Truck	40	84	74	4	78.0	74.0	100	68.0	64.0
Front End Loader	40	80	79	96	74.0	70.0	100	73.0	69.0
Generator	50	82	81	19	76.0	73.0	100	75.0	72.0
Generator (<25KVA, VMS si	50	70	73	74	64.0	61.0	100	67.0	64.0
Gradall	40	85	83	70	79.0	75.0	100	77.0	73.0
Grader	40	85	na	0	79.0	75.0	100		
Grapple (on Backhoe)	40	85	87	1	79.0	75.0	100	81.0	77.0
Horizontal Boring Hydr. Jac	25	80	82	6	74.0	68.0	100	76.0	70.0
Hydra Break Ram	10	90	na	0	84.0	74.0	100		
Impact Pile Driver	20	95	101	11	89.0	82.0	100	95.0	88.0
Jackhammer	20	85	89	133	79.0	72.0	100	83.0	76.0
Man Lift	20	85	75	23	79.0	72.0	100	69.0	62.0
Mounted Impact Hammer (	20	90	90	212	84.0	77.0	100	84.0	77.0
Pavement Scarafier	20	85	90	2	79.0	72.0	100	84.0	77.0
Paver	50	85	77	9	79.0	76.0	100	71.0	68.0
Pickup Truck	40	55	75	1	49.0	45.0	100	69.0	65.0

Equipment Description	Acoustical Usage Factor (%)	Spec 721.560 Lmax @ 50ft (dBA slow)	Actual Measured Lmax @ 50ft (dBA slow)	No. of Actual Data Samples (count)	Spec 721.560 LmaxCalc	Spec 721.560 Leq	Distance	Actual Measured LmaxCalc	Actual Measured Leq
Pneumatic Tools	50	85	85	90	79.0	76.0	100	79.0	76.0
Pumps	50	77	81	17	71.0	68.0	100	75.0	72.0
Refrigerator Unit	100	82	73	3	76.0	76.0	100	67.0	67.0
Rivit Buster/chipping gun	20	85	79	19	79.0	72.0	100	73.0	66.0
Rock Drill	20	85	81	3	79.0	72.0	100	75.0	68.0
Roller	20	85	80	16	79.0	72.0	100	74.0	67.0
Sand Blasting (Single Nozzle	20	85	96	9	79.0	72.0	100	90.0	83.0
Scraper	40	85	84	12	79.0	75.0	100	78.0	74.0
Shears (on backhoe)	40	85	96	5	79.0	75.0	100	90.0	86.0
Slurry Plant	100	78	78	1	72.0	72.0	100	72.0	72.0
Slurry Trenching Machine	50	82	80	75	76.0	73.0	100	74.0	71.0
Soil Mix Drill Rig	50	80	na	0	74.0	71.0	100		
Tractor	40	84	na	0	78.0	74.0	100		
Vacuum Excavator (Vac-tru	40	85	85	149	79.0	75.0	100	79.0	75.0
Vacuum Street Sweeper	10	80	82	19	74.0	64.0	100	76.0	66.0
Ventilation Fan	100	85	79	13	79.0	79.0	100	73.0	73.0
Vibrating Hopper	50	85	87	1	79.0	76.0	100	81.0	78.0
Vibratory Concrete Mixer	20	80	80	1	74.0	67.0	100	74.0	67.0
Vibratory Pile Driver	20	95	101	44	89.0	82.0	100	95.0	88.0
Warning Horn	5	85	83	12	79.0	66.0	100	77.0	64.0
Welder / Torch	40	73	74	5	67.0	63.0	100	68.0	64.0

Source:
FHWA Roadway Construction Noise Model, January 2006. Table 9.1
U.S. Department of Transportation
CA/T Construction Spec. 721.560