

Case No. PU-11-57
Minnesota Power
Late-filed Exhibit 8
Noise Study Results

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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Calculated:

6/23/2011 1:32 PM/2.7.486

DECIBEL - Main Result

Calculation: BISON 2 Noise (with existing BISON 1)

Noise calculation model:

ISO 9613-2 General

Wind speed:

8.0 m/s

Ground attenuation:

General, Ground factor: 0.5

Meteorological coefficient, C0:

0.0 dB

Type of demand in calculation:

1: WTG noise is compared to demand (DK, DE, SE, NL etc.)

Noise values in calculation:

All noise values are mean values (Lwa) (Normal)

Pure tones:

Pure and Impulse tone penalty are added to WTG source noise

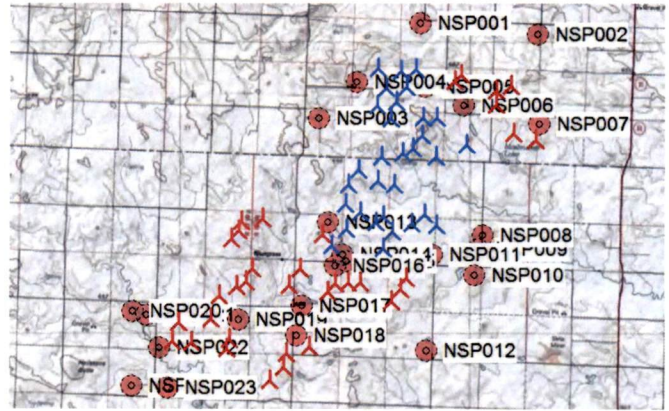
Height above ground level, when no value in NSA object:

0.0 m Don't allow override of model height with height from NSA object

Deviation from "official" noise demands. Negative is more restrictive,

positive is less restrictive.:

0.0 dB(A)



Scale 1:250,000

New WTG

Noise sensitive area

WTGs

UTM WGS84 Zone: 14				WTG type			Noise data			Wind speed							
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Creator	Name	Wind speed [m/s]	Hub height [m]	Lwa,ref [dB(A)]	Pure tones	Octave data	
UTM WGS84 Zone: 14																	
1	308,045	5,206,621	710.2 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
2	308,398	5,207,681	712.8 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
3	305,708	5,204,697	697.2 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
4	306,742	5,204,066	684.1 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
5	306,144	5,205,889	687.5 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
6	307,814	5,208,723	699.8 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
7	306,789	5,208,091	697.9 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
8	305,723	5,203,854	694.7 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
9	308,835	5,206,312	686.8 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
10	308,356	5,207,066	704.4 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
11	309,883	5,206,747	665.7 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
12	308,458	5,204,347	662.0 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
13	307,026	5,204,302	678.5 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
14	306,821	5,205,492	674.2 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
15	307,258	5,207,647	696.1 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
16	306,222	5,204,408	682.6 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
17	307,611	5,209,252	691.9 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
18	306,948	5,206,325	663.9 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
19	307,408	5,205,372	666.1 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
20	307,108	5,208,697	698.3 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
22	307,008	5,203,168	670.0 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
23	305,241	5,203,255	705.6 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
25	308,117	5,209,319	675.4 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
26	306,823	5,209,364	689.1 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
27	307,666	5,206,450	684.1 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
28	307,454	5,208,223	699.8 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
29	308,855	5,203,961	659.6 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
30	308,850	5,207,651	682.8 BISON 1B	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
31	308,007	5,204,045	659.6 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
32	305,787	5,205,371	676.0 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
33	307,319	5,203,760	676.0 BISON 1A	Yes	Siemens	SWT-2.3-101-2,300	2,300	101.0	80.0	USER	SWT-2.3-101 Standard	8.0	80.0	107.0	0 dB	Yes	
201	309,464	5,208,918	677.3 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
202	309,685	5,209,120	676.7 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
203	310,887	5,208,104	665.3 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
204	310,897	5,208,576	676.0 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
205	311,399	5,208,734	691.6 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
206	311,493	5,207,129	663.0 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
207	312,259	5,206,895	682.4 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
208	307,794	5,202,144	666.4 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
209	307,622	5,201,766	676.7 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
210	307,287	5,201,341	678.5 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
211	306,204	5,201,988	691.0 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
212	305,792	5,201,997	687.0 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
213	305,343	5,201,946	688.8 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
214	305,086	5,201,688	683.4 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
215	304,921	5,203,659	700.3 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	
216	304,151	5,202,483	677.3 BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes	

To be continued on next page...

Project: **Minnesota Power - BISON Wind Energy Center**

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DECIBEL - Main Result

Calculation: BISON 2 Noise (with existing BISON 1)

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	UTM WGS84 Zone: 14			Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data		Wind speed [m/s]	Hub height [m]	LwA,ref [dB(A)]	Pure tones	Octave data
	East	North	Z [m]		Valid	Manufact.	Type-generator				Creator	Name					
217	303,760	5,201,883	670.6	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
218	304,453	5,199,790	684.6	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
219	303,654	5,199,579	680.9	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
220	303,574	5,199,109	668.2	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
221	303,104	5,198,656	658.4	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
222	299,716	5,199,978	657.8	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
223	299,930	5,200,609	665.1	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
224	301,600	5,199,737	677.0	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
225	301,676	5,200,064	678.5	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
226	301,044	5,200,758	684.0	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
227	301,339	5,201,562	683.4	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
228	300,385	5,199,954	656.5	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
229	301,958	5,201,876	689.4	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
230	302,272	5,202,012	695.0	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
231	302,500	5,202,464	685.2	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
232	301,742	5,203,479	692.5	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
233	302,013	5,203,777	696.8	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
234	302,093	5,204,102	699.8	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes
235	302,838	5,204,194	681.1	BISON 2	Yes	Siemens	SWT-3.0-101-3,000	3,000	101.0	80.0	USER	SWT-3.0-101 Standard	8.0	80.0	108.0	0 dB	Yes

Calculation Results

Sound Level

Noise sensitive area UTM WGS84 Zone: 14

No.	Name	East	North	Z [m]	Imission height [m]	Demands		Sound Level From WTGs [dB(A)]	Demands fulfilled ?		
						Noise [dB(A)]	Distance [m]		Noise	Distance	All
NSP001	NSP001	308,281	5,210,878	684.7	0.0	45.0	427	34.0	Yes	Yes	Yes
NSP002	NSP002	312,331	5,210,518	667.5	0.0	45.0	427	30.3	Yes	Yes	Yes
NSP003	NSP003	304,789	5,207,620	679.2	0.0	45.0	427	33.6	Yes	Yes	Yes
NSP004	NSP004	306,077	5,208,878	691.7	0.0	45.0	427	38.8	Yes	Yes	Yes
NSP005	NSP005	308,456	5,208,732	677.3	0.0	45.0	427	42.7	Yes	Yes	Yes
NSP006	NSP006	309,777	5,208,086	658.4	0.0	45.0	427	40.4	Yes	Yes	Yes
NSP007	NSP007	312,386	5,207,439	674.5	0.0	45.0	427	39.8	Yes	Yes	Yes
NSP008	NSP008	310,463	5,203,623	650.0	0.0	45.0	427	32.5	Yes	Yes	Yes
NSP009	NSP009	310,303	5,203,128	643.1	0.0	45.0	427	32.3	Yes	Yes	Yes
NSP010	NSP010	310,167	5,202,263	676.7	0.0	45.0	427	31.5	Yes	Yes	Yes
NSP011	NSP011	308,704	5,202,962	655.3	0.0	45.0	427	37.7	Yes	Yes	Yes
NSP012	NSP012	308,504	5,199,667	674.6	0.0	45.0	427	30.9	Yes	Yes	Yes
NSP013	NSP013	305,091	5,204,059	680.2	0.0	45.0	427	43.4	Yes	Yes	Yes
NSP014	NSP014	305,600	5,202,951	680.3	0.0	45.0	427	42.9	Yes	Yes	Yes
NSP015	NSP015	305,735	5,202,742	681.1	0.0	45.0	427	42.1	Yes	Yes	Yes
NSP016	NSP016	305,362	5,202,580	681.3	0.0	45.0	427	42.8	Yes	Yes	Yes
NSP017	NSP017	304,204	5,201,211	671.2	0.0	45.0	427	39.7	Yes	Yes	Yes
NSP018	NSP018	304,015	5,200,169	672.6	0.0	45.0	427	41.1	Yes	Yes	Yes
NSP019	NSP019	302,002	5,200,728	663.3	0.0	45.0	427	40.6	Yes	Yes	Yes
NSP020	NSP020	298,345	5,201,007	658.4	0.0	45.0	427	32.1	Yes	Yes	Yes
NSP021	NSP021	298,817	5,200,870	660.0	0.0	45.0	427	34.9	Yes	Yes	Yes
NSP022	NSP022	299,277	5,199,763	649.2	0.0	45.0	427	40.6	Yes	Yes	Yes
NSP023	NSP023	299,548	5,198,404	658.4	0.0	45.0	427	32.4	Yes	Yes	Yes
NSP024	NSP024	298,327	5,198,450	669.3	0.0	45.0	427	29.4	Yes	Yes	Yes

Distances (m)

WTG	NSP001	NSP002	NSP003	NSP004	NSP005	NSP006	NSP007	NSP008	NSP009	NSP010	NSP011	NSP012	NSP013	NSP014	NSP015	NSP016	NSP017	NSP018	NSP019	NSP020	NSP021	NSP022
1	4264	5793	3406	2995	2151	2269	4417	3852	4159	4847	3718	6969	3910	4410	4515	4851	6635	7607	8441	11207	10873	11131
2	3199	4849	3610	2611	1053	1437	3995	4553	4935	5699	4729	8015	4905	5496	5611	5936	7710	8697	9447	12067	11755	12078
3	6695	8818	3064	4197	4882	5295	7219	4875	4855	5080	3462	5755	888	1749	1955	2145	3797	4834	5430	8236	7882	8106
4	6984	8536	4055	4858	4971	5037	6575	3747	3682	3871	2251	4739	1651	1596	1663	2028	3820	4756	5797	8937	8545	8616
5	5427	7727	2198	2990	3664	4246	6432	4877	4992	5416	3889	6655	2111	2988	3173	3400	5064	6103	6618	9201	8881	9202
6	2205	4861	3220	1744	642	2064	4749	5747	6124	6875	5829	9082	5401	6182	6332	6614	8334	9360	9884	12215	11942	12376
7	3161	6050	2055	1061	1786	2988	5635	5785	6081	6736	5475	8597	4375	5276	5452	5693	7350	8394	8782	11022	10756	11215
8	7475	9385	3880	5036	5591	5860	7566	4746	4637	4720	3112	5026	664	911	1112	1324	3048	4062	4860	7908	7523	7635

To be continued on next page.

Project:

Minnesota Power - BISON Wind Energy Center

Description:

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Calculated:

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DECIBEL - Main Result

Calculation: BISON 2 Noise (with existing BISON 1)

...continued from previous page

WTG	NSP001	NSP002	NSP003	NSP004	NSP005	NSP006	NSP007	NSP008	NSP009	NSP010	NSP011	NSP012	NSP013	NSP014	NSP015	NSP016	NSP017	NSP018	NSP019	NSP020	NSP021	NSP022
9	4600	5469	4252	3767	2450	2009	3726	3143	3506	4262	3353	6653	4370	4665	4728	5098	6890	7808	8824	11755	11401	11586
10	3813	5265	3610	2912	1669	1749	4047	4037	4393	5133	4119	7400	4439	4953	5056	5393	7178	8149	8975	11702	11375	11652
11	4431	4496	5168	4362	2445	1343	2597	3177	3643	4493	3964	7213	5494	5723	5766	6148	7931	8815	9917	12887	12530	12699
12	6533	7286	4917	5119	4385	3965	4999	2132	2211	2695	1407	4680	3379	3181	3161	3565	5285	6099	7401	10650	10249	10262
13	6695	8172	4002	4673	4655	4678	6211	3503	3481	3745	2147	4865	1950	1964	2025	2395	4185	5113	6166	9285	8898	8980
14	5580	7458	2942	3467	3629	3933	5896	4094	4209	4650	3154	6063	2246	2819	2957	3257	5018	6017	6776	9589	9243	9473
15	3389	5829	2469	1706	1616	2557	5132	5144	5449	6120	4903	8077	4192	4980	5136	5410	7124	8151	8669	11114	10825	11218
16	6790	8640	3517	4472	4867	5115	6869	4313	4277	4490	2872	5262	1184	1584	1736	2020	3784	4779	5599	8580	8207	8355
17	1759	4887	3260	1579	992	2460	5108	6310	6690	7442	6384	9626	5772	6614	6775	7041	8733	9769	10204	12403	12149	12629
18	4744	6823	2518	2698	2840	3332	5551	4433	4634	5183	3794	6837	2930	3633	3783	4067	5804	6819	7469	10114	9791	10095
19	5575	7122	3451	3750	3520	3603	5390	3520	3663	4157	2736	5809	2663	3022	3117	3461	5252	6212	7127	10059	9699	9878
20	2476	5531	2557	1047	1348	2738	5426	6083	6420	7124	5953	9137	5058	5941	6111	6361	8030	9072	9464	11659	11402	11880
22	7814	9075	4974	5785	5749	5644	6868	3485	3295	3286	1708	3807	2114	1425	1342	1748	3419	4237	5569	8928	8507	8448
23	8207	10150	4388	5685	6351	6627	8280	5235	5064	5025	3475	4850	818	470	712	686	2292	3321	4108	7253	6852	6911
25	1568	4381	3737	2087	678	2068	4665	6160	6566	7348	6384	9660	6068	6847	6995	7280	9003	10027	10545	12829	12565	13018
26	2102	5628	2679	890	1751	3219	5887	6798	7141	7849	6673	9842	5581	6529	6711	6940	8563	9614	9891	11904	11672	12212
27	4471	6190	3106	2902	2415	2671	4823	3977	4241	4877	3639	6835	3514	4063	4181	4504	6280	7265	8051	10794	10461	10728
28	2781	5390	2732	1525	1124	2327	4994	5497	5837	6548	5407	8620	4788	5588	5744	6018	7729	8757	9268	11621	11343	11766
29	6941	7421	5470	5648	4788	4227	4956	1643	1670	2146	1010	4308	3765	3408	3350	3756	5403	6149	7577	10917	10503	10458
30	3277	4510	4061	3032	1151	1024	3542	4339	4751	5547	4691	7991	5199	5714	5814	6155	7941	8908	9738	12430	12110	12404
31	6839	7784	4810	5204	4708	4412	5540	2492	2472	2800	1288	4406	2916	2644	2619	3024	4743	5564	6860	10128	9723	9724
32	6045	8326	2461	3519	4292	4826	6915	4992	5042	5371	3783	6318	1485	2427	2629	2823	4451	5495	5990	8627	8297	8592
33	7183	8414	4615	5267	5100	4976	6262	3147	3050	3217	1598	4261	2248	1900	1883	2285	4025	4880	6121	9387	8980	8981
201	2289	3283	4852	3387	1025	889	3275	5388	5850	6692	6004	9301	6537	7109	7214	7550	9331	10307	11080	13646	13346	13696
202	2250	2993	5121	3616	1289	1038	3181	5552	6024	6674	6236	9526	6835	7399	7502	7840	9623	10596	11378	13943	13645	13996
203	3806	2812	6117	4872	2511	1110	1640	4501	5011	5886	5587	8768	7068	7383	7436	7813	9601	10497	11548	14411	14072	14296
204	3485	2414	6183	4830	2446	1223	1873	4972	5480	6355	6027	9225	7356	7727	7790	8160	9952	10865	11863	14658	14329	14584
205	3784	2013	6703	5324	2943	1747	1628	5196	5712	6587	6370	9518	7852	8190	8245	8621	10410	11308	12345	15170	14837	15081
206	4937	3492	6722	5691	3434	1965	946	3654	4174	5043	5014	8038	7100	7223	7238	7634	9389	10215	11447	14503	14137	14265
207	5629	3624	7505	6492	4224	2753	559	3732	4244	5082	5302	8145	7709	7739	7734	8136	9859	10640	11968	15109	14731	14812
208	8747	9524	6246	6949	6621	6264	7009	3051	2695	2376	1224	2577	3312	2337	2144	2470	3709	4264	5962	9517	9067	8843
209	9136	9939	6504	7278	7016	6678	7408	3394	3007	2593	1613	2276	3416	2344	2125	2402	3463	3945	5715	9308	8851	8582
210	9588	10471	6758	7633	7482	7189	7948	3910	3505	3023	2152	2070	3494	2332	2091	2289	3086	3476	5321	8949	8484	8165
211	9129	10503	5807	6891	7110	7068	8242	4562	4255	3973	2683	3268	2351	1136	888	1029	2145	2846	4386	7920	7471	7275
212	9223	10741	5711	6886	7242	7277	8550	4946	4651	4383	3068	3576	2177	973	747	724	1772	2549	3997	7512	7065	6887
213	9403	11060	5701	6971	7466	7574	8932	5388	5099	4835	3512	3897	2128	1038	888	634	1355	2218	3556	7060	6614	6447
214	9729	11421	5939	7258	7808	7933	9293	5714	5412	5113	3835	3971	2371	1363	1237	933	1003	1859	3230	6776	6323	6120
215	7962	10097	3963	5345	6183	6571	8368	5543	5409	5429	3847	5365	434	982	1227	1166	2551	3606	4137	7090	6711	6858
216	9355	11466	5176	6678	7588	7940	9611	6414	6185	6020	4578	5184	1835	1522	1605	1215	1273	2318	2775	5991	5573	5582
217	10067	12167	5829	7369	8304	8642	10260	6650	6660	6418	5060	5236	2551	2127	2154	1747	805	1733	2104	5485	5046	4959
218	11731	13310	7838	9232	9798	9858	11021	7129	6736	6227	5305	4053	4317	3363	3219	2935	1443	579	2624	6228	5738	5176
219	12209	13962	8121	9609	10336	10481	11748	7919	7537	7044	6078	4851	4705	3893	3786	3453	1722	691	2012	5498	5007	4381
220	12676	14383	8598	10085	10791	10912	12127	8237	7838	7309	6416	4962	5178	4344	4228	3905	2195	1149	2257	5563	5072	4346
221	13273	15028	9121	10646	11152	12779	8878	8475	7931	7064	5846	5757	4968	4860	4527	2782	1766	2347	5308	4825	3984	
222	13863	16439	9173	10940	12370	12922	14704	11348	11046	10698	9470	8793	6749	6593	6623	6217	4654	4303	2406	1715	1267	489
223	13236	15874	8531	10304	11776	12364	14206	10956	10675	10370	9084	8626	6208	6135	6185	5779	4316	4109	2076	1634	1143	1068
224	12991	15212	8504	10179	11310	11687	13254	9678	9341	8932	7802	6905	5556	5132	5112	4716	2993	2454	1070	3494	3004	2323
225	12672	14927	8173	9852	11005	11401	13004	9480	9155	8771	7602	6839	5256	4872	4863	4463	2776	2341	740	3462	2971	2418
226	12441	14921	7817	9553	10887	11400	13163	9845	9557	9246	7971	7539	5222	5056	5093	4686	3192	3029	958	2711	2230	2028
227	11619	14179	6972	8717	10103	10666	12513	9354	9100	8856	7497	7411	4507	4482	4552	4150	2887	3017	1065	3045	2615	2736
228	13479	15947	8841	10585	11924	12423	14144	10725	10413	10051	8846	8124	6245	6015	6033	5627	4020	3636	1793	2296	1816	1125
229	11001	13502	6404	8124	9446	9985	11819	8683	8439	8219	6833	6909	3819	3798	3875	3476	2343	2673	1149	3716	3298	3413
230	10710	13173	6147	7850	9132	9655	11478	8348	8108	7899	6502	6659	3484	3458	3539	3142	2092	2537	1312			

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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DECIBEL - Main Result

Calculation: BISON 2 Noise (with existing BISON 1)

...continued from previous page

WTG	NSP023	NSP024
17	13516	14243
18	10840	11676
19	10504	11418
20	12771	13495
22	8851	9880
23	7479	8420
25	13877	14628
26	13155	13831
27	11430	12297
28	12606	13372
29	10840	11883
30	13116	13978
31	10167	11181
32	9352	10176
33	9438	10443
201	14452	15284
202	14751	15584
203	14922	15842
204	15241	16142
205	15721	16632
206	14792	15769
207	15286	16292
208	9054	10162
209	8746	9869
210	8278	9415
211	7559	8635
212	7204	8265
213	6791	7838
214	6439	7495
215	7516	8403
216	6151	7085
217	5463	6427
218	5097	6270
219	4271	5446
220	4087	5288
221	3565	4782
222	1582	2065
223	2237	2689
224	2447	3517
225	2699	3718
226	2789	3565
227	3630	4330
228	1762	2549
229	4226	4992
230	4521	5315
231	5020	5790
232	5529	6079
233	5912	6478
234	6240	6791
235	6659	7304

Project:

Minnesota Power - BISON Wind Energy Center

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DECIBEL - Detailed results**Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s****Assumptions**

Calculated L(DW) = LWA,ref + K + Dc - (Adiv + Aatm + Agr + Abar + Amisc) - Cmet
(when calculated with ground attenuation, then Dc = Omega)

LWA,ref: Sound pressure level at WTG
K: Pure tone
Dc: Directivity correction
Adiv: the attenuation due to geometrical divergence
Aatm: the attenuation due to atmospheric absorption
Agr: the attenuation due to ground effect
Abar: the attenuation due to a barrier
Amisc: the attenuation due to miscellaneous other effects
Cmet: Meteorological correction

Calculation Results**Noise sensitive area: NSP001 NSP001****WTG****Wind speed: 8.0 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	4,264	4,265	14.93	108.0	0.00	83.60	-	-	0.00	0.00	-	0.00
2	3,199	3,201	18.41	108.0	0.00	81.11	-	-	0.00	0.00	-	0.00
3	6,695	6,696	7.53	107.0	0.00	87.52	-	-	0.00	0.00	-	0.00
4	6,984	6,984	6.99	107.0	0.00	87.88	-	-	0.00	0.00	-	0.00
5	5,427	5,428	10.20	107.0	0.00	85.69	-	-	0.00	0.00	-	0.00
6	2,205	2,207	22.66	108.0	0.00	77.88	-	-	0.00	0.00	-	0.00
7	3,161	3,163	18.55	108.0	0.00	81.00	-	-	0.00	0.00	-	0.00
8	7,475	7,476	6.11	107.0	0.00	88.47	-	-	0.00	0.00	-	0.00
9	4,600	4,600	13.97	108.0	0.00	84.26	-	-	0.00	0.00	-	0.00
10	3,813	3,814	16.31	108.0	0.00	82.63	-	-	0.00	0.00	-	0.00
11	4,431	4,431	14.45	108.0	0.00	83.93	-	-	0.00	0.00	-	0.00
12	6,533	6,534	7.84	107.0	0.00	87.30	-	-	0.00	0.00	-	0.00
13	6,695	6,695	7.53	107.0	0.00	87.52	-	-	0.00	0.00	-	0.00
14	5,580	5,581	9.85	107.0	0.00	85.93	-	-	0.00	0.00	-	0.00
15	3,389	3,390	17.73	108.0	0.00	81.60	-	-	0.00	0.00	-	0.00
16	6,790	6,790	7.35	107.0	0.00	87.64	-	-	0.00	0.00	-	0.00
17	1,759	1,761	25.34	108.0	0.00	75.91	-	-	0.00	0.00	-	0.00
18	4,744	4,745	11.89	107.0	0.00	84.52	-	-	0.00	0.00	-	0.00
19	5,575	5,575	9.86	107.0	0.00	85.93	-	-	0.00	0.00	-	0.00
20	2,476	2,478	21.29	108.0	0.00	78.88	-	-	0.00	0.00	-	0.00
22	7,814	7,815	5.54	107.0	0.00	88.86	-	-	0.00	0.00	-	0.00
23	8,207	8,207	4.90	107.0	0.00	89.28	-	-	0.00	0.00	-	0.00
25	1,568	1,569	26.67	108.0	0.00	74.91	-	-	0.00	0.00	-	0.00
26	2,102	2,104	23.24	108.0	0.00	77.46	-	-	0.00	0.00	-	0.00
27	4,471	4,471	14.33	108.0	0.00	84.01	-	-	0.00	0.00	-	0.00
28	2,781	2,782	20.02	108.0	0.00	79.89	-	-	0.00	0.00	-	0.00
29	6,941	6,941	7.07	107.0	0.00	87.83	-	-	0.00	0.00	-	0.00
30	3,277	3,278	18.13	108.0	0.00	81.31	-	-	0.00	0.00	-	0.00
31	6,839	6,839	7.26	107.0	0.00	87.70	-	-	0.00	0.00	-	0.00
32	6,045	6,046	8.83	107.0	0.00	86.63	-	-	0.00	0.00	-	0.00
33	7,183	7,183	6.63	107.0	0.00	88.13	-	-	0.00	0.00	-	0.00
201	2,289	2,290	22.21	108.0	0.00	78.20	-	-	0.00	0.00	-	0.00
202	2,250	2,251	22.42	108.0	0.00	78.05	-	-	0.00	0.00	-	0.00
203	3,806	3,806	16.34	108.0	0.00	82.61	-	-	0.00	0.00	-	0.00
204	3,485	3,486	17.40	108.0	0.00	81.85	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
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 Duluth, MN 55802-2093

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DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
205	3,784	3,785	16.41	108.0	0.00	82.56	-	-	0.00	0.00	-	0.00
206	4,937	4,937	13.06	108.0	0.00	84.87	-	-	0.00	0.00	-	0.00
207	5,629	5,630	11.34	108.0	0.00	86.01	-	-	0.00	0.00	-	0.00
208	8,747	8,747	5.24	108.0	0.00	89.84	-	-	0.00	0.00	-	0.00
209	9,136	9,136	4.61	108.0	0.00	90.22	-	-	0.00	0.00	-	0.00
210	9,588	9,589	3.91	108.0	0.00	90.64	-	-	0.00	0.00	-	0.00
211	9,129	9,130	4.62	108.0	0.00	90.21	-	-	0.00	0.00	-	0.00
212	9,223	9,223	4.47	108.0	0.00	90.30	-	-	0.00	0.00	-	0.00
213	9,403	9,403	4.19	108.0	0.00	90.47	-	-	0.00	0.00	-	0.00
214	9,729	9,729	3.70	108.0	0.00	90.76	-	-	0.00	0.00	-	0.00
215	7,962	7,963	6.57	108.0	0.00	89.02	-	-	0.00	0.00	-	0.00
216	9,355	9,356	4.27	108.0	0.00	90.42	-	-	0.00	0.00	-	0.00
217	10,067	10,067	3.20	108.0	0.00	91.06	-	-	0.00	0.00	-	0.00
218	11,731	11,731	0.95	108.0	0.00	92.39	-	-	0.00	0.00	-	0.00
219	12,209	12,210	0.36	108.0	0.00	92.73	-	-	0.00	0.00	-	0.00
220	12,676	12,676	-0.20	108.0	0.00	93.06	-	-	0.00	0.00	-	0.00
221	13,273	13,273	-0.88	108.0	0.00	93.46	-	-	0.00	0.00	-	0.00
222	13,863	13,863	-1.53	108.0	0.00	93.84	-	-	0.00	0.00	-	0.00
223	13,236	13,237	-0.84	108.0	0.00	93.44	-	-	0.00	0.00	-	0.00
224	12,991	12,991	-0.56	108.0	0.00	93.27	-	-	0.00	0.00	-	0.00
225	12,672	12,672	-0.19	108.0	0.00	93.06	-	-	0.00	0.00	-	0.00
226	12,441	12,442	0.08	108.0	0.00	92.90	-	-	0.00	0.00	-	0.00
227	11,619	11,619	1.10	108.0	0.00	92.30	-	-	0.00	0.00	-	0.00
228	13,479	13,479	-1.11	108.0	0.00	93.59	-	-	0.00	0.00	-	0.00
229	11,001	11,001	1.90	108.0	0.00	91.83	-	-	0.00	0.00	-	0.00
230	10,710	10,711	2.30	108.0	0.00	91.60	-	-	0.00	0.00	-	0.00
231	10,209	10,209	3.00	108.0	0.00	91.18	-	-	0.00	0.00	-	0.00
232	9,874	9,875	3.48	108.0	0.00	90.89	-	-	0.00	0.00	-	0.00
233	9,471	9,472	4.09	108.0	0.00	90.53	-	-	0.00	0.00	-	0.00
234	9,177	9,177	4.55	108.0	0.00	90.25	-	-	0.00	0.00	-	0.00
235	8,620	8,620	5.45	108.0	0.00	89.71	-	-	0.00	0.00	-	0.00

Sum 34.04

- Data undefined due to calculation with octave data

Noise sensitive area: NSP002 NSP002

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	5,793	5,794	10.95	108.0	0.00	86.26	-	-	0.00	0.00	-	0.00
2	4,849	4,851	13.29	108.0	0.00	84.72	-	-	0.00	0.00	-	0.00
3	8,818	8,818	3.97	107.0	0.00	89.91	-	-	0.00	0.00	-	0.00
4	8,536	8,537	4.39	107.0	0.00	89.63	-	-	0.00	0.00	-	0.00
5	7,727	7,728	5.68	107.0	0.00	88.76	-	-	0.00	0.00	-	0.00
6	4,861	4,862	13.26	108.0	0.00	84.74	-	-	0.00	0.00	-	0.00
7	6,050	6,051	10.37	108.0	0.00	86.64	-	-	0.00	0.00	-	0.00
8	9,385	9,385	3.15	107.0	0.00	90.45	-	-	0.00	0.00	-	0.00
9	5,469	5,470	11.72	108.0	0.00	85.76	-	-	0.00	0.00	-	0.00
10	5,265	5,266	12.22	108.0	0.00	85.43	-	-	0.00	0.00	-	0.00
11	4,496	4,497	14.26	108.0	0.00	84.06	-	-	0.00	0.00	-	0.00
12	7,286	7,286	6.44	107.0	0.00	88.25	-	-	0.00	0.00	-	0.00
13	8,172	8,173	4.96	107.0	0.00	89.25	-	-	0.00	0.00	-	0.00
14	7,458	7,458	6.14	107.0	0.00	88.45	-	-	0.00	0.00	-	0.00
15	5,829	5,830	10.87	108.0	0.00	86.31	-	-	0.00	0.00	-	0.00
16	8,640	8,641	4.23	107.0	0.00	89.73	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Description:

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 Calculated:
 6/23/2011 1:32 PM/2.7.486

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
17	4,887	4,888	13.19	108.0	0.00	84.78	-	-	0.00	0.00	-	0.00
18	6,823	6,824	7.29	107.0	0.00	87.68	-	-	0.00	0.00	-	0.00
19	7,122	7,122	6.74	107.0	0.00	88.05	-	-	0.00	0.00	-	0.00
20	5,531	5,532	11.57	108.0	0.00	85.86	-	-	0.00	0.00	-	0.00
22	9,075	9,075	3.59	107.0	0.00	90.16	-	-	0.00	0.00	-	0.00
23	10,150	10,151	2.12	107.0	0.00	91.13	-	-	0.00	0.00	-	0.00
25	4,381	4,382	14.59	108.0	0.00	83.83	-	-	0.00	0.00	-	0.00
26	5,628	5,629	11.34	108.0	0.00	86.01	-	-	0.00	0.00	-	0.00
27	6,190	6,190	10.06	108.0	0.00	86.83	-	-	0.00	0.00	-	0.00
28	5,390	5,391	11.91	108.0	0.00	85.63	-	-	0.00	0.00	-	0.00
29	7,421	7,422	6.21	107.0	0.00	88.41	-	-	0.00	0.00	-	0.00
30	4,510	4,511	14.22	108.0	0.00	84.08	-	-	0.00	0.00	-	0.00
31	7,784	7,785	5.59	107.0	0.00	88.82	-	-	0.00	0.00	-	0.00
32	8,326	8,326	4.72	107.0	0.00	89.41	-	-	0.00	0.00	-	0.00
33	8,414	8,414	4.58	107.0	0.00	89.50	-	-	0.00	0.00	-	0.00
201	3,283	3,285	18.11	108.0	0.00	81.33	-	-	0.00	0.00	-	0.00
202	2,993	2,994	19.18	108.0	0.00	80.52	-	-	0.00	0.00	-	0.00
203	2,812	2,814	19.89	108.0	0.00	79.99	-	-	0.00	0.00	-	0.00
204	2,414	2,415	21.57	108.0	0.00	78.66	-	-	0.00	0.00	-	0.00
205	2,013	2,016	23.75	108.0	0.00	77.09	-	-	0.00	0.00	-	0.00
206	3,492	3,492	17.38	108.0	0.00	81.86	-	-	0.00	0.00	-	0.00
207	3,624	3,625	16.93	108.0	0.00	82.19	-	-	0.00	0.00	-	0.00
208	9,524	9,524	4.01	108.0	0.00	90.58	-	-	0.00	0.00	-	0.00
209	9,939	9,939	3.39	108.0	0.00	90.95	-	-	0.00	0.00	-	0.00
210	10,471	10,472	2.63	108.0	0.00	91.40	-	-	0.00	0.00	-	0.00
211	10,503	10,503	2.58	108.0	0.00	91.43	-	-	0.00	0.00	-	0.00
212	10,741	10,741	2.25	108.0	0.00	91.62	-	-	0.00	0.00	-	0.00
213	11,060	11,060	1.82	108.0	0.00	91.88	-	-	0.00	0.00	-	0.00
214	11,421	11,422	1.35	108.0	0.00	92.15	-	-	0.00	0.00	-	0.00
215	10,097	10,098	3.16	108.0	0.00	91.08	-	-	0.00	0.00	-	0.00
216	11,466	11,466	1.29	108.0	0.00	92.19	-	-	0.00	0.00	-	0.00
217	12,167	12,167	0.41	108.0	0.00	92.70	-	-	0.00	0.00	-	0.00
218	13,310	13,311	-0.93	108.0	0.00	93.48	-	-	0.00	0.00	-	0.00
219	13,962	13,963	-1.64	108.0	0.00	93.90	-	-	0.00	0.00	-	0.00
220	14,383	14,383	-2.08	108.0	0.00	94.16	-	-	0.00	0.00	-	0.00
221	15,028	15,028	-2.74	108.0	0.00	94.54	-	-	0.00	0.00	-	0.00
222	16,439	16,439	-4.09	108.0	0.00	95.32	-	-	0.00	0.00	-	0.00
223	15,874	15,874	-3.56	108.0	0.00	95.01	-	-	0.00	0.00	-	0.00
224	15,212	15,212	-2.92	108.0	0.00	94.64	-	-	0.00	0.00	-	0.00
225	14,927	14,928	-2.64	108.0	0.00	94.48	-	-	0.00	0.00	-	0.00
226	14,921	14,922	-2.64	108.0	0.00	94.48	-	-	0.00	0.00	-	0.00
227	14,179	14,179	-1.87	108.0	0.00	94.03	-	-	0.00	0.00	-	0.00
228	15,947	15,947	-3.63	108.0	0.00	95.05	-	-	0.00	0.00	-	0.00
229	13,502	13,502	-1.14	108.0	0.00	93.61	-	-	0.00	0.00	-	0.00
230	13,173	13,174	-0.77	108.0	0.00	93.39	-	-	0.00	0.00	-	0.00
231	12,709	12,710	-0.24	108.0	0.00	93.08	-	-	0.00	0.00	-	0.00
232	12,715	12,715	-0.24	108.0	0.00	93.09	-	-	0.00	0.00	-	0.00
233	12,325	12,325	0.22	108.0	0.00	92.82	-	-	0.00	0.00	-	0.00
234	12,083	12,083	0.51	108.0	0.00	92.64	-	-	0.00	0.00	-	0.00
235	11,407	11,407	1.37	108.0	0.00	92.14	-	-	0.00	0.00	-	0.00

Sum 30.33

- Data undefined due to calculation with octave data

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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 6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

Noise sensitive area: NSP003 NSP003

WTG

Wind speed: 8.0 m/s

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	3,406	3,408	17.67	108.0	0.00	81.65	-	-	0.00	0.00	-	0.00
2	3,610	3,611	16.98	108.0	0.00	82.15	-	-	0.00	0.00	-	0.00
3	3,064	3,066	17.21	107.0	0.00	80.73	-	-	0.00	0.00	-	0.00
4	4,055	4,056	13.83	107.0	0.00	83.16	-	-	0.00	0.00	-	0.00
5	2,198	2,200	21.12	107.0	0.00	77.85	-	-	0.00	0.00	-	0.00
6	3,220	3,221	18.34	108.0	0.00	81.16	-	-	0.00	0.00	-	0.00
7	2,055	2,057	23.51	108.0	0.00	77.26	-	-	0.00	0.00	-	0.00
8	3,880	3,881	14.37	107.0	0.00	82.78	-	-	0.00	0.00	-	0.00
9	4,252	4,253	14.96	108.0	0.00	83.57	-	-	0.00	0.00	-	0.00
10	3,610	3,611	16.98	108.0	0.00	82.15	-	-	0.00	0.00	-	0.00
11	5,168	5,169	12.47	108.0	0.00	85.27	-	-	0.00	0.00	-	0.00
12	4,917	4,917	11.44	107.0	0.00	84.83	-	-	0.00	0.00	-	0.00
13	4,002	4,002	14.00	107.0	0.00	83.05	-	-	0.00	0.00	-	0.00
14	2,942	2,943	17.68	107.0	0.00	80.38	-	-	0.00	0.00	-	0.00
15	2,469	2,471	21.32	108.0	0.00	78.86	-	-	0.00	0.00	-	0.00
16	3,517	3,518	15.57	107.0	0.00	81.93	-	-	0.00	0.00	-	0.00
17	3,260	3,261	18.19	108.0	0.00	81.27	-	-	0.00	0.00	-	0.00
18	2,518	2,518	19.47	107.0	0.00	79.02	-	-	0.00	0.00	-	0.00
19	3,451	3,452	15.79	107.0	0.00	81.76	-	-	0.00	0.00	-	0.00
20	2,557	2,559	20.94	108.0	0.00	79.16	-	-	0.00	0.00	-	0.00
22	4,974	4,975	11.30	107.0	0.00	84.94	-	-	0.00	0.00	-	0.00
23	4,388	4,390	12.86	107.0	0.00	83.85	-	-	0.00	0.00	-	0.00
25	3,737	3,737	16.56	108.0	0.00	82.45	-	-	0.00	0.00	-	0.00
26	2,679	2,681	20.43	108.0	0.00	79.57	-	-	0.00	0.00	-	0.00
27	3,106	3,107	18.76	108.0	0.00	80.85	-	-	0.00	0.00	-	0.00
28	2,732	2,734	20.21	108.0	0.00	79.74	-	-	0.00	0.00	-	0.00
29	5,470	5,470	10.10	107.0	0.00	85.76	-	-	0.00	0.00	-	0.00
30	4,061	4,062	15.54	108.0	0.00	83.17	-	-	0.00	0.00	-	0.00
31	4,810	4,810	11.72	107.0	0.00	84.64	-	-	0.00	0.00	-	0.00
32	2,461	2,462	19.73	107.0	0.00	78.82	-	-	0.00	0.00	-	0.00
33	4,615	4,616	12.23	107.0	0.00	84.29	-	-	0.00	0.00	-	0.00
201	4,852	4,852	13.29	108.0	0.00	84.72	-	-	0.00	0.00	-	0.00
202	5,121	5,121	12.59	108.0	0.00	85.19	-	-	0.00	0.00	-	0.00
203	6,117	6,118	10.22	108.0	0.00	86.73	-	-	0.00	0.00	-	0.00
204	6,183	6,183	10.08	108.0	0.00	86.82	-	-	0.00	0.00	-	0.00
205	6,703	6,704	8.97	108.0	0.00	87.53	-	-	0.00	0.00	-	0.00
206	6,722	6,722	8.94	108.0	0.00	87.55	-	-	0.00	0.00	-	0.00
207	7,505	7,506	7.41	108.0	0.00	88.51	-	-	0.00	0.00	-	0.00
208	6,246	6,246	9.94	108.0	0.00	86.91	-	-	0.00	0.00	-	0.00
209	6,504	6,504	9.39	108.0	0.00	87.26	-	-	0.00	0.00	-	0.00
210	6,758	6,758	8.86	108.0	0.00	87.60	-	-	0.00	0.00	-	0.00
211	5,807	5,807	10.92	108.0	0.00	86.28	-	-	0.00	0.00	-	0.00
212	5,711	5,712	11.14	108.0	0.00	86.14	-	-	0.00	0.00	-	0.00
213	5,701	5,702	11.17	108.0	0.00	86.12	-	-	0.00	0.00	-	0.00
214	5,939	5,940	10.62	108.0	0.00	86.48	-	-	0.00	0.00	-	0.00
215	3,963	3,964	15.84	108.0	0.00	82.96	-	-	0.00	0.00	-	0.00
216	5,176	5,177	12.45	108.0	0.00	85.28	-	-	0.00	0.00	-	0.00
217	5,829	5,829	10.87	108.0	0.00	86.31	-	-	0.00	0.00	-	0.00
218	7,838	7,838	6.80	108.0	0.00	88.88	-	-	0.00	0.00	-	0.00
219	8,121	8,121	6.30	108.0	0.00	89.19	-	-	0.00	0.00	-	0.00
220	8,598	8,598	5.48	108.0	0.00	89.69	-	-	0.00	0.00	-	0.00
221	9,121	9,121	4.63	108.0	0.00	90.20	-	-	0.00	0.00	-	0.00
222	9,173	9,173	4.55	108.0	0.00	90.25	-	-	0.00	0.00	-	0.00
223	8,531	8,531	5.59	108.0	0.00	89.62	-	-	0.00	0.00	-	0.00
224	8,504	8,504	5.64	108.0	0.00	89.59	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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 Calculated:
 6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

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WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
225	8,173	8,173	6.21	108.0	0.00	89.25	-	-	0.00	0.00	-	0.00
226	7,817	7,818	6.83	108.0	0.00	88.86	-	-	0.00	0.00	-	0.00
227	6,972	6,973	8.43	108.0	0.00	87.87	-	-	0.00	0.00	-	0.00
228	8,841	8,841	5.08	108.0	0.00	89.93	-	-	0.00	0.00	-	0.00
229	6,404	6,405	9.60	108.0	0.00	87.13	-	-	0.00	0.00	-	0.00
230	6,147	6,148	10.16	108.0	0.00	86.77	-	-	0.00	0.00	-	0.00
231	5,641	5,642	11.31	108.0	0.00	86.03	-	-	0.00	0.00	-	0.00
232	5,141	5,142	12.53	108.0	0.00	85.22	-	-	0.00	0.00	-	0.00
233	4,741	4,742	13.58	108.0	0.00	84.52	-	-	0.00	0.00	-	0.00
234	4,433	4,434	14.44	108.0	0.00	83.94	-	-	0.00	0.00	-	0.00
235	3,943	3,943	15.90	108.0	0.00	82.92	-	-	0.00	0.00	-	0.00
Sum	33.56											

- Data undefined due to calculation with octave data

Noise sensitive area: NSP004 NSP004

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	2,995	2,996	19.18	108.0	0.00	80.53	-	-	0.00	0.00	-	0.00
2	2,611	2,613	20.71	108.0	0.00	79.34	-	-	0.00	0.00	-	0.00
3	4,197	4,198	13.41	107.0	0.00	83.46	-	-	0.00	0.00	-	0.00
4	4,858	4,858	11.59	107.0	0.00	84.73	-	-	0.00	0.00	-	0.00
5	2,990	2,991	17.50	107.0	0.00	80.52	-	-	0.00	0.00	-	0.00
6	1,744	1,746	25.44	108.0	0.00	75.84	-	-	0.00	0.00	-	0.00
7	1,061	1,065	31.00	108.0	0.00	71.55	-	-	0.00	0.00	-	0.00
8	5,036	5,037	11.14	107.0	0.00	85.04	-	-	0.00	0.00	-	0.00
9	3,767	3,768	16.46	108.0	0.00	82.52	-	-	0.00	0.00	-	0.00
10	2,912	2,913	19.50	108.0	0.00	80.29	-	-	0.00	0.00	-	0.00
11	4,362	4,362	14.65	108.0	0.00	83.79	-	-	0.00	0.00	-	0.00
12	5,119	5,119	10.94	107.0	0.00	85.18	-	-	0.00	0.00	-	0.00
13	4,673	4,674	12.08	107.0	0.00	84.39	-	-	0.00	0.00	-	0.00
14	3,467	3,467	15.74	107.0	0.00	81.80	-	-	0.00	0.00	-	0.00
15	1,706	1,708	25.70	108.0	0.00	75.65	-	-	0.00	0.00	-	0.00
16	4,472	4,473	12.63	107.0	0.00	84.01	-	-	0.00	0.00	-	0.00
17	1,579	1,581	26.59	108.0	0.00	74.98	-	-	0.00	0.00	-	0.00
18	2,698	2,698	18.69	107.0	0.00	79.62	-	-	0.00	0.00	-	0.00
19	3,750	3,751	14.79	107.0	0.00	82.48	-	-	0.00	0.00	-	0.00
20	1,047	1,050	31.15	108.0	0.00	71.43	-	-	0.00	0.00	-	0.00
22	5,785	5,786	9.39	107.0	0.00	86.25	-	-	0.00	0.00	-	0.00
23	5,685	5,686	9.61	107.0	0.00	86.10	-	-	0.00	0.00	-	0.00
25	2,087	2,088	23.33	108.0	0.00	77.39	-	-	0.00	0.00	-	0.00
26	890	894	32.89	108.0	0.00	70.02	-	-	0.00	0.00	-	0.00
27	2,902	2,903	19.54	108.0	0.00	80.26	-	-	0.00	0.00	-	0.00
28	1,525	1,527	26.98	108.0	0.00	74.68	-	-	0.00	0.00	-	0.00
29	5,648	5,648	9.70	107.0	0.00	86.04	-	-	0.00	0.00	-	0.00
30	3,032	3,033	19.03	108.0	0.00	80.64	-	-	0.00	0.00	-	0.00
31	5,204	5,204	10.73	107.0	0.00	85.33	-	-	0.00	0.00	-	0.00
32	3,519	3,520	15.56	107.0	0.00	81.93	-	-	0.00	0.00	-	0.00
33	5,267	5,267	10.58	107.0	0.00	85.43	-	-	0.00	0.00	-	0.00
201	3,387	3,388	17.74	108.0	0.00	81.60	-	-	0.00	0.00	-	0.00
202	3,616	3,617	16.96	108.0	0.00	82.17	-	-	0.00	0.00	-	0.00
203	4,872	4,872	13.23	108.0	0.00	84.75	-	-	0.00	0.00	-	0.00
204	4,830	4,830	13.35	108.0	0.00	84.68	-	-	0.00	0.00	-	0.00
205	5,324	5,325	12.08	108.0	0.00	85.53	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Description:

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 Calculated:
 6/23/2011 1:32 PM/2.7.486

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
206	5,691	5,692	11.19	108.0	0.00	86.10	-	-	0.00	0.00	-	0.00
207	6,492	6,493	9.41	108.0	0.00	87.25	-	-	0.00	0.00	-	0.00
208	6,949	6,949	8.48	108.0	0.00	87.84	-	-	0.00	0.00	-	0.00
209	7,278	7,279	7.84	108.0	0.00	88.24	-	-	0.00	0.00	-	0.00
210	7,633	7,634	7.17	108.0	0.00	88.65	-	-	0.00	0.00	-	0.00
211	6,891	6,891	8.59	108.0	0.00	87.77	-	-	0.00	0.00	-	0.00
212	6,886	6,887	8.60	108.0	0.00	87.76	-	-	0.00	0.00	-	0.00
213	6,971	6,971	8.44	108.0	0.00	87.87	-	-	0.00	0.00	-	0.00
214	7,258	7,258	7.88	108.0	0.00	88.22	-	-	0.00	0.00	-	0.00
215	5,345	5,346	12.02	108.0	0.00	85.56	-	-	0.00	0.00	-	0.00
216	6,678	6,679	9.03	108.0	0.00	87.49	-	-	0.00	0.00	-	0.00
217	7,369	7,369	7.66	108.0	0.00	88.35	-	-	0.00	0.00	-	0.00
218	9,232	9,233	4.46	108.0	0.00	90.31	-	-	0.00	0.00	-	0.00
219	9,609	9,610	3.88	108.0	0.00	90.65	-	-	0.00	0.00	-	0.00
220	10,085	10,085	3.18	108.0	0.00	91.07	-	-	0.00	0.00	-	0.00
221	10,646	10,646	2.38	108.0	0.00	91.54	-	-	0.00	0.00	-	0.00
222	10,940	10,940	1.98	108.0	0.00	91.78	-	-	0.00	0.00	-	0.00
223	10,304	10,304	2.86	108.0	0.00	91.26	-	-	0.00	0.00	-	0.00
224	10,179	10,179	3.04	108.0	0.00	91.15	-	-	0.00	0.00	-	0.00
225	9,852	9,852	3.52	108.0	0.00	90.87	-	-	0.00	0.00	-	0.00
226	9,553	9,554	3.96	108.0	0.00	90.60	-	-	0.00	0.00	-	0.00
227	8,717	8,717	5.29	108.0	0.00	89.81	-	-	0.00	0.00	-	0.00
228	10,585	10,585	2.47	108.0	0.00	91.49	-	-	0.00	0.00	-	0.00
229	8,124	8,124	6.29	108.0	0.00	89.20	-	-	0.00	0.00	-	0.00
230	7,850	7,850	6.78	108.0	0.00	88.90	-	-	0.00	0.00	-	0.00
231	7,344	7,345	7.71	108.0	0.00	88.32	-	-	0.00	0.00	-	0.00
232	6,924	6,924	8.53	108.0	0.00	87.81	-	-	0.00	0.00	-	0.00
233	6,522	6,522	9.35	108.0	0.00	87.29	-	-	0.00	0.00	-	0.00
234	6,220	6,220	10.00	108.0	0.00	86.88	-	-	0.00	0.00	-	0.00
235	5,695	5,695	11.18	108.0	0.00	86.11	-	-	0.00	0.00	-	0.00
Sum	38.84											

- Data undefined due to calculation with octave data

Noise sensitive area: NSP005 NSP005

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	2,151	2,154	22.96	108.0	0.00	77.66	-	-	0.00	0.00	-	0.00
2	1,053	1,059	31.06	108.0	0.00	71.50	-	-	0.00	0.00	-	0.00
3	4,882	4,883	11.53	107.0	0.00	84.77	-	-	0.00	0.00	-	0.00
4	4,971	4,972	11.31	107.0	0.00	84.93	-	-	0.00	0.00	-	0.00
5	3,664	3,666	15.07	107.0	0.00	82.28	-	-	0.00	0.00	-	0.00
6	642	650	36.24	108.0	0.00	67.26	-	-	0.00	0.00	-	0.00
7	1,786	1,789	25.16	108.0	0.00	76.05	-	-	0.00	0.00	-	0.00
8	5,591	5,592	9.82	107.0	0.00	85.95	-	-	0.00	0.00	-	0.00
9	2,450	2,451	21.41	108.0	0.00	78.79	-	-	0.00	0.00	-	0.00
10	1,669	1,672	25.94	108.0	0.00	75.47	-	-	0.00	0.00	-	0.00
11	2,445	2,446	21.44	108.0	0.00	78.77	-	-	0.00	0.00	-	0.00
12	4,385	4,386	12.87	107.0	0.00	83.84	-	-	0.00	0.00	-	0.00
13	4,655	4,656	12.13	107.0	0.00	84.36	-	-	0.00	0.00	-	0.00
14	3,629	3,630	15.19	107.0	0.00	82.20	-	-	0.00	0.00	-	0.00
15	1,616	1,619	26.31	108.0	0.00	75.19	-	-	0.00	0.00	-	0.00
16	4,867	4,868	11.57	107.0	0.00	84.75	-	-	0.00	0.00	-	0.00
17	992	997	31.72	108.0	0.00	70.97	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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Calculated:

6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG

Wind speed: 8.0 m/s

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
18	2,840	2,841	18.09	107.0	0.00	80.07	-	-	0.00	0.00	-	0.00
19	3,520	3,520	15.56	107.0	0.00	81.93	-	-	0.00	0.00	-	0.00
20	1,348	1,352	28.36	108.0	0.00	73.62	-	-	0.00	0.00	-	0.00
22	5,749	5,750	9.47	107.0	0.00	86.19	-	-	0.00	0.00	-	0.00
23	6,351	6,352	8.20	107.0	0.00	87.06	-	-	0.00	0.00	-	0.00
25	678	682	35.73	108.0	0.00	67.68	-	-	0.00	0.00	-	0.00
26	1,751	1,753	25.39	108.0	0.00	75.88	-	-	0.00	0.00	-	0.00
27	2,415	2,416	21.57	108.0	0.00	78.66	-	-	0.00	0.00	-	0.00
28	1,124	1,129	30.36	108.0	0.00	72.05	-	-	0.00	0.00	-	0.00
29	4,788	4,788	11.78	107.0	0.00	84.60	-	-	0.00	0.00	-	0.00
30	1,151	1,154	30.12	108.0	0.00	72.24	-	-	0.00	0.00	-	0.00
31	4,708	4,709	11.99	107.0	0.00	84.46	-	-	0.00	0.00	-	0.00
32	4,292	4,293	13.14	107.0	0.00	83.65	-	-	0.00	0.00	-	0.00
33	5,100	5,101	10.98	107.0	0.00	85.15	-	-	0.00	0.00	-	0.00
201	1,025	1,028	31.38	108.0	0.00	71.24	-	-	0.00	0.00	-	0.00
202	1,289	1,291	28.88	108.0	0.00	73.22	-	-	0.00	0.00	-	0.00
203	2,511	2,512	21.15	108.0	0.00	79.00	-	-	0.00	0.00	-	0.00
204	2,446	2,448	21.43	108.0	0.00	78.77	-	-	0.00	0.00	-	0.00
205	2,943	2,945	19.37	108.0	0.00	80.38	-	-	0.00	0.00	-	0.00
206	3,434	3,435	17.58	108.0	0.00	81.72	-	-	0.00	0.00	-	0.00
207	4,224	4,224	15.05	108.0	0.00	83.52	-	-	0.00	0.00	-	0.00
208	6,621	6,621	9.15	108.0	0.00	87.42	-	-	0.00	0.00	-	0.00
209	7,016	7,017	8.35	108.0	0.00	87.92	-	-	0.00	0.00	-	0.00
210	7,482	7,483	7.45	108.0	0.00	88.48	-	-	0.00	0.00	-	0.00
211	7,110	7,111	8.16	108.0	0.00	88.04	-	-	0.00	0.00	-	0.00
212	7,242	7,243	7.90	108.0	0.00	88.20	-	-	0.00	0.00	-	0.00
213	7,466	7,467	7.48	108.0	0.00	88.46	-	-	0.00	0.00	-	0.00
214	7,808	7,809	6.85	108.0	0.00	88.85	-	-	0.00	0.00	-	0.00
215	6,183	6,184	10.08	108.0	0.00	86.83	-	-	0.00	0.00	-	0.00
216	7,588	7,588	7.25	108.0	0.00	88.60	-	-	0.00	0.00	-	0.00
217	8,304	8,305	5.98	108.0	0.00	89.39	-	-	0.00	0.00	-	0.00
218	9,798	9,798	3.60	108.0	0.00	90.82	-	-	0.00	0.00	-	0.00
219	10,336	10,336	2.82	108.0	0.00	91.29	-	-	0.00	0.00	-	0.00
220	10,791	10,791	2.19	108.0	0.00	91.66	-	-	0.00	0.00	-	0.00
221	11,409	11,409	1.36	108.0	0.00	92.15	-	-	0.00	0.00	-	0.00
222	12,370	12,371	0.17	108.0	0.00	92.85	-	-	0.00	0.00	-	0.00
223	11,776	11,777	0.90	108.0	0.00	92.42	-	-	0.00	0.00	-	0.00
224	11,310	11,311	1.49	108.0	0.00	92.07	-	-	0.00	0.00	-	0.00
225	11,005	11,005	1.90	108.0	0.00	91.83	-	-	0.00	0.00	-	0.00
226	10,887	10,887	2.06	108.0	0.00	91.74	-	-	0.00	0.00	-	0.00
227	10,103	10,103	3.15	108.0	0.00	91.09	-	-	0.00	0.00	-	0.00
228	11,924	11,925	0.71	108.0	0.00	92.53	-	-	0.00	0.00	-	0.00
229	9,446	9,447	4.13	108.0	0.00	90.51	-	-	0.00	0.00	-	0.00
230	9,132	9,133	4.62	108.0	0.00	90.21	-	-	0.00	0.00	-	0.00
231	8,647	8,647	5.40	108.0	0.00	89.74	-	-	0.00	0.00	-	0.00
232	8,525	8,525	5.60	108.0	0.00	89.61	-	-	0.00	0.00	-	0.00
233	8,128	8,128	6.28	108.0	0.00	89.20	-	-	0.00	0.00	-	0.00
234	7,869	7,870	6.74	108.0	0.00	88.92	-	-	0.00	0.00	-	0.00
235	7,222	7,222	7.94	108.0	0.00	88.17	-	-	0.00	0.00	-	0.00

Sum 42.71

- Data undefined due to calculation with octave data

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

Noise sensitive area: NSP006 NSP006

WTG

Wind speed: 8.0 m/s

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	2,269	2,272	22.31	108.0	0.00	78.13	-	-	0.00	0.00	-	0.00
2	1,437	1,444	27.63	108.0	0.00	74.19	-	-	0.00	0.00	-	0.00
3	5,295	5,297	10.51	107.0	0.00	85.48	-	-	0.00	0.00	-	0.00
4	5,037	5,038	11.14	107.0	0.00	85.05	-	-	0.00	0.00	-	0.00
5	4,246	4,247	13.27	107.0	0.00	83.56	-	-	0.00	0.00	-	0.00
6	2,064	2,067	23.45	108.0	0.00	77.31	-	-	0.00	0.00	-	0.00
7	2,988	2,990	19.20	108.0	0.00	80.51	-	-	0.00	0.00	-	0.00
8	5,860	5,862	9.23	107.0	0.00	86.36	-	-	0.00	0.00	-	0.00
9	2,009	2,012	23.78	108.0	0.00	77.07	-	-	0.00	0.00	-	0.00
10	1,749	1,754	25.39	108.0	0.00	75.88	-	-	0.00	0.00	-	0.00
11	1,343	1,346	28.41	108.0	0.00	73.58	-	-	0.00	0.00	-	0.00
12	3,965	3,966	14.11	107.0	0.00	82.97	-	-	0.00	0.00	-	0.00
13	4,678	4,679	12.06	107.0	0.00	84.40	-	-	0.00	0.00	-	0.00
14	3,933	3,934	14.21	107.0	0.00	82.90	-	-	0.00	0.00	-	0.00
15	2,557	2,560	20.94	108.0	0.00	79.16	-	-	0.00	0.00	-	0.00
16	5,115	5,116	10.95	107.0	0.00	85.18	-	-	0.00	0.00	-	0.00
17	2,460	2,463	21.36	108.0	0.00	78.83	-	-	0.00	0.00	-	0.00
18	3,332	3,333	16.21	107.0	0.00	81.46	-	-	0.00	0.00	-	0.00
19	3,603	3,604	15.28	107.0	0.00	82.13	-	-	0.00	0.00	-	0.00
20	2,738	2,741	20.18	108.0	0.00	79.76	-	-	0.00	0.00	-	0.00
22	5,644	5,645	9.71	107.0	0.00	86.03	-	-	0.00	0.00	-	0.00
23	6,627	6,628	7.66	107.0	0.00	87.43	-	-	0.00	0.00	-	0.00
25	2,068	2,070	23.43	108.0	0.00	77.32	-	-	0.00	0.00	-	0.00
26	3,219	3,220	18.34	108.0	0.00	81.16	-	-	0.00	0.00	-	0.00
27	2,671	2,673	20.46	108.0	0.00	79.54	-	-	0.00	0.00	-	0.00
28	2,327	2,330	22.00	108.0	0.00	78.35	-	-	0.00	0.00	-	0.00
29	4,227	4,228	13.32	107.0	0.00	83.52	-	-	0.00	0.00	-	0.00
30	1,024	1,029	31.37	108.0	0.00	71.25	-	-	0.00	0.00	-	0.00
31	4,412	4,412	12.79	107.0	0.00	83.89	-	-	0.00	0.00	-	0.00
32	4,826	4,827	11.68	107.0	0.00	84.67	-	-	0.00	0.00	-	0.00
33	4,976	4,977	11.29	107.0	0.00	84.94	-	-	0.00	0.00	-	0.00
201	889	894	32.88	108.0	0.00	70.03	-	-	0.00	0.00	-	0.00
202	1,038	1,043	31.23	108.0	0.00	71.36	-	-	0.00	0.00	-	0.00
203	1,110	1,114	30.51	108.0	0.00	71.94	-	-	0.00	0.00	-	0.00
204	1,223	1,227	29.44	108.0	0.00	72.78	-	-	0.00	0.00	-	0.00
205	1,747	1,750	25.41	108.0	0.00	75.86	-	-	0.00	0.00	-	0.00
206	1,965	1,967	24.04	108.0	0.00	76.87	-	-	0.00	0.00	-	0.00
207	2,753	2,755	20.13	108.0	0.00	79.80	-	-	0.00	0.00	-	0.00
208	6,264	6,265	9.90	108.0	0.00	86.94	-	-	0.00	0.00	-	0.00
209	6,678	6,678	9.03	108.0	0.00	87.49	-	-	0.00	0.00	-	0.00
210	7,189	7,190	8.01	108.0	0.00	88.13	-	-	0.00	0.00	-	0.00
211	7,068	7,069	8.24	108.0	0.00	87.99	-	-	0.00	0.00	-	0.00
212	7,277	7,278	7.84	108.0	0.00	88.24	-	-	0.00	0.00	-	0.00
213	7,574	7,575	7.28	108.0	0.00	88.59	-	-	0.00	0.00	-	0.00
214	7,933	7,934	6.63	108.0	0.00	88.99	-	-	0.00	0.00	-	0.00
215	6,571	6,572	9.25	108.0	0.00	87.35	-	-	0.00	0.00	-	0.00
216	7,940	7,940	6.61	108.0	0.00	89.00	-	-	0.00	0.00	-	0.00
217	8,642	8,642	5.41	108.0	0.00	89.73	-	-	0.00	0.00	-	0.00
218	9,858	9,858	3.51	108.0	0.00	90.88	-	-	0.00	0.00	-	0.00
219	10,481	10,482	2.61	108.0	0.00	91.41	-	-	0.00	0.00	-	0.00
220	10,912	10,913	2.02	108.0	0.00	91.76	-	-	0.00	0.00	-	0.00
221	11,552	11,552	1.18	108.0	0.00	92.25	-	-	0.00	0.00	-	0.00
222	12,922	12,922	-0.48	108.0	0.00	93.23	-	-	0.00	0.00	-	0.00
223	12,364	12,365	0.17	108.0	0.00	92.84	-	-	0.00	0.00	-	0.00
224	11,687	11,687	1.01	108.0	0.00	92.35	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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 6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG **Wind speed: 8.0 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
225	11,401	11,402	1.37	108.0	0.00	92.14	-	-	0.00	0.00	-	0.00
226	11,400	11,401	1.38	108.0	0.00	92.14	-	-	0.00	0.00	-	0.00
227	10,666	10,667	2.36	108.0	0.00	91.56	-	-	0.00	0.00	-	0.00
228	12,423	12,423	0.10	108.0	0.00	92.88	-	-	0.00	0.00	-	0.00
229	9,985	9,986	3.32	108.0	0.00	90.99	-	-	0.00	0.00	-	0.00
230	9,655	9,656	3.81	108.0	0.00	90.70	-	-	0.00	0.00	-	0.00
231	9,196	9,197	4.52	108.0	0.00	90.27	-	-	0.00	0.00	-	0.00
232	9,262	9,263	4.41	108.0	0.00	90.33	-	-	0.00	0.00	-	0.00
233	8,879	8,880	5.02	108.0	0.00	89.97	-	-	0.00	0.00	-	0.00
234	8,656	8,657	5.39	108.0	0.00	89.75	-	-	0.00	0.00	-	0.00
235	7,956	7,957	6.59	108.0	0.00	89.01	-	-	0.00	0.00	-	0.00
Sum			40.41									

- Data undefined due to calculation with octave data

Noise sensitive area: NSP007 NSP007

WTG **Wind speed: 8.0 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	4,417	4,419	14.48	108.0	0.00	83.91	-	-	0.00	0.00	-	0.00
2	3,995	3,997	15.74	108.0	0.00	83.03	-	-	0.00	0.00	-	0.00
3	7,219	7,220	6.56	107.0	0.00	88.17	-	-	0.00	0.00	-	0.00
4	6,575	6,576	7.76	107.0	0.00	87.36	-	-	0.00	0.00	-	0.00
5	6,432	6,432	8.04	107.0	0.00	87.17	-	-	0.00	0.00	-	0.00
6	4,749	4,750	13.56	108.0	0.00	84.53	-	-	0.00	0.00	-	0.00
7	5,635	5,636	11.32	108.0	0.00	86.02	-	-	0.00	0.00	-	0.00
8	7,566	7,567	5.96	107.0	0.00	88.58	-	-	0.00	0.00	-	0.00
9	3,726	3,727	16.60	108.0	0.00	82.43	-	-	0.00	0.00	-	0.00
10	4,047	4,049	15.58	108.0	0.00	83.15	-	-	0.00	0.00	-	0.00
11	2,597	2,598	20.78	108.0	0.00	79.29	-	-	0.00	0.00	-	0.00
12	4,999	4,999	11.24	107.0	0.00	84.98	-	-	0.00	0.00	-	0.00
13	6,211	6,211	8.49	107.0	0.00	86.86	-	-	0.00	0.00	-	0.00
14	5,896	5,896	9.15	107.0	0.00	86.41	-	-	0.00	0.00	-	0.00
15	5,132	5,133	12.56	108.0	0.00	85.21	-	-	0.00	0.00	-	0.00
16	6,869	6,869	7.20	107.0	0.00	87.74	-	-	0.00	0.00	-	0.00
17	5,108	5,109	12.62	108.0	0.00	85.17	-	-	0.00	0.00	-	0.00
18	5,551	5,551	9.92	107.0	0.00	85.89	-	-	0.00	0.00	-	0.00
19	5,390	5,391	10.29	107.0	0.00	85.63	-	-	0.00	0.00	-	0.00
20	5,426	5,427	11.82	108.0	0.00	85.69	-	-	0.00	0.00	-	0.00
22	6,868	6,868	7.20	107.0	0.00	87.74	-	-	0.00	0.00	-	0.00
23	8,280	8,281	4.79	107.0	0.00	89.36	-	-	0.00	0.00	-	0.00
25	4,665	4,665	13.79	108.0	0.00	84.38	-	-	0.00	0.00	-	0.00
26	5,887	5,887	10.74	108.0	0.00	86.40	-	-	0.00	0.00	-	0.00
27	4,823	4,823	13.36	108.0	0.00	84.67	-	-	0.00	13.36	-	0.00
28	4,994	4,995	12.91	108.0	0.00	84.97	-	-	0.00	0.00	-	0.00
29	4,956	4,957	11.34	107.0	0.00	84.90	-	-	0.00	0.00	-	0.00
30	3,542	3,543	17.21	108.0	0.00	81.99	-	-	0.00	0.00	-	0.00
31	5,540	5,541	9.94	107.0	0.00	85.87	-	-	0.00	0.00	-	0.00
32	6,915	6,916	7.12	107.0	0.00	87.80	-	-	0.00	0.00	-	0.00
33	6,262	6,262	8.39	107.0	0.00	86.93	-	-	0.00	0.00	-	0.00
201	3,275	3,276	18.14	108.0	0.00	81.31	-	-	0.00	0.00	-	0.00
202	3,181	3,182	18.48	108.0	0.00	81.05	-	-	0.00	0.00	-	0.00
203	1,640	1,641	26.16	108.0	0.00	75.30	-	-	0.00	0.00	-	0.00
204	1,873	1,875	24.61	108.0	0.00	76.46	-	-	0.00	0.00	-	0.00
205	1,628	1,631	26.23	108.0	0.00	75.25	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:
Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:
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 Calculated:
 6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
206	946	948	32.25	108.0	0.00	70.54	-	-	0.00	0.00	-	0.00
207	559	566	37.67	108.0	0.00	66.05	-	-	0.00	0.00	-	0.00
208	7,009	7,009	8.36	108.0	0.00	87.91	-	-	0.00	0.00	-	0.00
209	7,408	7,409	7.59	108.0	0.00	88.39	-	-	0.00	0.00	-	0.00
210	7,948	7,949	6.60	108.0	0.00	89.01	-	-	0.00	0.00	-	0.00
211	8,242	8,243	6.08	108.0	0.00	89.32	-	-	0.00	0.00	-	0.00
212	8,550	8,550	5.56	108.0	0.00	89.64	-	-	0.00	0.00	-	0.00
213	8,932	8,933	4.94	108.0	0.00	90.02	-	-	0.00	0.00	-	0.00
214	9,293	9,293	4.36	108.0	0.00	90.36	-	-	0.00	0.00	-	0.00
215	8,368	8,368	5.87	108.0	0.00	89.45	-	-	0.00	0.00	-	0.00
216	9,611	9,611	3.88	108.0	0.00	90.66	-	-	0.00	0.00	-	0.00
217	10,260	10,261	2.92	108.0	0.00	91.22	-	-	0.00	0.00	-	0.00
218	11,021	11,021	1.88	108.0	0.00	91.84	-	-	0.00	0.00	-	0.00
219	11,748	11,749	0.93	108.0	0.00	92.40	-	-	0.00	0.00	-	0.00
220	12,127	12,127	0.46	108.0	0.00	92.67	-	-	0.00	0.00	-	0.00
221	12,779	12,779	-0.32	108.0	0.00	93.13	-	-	0.00	0.00	-	0.00
222	14,704	14,704	-2.41	108.0	0.00	94.35	-	-	0.00	0.00	-	0.00
223	14,206	14,206	-1.90	108.0	0.00	94.05	-	-	0.00	0.00	-	0.00
224	13,254	13,254	-0.86	108.0	0.00	93.45	-	-	0.00	0.00	-	0.00
225	13,004	13,004	-0.58	108.0	0.00	93.28	-	-	0.00	0.00	-	0.00
226	13,163	13,164	-0.76	108.0	0.00	93.39	-	-	0.00	0.00	-	0.00
227	12,513	12,514	-0.01	108.0	0.00	92.95	-	-	0.00	0.00	-	0.00
228	14,144	14,144	-1.83	108.0	0.00	94.01	-	-	0.00	0.00	-	0.00
229	11,819	11,820	0.84	108.0	0.00	92.45	-	-	0.00	0.00	-	0.00
230	11,478	11,479	1.28	108.0	0.00	92.20	-	-	0.00	0.00	-	0.00
231	11,068	11,068	1.81	108.0	0.00	91.88	-	-	0.00	0.00	-	0.00
232	11,357	11,357	1.43	108.0	0.00	92.11	-	-	0.00	0.00	-	0.00
233	11,000	11,001	1.90	108.0	0.00	91.83	-	-	0.00	0.00	-	0.00
234	10,821	10,821	2.14	108.0	0.00	91.69	-	-	0.00	0.00	-	0.00
235	10,084	10,085	3.18	108.0	0.00	91.07	-	-	0.00	0.00	-	0.00
Sum	39.75											

- Data undefined due to calculation with octave data

Noise sensitive area: NSP008 NSP008

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	3,852	3,854	16.19	108.0	0.00	82.72	-	-	0.00	0.00	-	0.00
2	4,553	4,555	14.10	108.0	0.00	84.17	-	-	0.00	0.00	-	0.00
3	4,875	4,876	11.55	107.0	0.00	84.76	-	-	0.00	0.00	-	0.00
4	3,747	3,749	14.80	107.0	0.00	82.48	-	-	0.00	0.00	-	0.00
5	4,877	4,879	11.54	107.0	0.00	84.77	-	-	0.00	0.00	-	0.00
6	5,747	5,748	11.06	108.0	0.00	86.19	-	-	0.00	0.00	-	0.00
7	5,785	5,786	10.97	108.0	0.00	86.25	-	-	0.00	0.00	-	0.00
8	4,746	4,747	11.88	107.0	0.00	84.53	-	-	0.00	0.00	-	0.00
9	3,143	3,146	18.61	108.0	0.00	80.95	-	-	0.00	0.00	-	0.00
10	4,037	4,039	15.61	108.0	0.00	83.12	-	-	0.00	0.00	-	0.00
11	3,177	3,179	18.49	108.0	0.00	81.05	-	-	0.00	0.00	-	0.00
12	2,132	2,134	21.50	107.0	0.00	77.58	-	-	0.00	0.00	-	0.00
13	3,503	3,505	15.61	107.0	0.00	81.89	-	-	0.00	0.00	-	0.00
14	4,094	4,095	13.72	107.0	0.00	83.24	-	-	0.00	0.00	-	0.00
15	5,144	5,146	12.52	108.0	0.00	85.23	-	-	0.00	0.00	-	0.00
16	4,313	4,315	13.07	107.0	0.00	83.70	-	-	0.00	0.00	-	0.00
17	6,310	6,311	9.80	108.0	0.00	87.00	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
18	4,433	4,434	12.73	107.0	0.00	83.94	-	-	0.00	0.00	-	0.00
19	3,520	3,522	15.55	107.0	0.00	81.93	-	-	0.00	0.00	-	0.00
20	6,083	6,084	10.30	108.0	0.00	86.68	-	-	0.00	0.00	-	0.00
22	3,485	3,486	15.67	107.0	0.00	81.85	-	-	0.00	0.00	-	0.00
23	5,235	5,237	10.65	107.0	0.00	85.38	-	-	0.00	0.00	-	0.00
25	6,160	6,161	10.13	108.0	0.00	86.79	-	-	0.00	0.00	-	0.00
26	6,798	6,799	8.78	108.0	0.00	87.65	-	-	0.00	0.00	-	0.00
27	3,977	3,978	15.80	108.0	0.00	82.99	-	-	0.00	0.00	-	0.00
28	5,497	5,498	11.65	108.0	0.00	85.80	-	-	0.00	0.00	-	0.00
29	1,643	1,646	24.72	107.0	0.00	75.33	-	-	0.00	0.00	-	0.00
30	4,339	4,340	14.71	108.0	0.00	83.75	-	-	0.00	0.00	-	0.00
31	2,492	2,494	19.58	107.0	0.00	78.94	-	-	0.00	0.00	-	0.00
32	4,992	4,993	11.25	107.0	0.00	84.97	-	-	0.00	0.00	-	0.00
33	3,147	3,149	16.89	107.0	0.00	80.96	-	-	0.00	0.00	-	0.00
201	5,388	5,389	11.92	108.0	0.00	85.63	-	-	0.00	0.00	-	0.00
202	5,552	5,553	11.52	108.0	0.00	85.89	-	-	0.00	0.00	-	0.00
203	4,501	4,502	14.25	108.0	0.00	84.07	-	-	0.00	0.00	-	0.00
204	4,972	4,973	12.97	108.0	0.00	84.93	-	-	0.00	0.00	-	0.00
205	5,196	5,197	12.39	108.0	0.00	85.32	-	-	0.00	0.00	-	0.00
206	3,654	3,655	16.83	108.0	0.00	82.26	-	-	0.00	0.00	-	0.00
207	3,732	3,734	16.57	108.0	0.00	82.44	-	-	0.00	0.00	-	0.00
208	3,051	3,053	18.96	108.0	0.00	80.69	-	-	0.00	0.00	-	0.00
209	3,394	3,396	17.71	108.0	0.00	81.62	-	-	0.00	0.00	-	0.00
210	3,910	3,912	16.00	108.0	0.00	82.85	-	-	0.00	0.00	-	0.00
211	4,562	4,564	14.07	108.0	0.00	84.19	-	-	0.00	0.00	-	0.00
212	4,946	4,948	13.03	108.0	0.00	84.89	-	-	0.00	0.00	-	0.00
213	5,388	5,389	11.92	108.0	0.00	85.63	-	-	0.00	0.00	-	0.00
214	5,714	5,715	11.14	108.0	0.00	86.14	-	-	0.00	0.00	-	0.00
215	5,543	5,544	11.54	108.0	0.00	85.88	-	-	0.00	0.00	-	0.00
216	6,414	6,415	9.58	108.0	0.00	87.14	-	-	0.00	0.00	-	0.00
217	6,925	6,926	8.53	108.0	0.00	87.81	-	-	0.00	0.00	-	0.00
218	7,129	7,130	8.12	108.0	0.00	88.06	-	-	0.00	0.00	-	0.00
219	7,919	7,920	6.65	108.0	0.00	88.97	-	-	0.00	0.00	-	0.00
220	8,237	8,237	6.09	108.0	0.00	89.32	-	-	0.00	0.00	-	0.00
221	8,878	8,879	5.02	108.0	0.00	89.97	-	-	0.00	0.00	-	0.00
222	11,348	11,349	1.44	108.0	0.00	92.10	-	-	0.00	0.00	-	0.00
223	10,956	10,956	1.96	108.0	0.00	91.79	-	-	0.00	0.00	-	0.00
224	9,678	9,678	3.78	108.0	0.00	90.72	-	-	0.00	0.00	-	0.00
225	9,480	9,481	4.07	108.0	0.00	90.54	-	-	0.00	0.00	-	0.00
226	9,845	9,846	3.53	108.0	0.00	90.86	-	-	0.00	0.00	-	0.00
227	9,354	9,355	4.27	108.0	0.00	90.42	-	-	0.00	0.00	-	0.00
228	10,725	10,725	2.28	108.0	0.00	91.61	-	-	0.00	0.00	-	0.00
229	8,683	8,684	5.34	108.0	0.00	89.77	-	-	0.00	0.00	-	0.00
230	8,348	8,349	5.90	108.0	0.00	89.43	-	-	0.00	0.00	-	0.00
231	8,047	8,048	6.42	108.0	0.00	89.11	-	-	0.00	0.00	-	0.00
232	8,722	8,723	5.28	108.0	0.00	89.81	-	-	0.00	0.00	-	0.00
233	8,451	8,452	5.73	108.0	0.00	89.54	-	-	0.00	0.00	-	0.00
234	8,384	8,385	5.84	108.0	0.00	89.47	-	-	0.00	0.00	-	0.00
235	7,646	7,647	7.14	108.0	0.00	88.67	-	-	0.00	0.00	-	0.00

Sum 32.53

- Data undefined due to calculation with octave data

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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 Calculated:
 6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

Noise sensitive area: NSP009 NSP009

WTG

Wind speed: 8.0 m/s

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	4,159	4,162	15.24	108.0	0.00	83.39	-	-	0.00	0.00	-	0.00
2	4,935	4,938	13.06	108.0	0.00	84.87	-	-	0.00	0.00	-	0.00
3	4,855	4,857	11.60	107.0	0.00	84.73	-	-	0.00	0.00	-	0.00
4	3,682	3,684	15.01	107.0	0.00	82.33	-	-	0.00	0.00	-	0.00
5	4,992	4,994	11.25	107.0	0.00	84.97	-	-	0.00	0.00	-	0.00
6	6,124	6,125	10.21	108.0	0.00	86.74	-	-	0.00	0.00	-	0.00
7	6,081	6,083	10.30	108.0	0.00	86.68	-	-	0.00	0.00	-	0.00
8	4,637	4,639	12.17	107.0	0.00	84.33	-	-	0.00	0.00	-	0.00
9	3,506	3,508	17.33	108.0	0.00	81.90	-	-	0.00	0.00	-	0.00
10	4,393	4,395	14.55	108.0	0.00	83.86	-	-	0.00	0.00	-	0.00
11	3,643	3,645	16.87	108.0	0.00	82.23	-	-	0.00	0.00	-	0.00
12	2,211	2,214	21.04	107.0	0.00	77.90	-	-	0.00	0.00	-	0.00
13	3,481	3,483	15.69	107.0	0.00	81.84	-	-	0.00	0.00	-	0.00
14	4,209	4,210	13.37	107.0	0.00	83.49	-	-	0.00	0.00	-	0.00
15	5,449	5,451	11.77	108.0	0.00	85.73	-	-	0.00	0.00	-	0.00
16	4,277	4,279	13.17	107.0	0.00	83.63	-	-	0.00	0.00	-	0.00
17	6,690	6,691	9.00	108.0	0.00	87.51	-	-	0.00	0.00	-	0.00
18	4,634	4,635	12.18	107.0	0.00	84.32	-	-	0.00	0.00	-	0.00
19	3,663	3,664	15.07	107.0	0.00	82.28	-	-	0.00	0.00	-	0.00
20	6,420	6,422	9.56	108.0	0.00	87.15	-	-	0.00	0.00	-	0.00
22	3,295	3,297	16.34	107.0	0.00	81.36	-	-	0.00	0.00	-	0.00
23	5,064	5,066	11.07	107.0	0.00	85.09	-	-	0.00	0.00	-	0.00
25	6,566	6,567	9.26	108.0	0.00	87.35	-	-	0.00	0.00	-	0.00
26	7,141	7,142	8.10	108.0	0.00	88.08	-	-	0.00	0.00	-	0.00
27	4,241	4,243	14.99	108.0	0.00	83.55	-	-	0.00	0.00	-	0.00
28	5,837	5,839	10.85	108.0	0.00	86.33	-	-	0.00	0.00	-	0.00
29	1,670	1,673	24.51	107.0	0.00	75.47	-	-	0.00	0.00	-	0.00
30	4,751	4,752	13.56	108.0	0.00	84.54	-	-	0.00	0.00	-	0.00
31	2,472	2,474	19.67	107.0	0.00	78.87	-	-	0.00	0.00	-	0.00
32	5,042	5,044	11.13	107.0	0.00	85.05	-	-	0.00	0.00	-	0.00
33	3,050	3,052	17.26	107.0	0.00	80.69	-	-	0.00	0.00	-	0.00
201	5,850	5,852	10.82	108.0	0.00	86.35	-	-	0.00	0.00	-	0.00
202	6,024	6,025	10.43	108.0	0.00	86.60	-	-	0.00	0.00	-	0.00
203	5,011	5,012	12.87	108.0	0.00	85.00	-	-	0.00	0.00	-	0.00
204	5,480	5,482	11.69	108.0	0.00	85.78	-	-	0.00	0.00	-	0.00
205	5,712	5,713	11.14	108.0	0.00	86.14	-	-	0.00	0.00	-	0.00
206	4,174	4,175	15.20	108.0	0.00	83.41	-	-	0.00	0.00	-	0.00
207	4,244	4,246	14.98	108.0	0.00	83.56	-	-	0.00	0.00	-	0.00
208	2,695	2,697	20.36	108.0	0.00	79.62	-	-	0.00	0.00	-	0.00
209	3,007	3,009	19.13	108.0	0.00	80.57	-	-	0.00	0.00	-	0.00
210	3,505	3,507	17.33	108.0	0.00	81.90	-	-	0.00	0.00	-	0.00
211	4,255	4,257	14.95	108.0	0.00	83.58	-	-	0.00	0.00	-	0.00
212	4,651	4,653	13.83	108.0	0.00	84.35	-	-	0.00	0.00	-	0.00
213	5,099	5,101	12.64	108.0	0.00	85.15	-	-	0.00	0.00	-	0.00
214	5,412	5,413	11.86	108.0	0.00	85.67	-	-	0.00	0.00	-	0.00
215	5,409	5,410	11.86	108.0	0.00	85.66	-	-	0.00	0.00	-	0.00
216	6,185	6,186	10.07	108.0	0.00	86.83	-	-	0.00	0.00	-	0.00
217	6,660	6,661	9.06	108.0	0.00	87.47	-	-	0.00	0.00	-	0.00
218	6,736	6,737	8.91	108.0	0.00	87.57	-	-	0.00	0.00	-	0.00
219	7,537	7,537	7.35	108.0	0.00	88.54	-	-	0.00	0.00	-	0.00
220	7,838	7,839	6.80	108.0	0.00	88.89	-	-	0.00	0.00	-	0.00
221	8,475	8,475	5.69	108.0	0.00	89.56	-	-	0.00	0.00	-	0.00
222	11,046	11,046	1.84	108.0	0.00	91.86	-	-	0.00	0.00	-	0.00
223	10,675	10,675	2.34	108.0	0.00	91.57	-	-	0.00	0.00	-	0.00
224	9,341	9,341	4.29	108.0	0.00	90.41	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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 wind@eapc.net
 Calculated:
 6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
225	9,155	9,156	4.58	108.0	0.00	90.23	-	-	0.00	0.00	-	0.00
226	9,557	9,558	3.96	108.0	0.00	90.61	-	-	0.00	0.00	-	0.00
227	9,100	9,101	4.67	108.0	0.00	90.18	-	-	0.00	0.00	-	0.00
228	10,413	10,414	2.71	108.0	0.00	91.35	-	-	0.00	0.00	-	0.00
229	8,439	8,440	5.75	108.0	0.00	89.53	-	-	0.00	0.00	-	0.00
230	8,108	8,110	6.32	108.0	0.00	89.18	-	-	0.00	0.00	-	0.00
231	7,831	7,832	6.81	108.0	0.00	88.88	-	-	0.00	0.00	-	0.00
232	8,568	8,569	5.53	108.0	0.00	89.66	-	-	0.00	0.00	-	0.00
233	8,315	8,316	5.96	108.0	0.00	89.40	-	-	0.00	0.00	-	0.00
234	8,268	8,269	6.04	108.0	0.00	89.35	-	-	0.00	0.00	-	0.00
235	7,541	7,542	7.34	108.0	0.00	88.55	-	-	0.00	0.00	-	0.00
Sum	32.35											

- Data undefined due to calculation with octave data

Noise sensitive area: NSP010 NSP010

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	4,847	4,848	13.30	108.0	0.00	84.71	-	-	0.00	0.00	-	0.00
2	5,699	5,701	11.17	108.0	0.00	86.12	-	-	0.00	0.00	-	0.00
3	5,080	5,081	11.03	107.0	0.00	85.12	-	-	0.00	0.00	-	0.00
4	3,871	3,872	14.40	107.0	0.00	82.76	-	-	0.00	0.00	-	0.00
5	5,416	5,417	10.23	107.0	0.00	85.67	-	-	0.00	0.00	-	0.00
6	6,875	6,876	8.63	108.0	0.00	87.75	-	-	0.00	0.00	-	0.00
7	6,736	6,737	8.91	108.0	0.00	87.57	-	-	0.00	0.00	-	0.00
8	4,720	4,721	11.95	107.0	0.00	84.48	-	-	0.00	0.00	-	0.00
9	4,262	4,263	14.93	108.0	0.00	83.60	-	-	0.00	0.00	-	0.00
10	5,133	5,134	12.55	108.0	0.00	85.21	-	-	0.00	0.00	-	0.00
11	4,493	4,493	14.27	108.0	0.00	84.05	-	-	0.00	0.00	-	0.00
12	2,695	2,696	18.70	107.0	0.00	79.61	-	-	0.00	0.00	-	0.00
13	3,745	3,746	14.81	107.0	0.00	82.47	-	-	0.00	0.00	-	0.00
14	4,650	4,651	12.14	107.0	0.00	84.35	-	-	0.00	0.00	-	0.00
15	6,120	6,120	10.22	108.0	0.00	86.74	-	-	0.00	0.00	-	0.00
16	4,490	4,491	12.57	107.0	0.00	84.05	-	-	0.00	0.00	-	0.00
17	7,442	7,442	7.53	108.0	0.00	88.43	-	-	0.00	0.00	-	0.00
18	5,183	5,183	10.78	107.0	0.00	85.29	-	-	0.00	0.00	-	0.00
19	4,157	4,157	13.53	107.0	0.00	83.38	-	-	0.00	0.00	-	0.00
20	7,124	7,125	8.13	108.0	0.00	88.06	-	-	0.00	0.00	-	0.00
22	3,286	3,287	16.38	107.0	0.00	81.34	-	-	0.00	0.00	-	0.00
23	5,025	5,026	11.17	107.0	0.00	85.02	-	-	0.00	0.00	-	0.00
25	7,348	7,348	7.70	108.0	0.00	88.32	-	-	0.00	0.00	-	0.00
26	7,849	7,849	6.78	108.0	0.00	88.90	-	-	0.00	0.00	-	0.00
27	4,877	4,878	13.22	108.0	0.00	84.76	-	-	0.00	0.00	-	0.00
28	6,548	6,549	9.30	108.0	0.00	87.32	-	-	0.00	0.00	-	0.00
29	2,146	2,147	21.43	107.0	0.00	77.64	-	-	0.00	0.00	-	0.00
30	5,547	5,547	11.53	108.0	0.00	85.88	-	-	0.00	0.00	-	0.00
31	2,800	2,801	18.26	107.0	0.00	79.95	-	-	0.00	0.00	-	0.00
32	5,371	5,371	10.33	107.0	0.00	85.60	-	-	0.00	0.00	-	0.00
33	3,217	3,218	16.63	107.0	0.00	81.15	-	-	0.00	0.00	-	0.00
201	6,692	6,693	9.00	108.0	0.00	87.51	-	-	0.00	0.00	-	0.00
202	6,874	6,874	8.63	108.0	0.00	87.74	-	-	0.00	0.00	-	0.00
203	5,886	5,886	10.74	108.0	0.00	86.40	-	-	0.00	0.00	-	0.00
204	6,355	6,356	9.70	108.0	0.00	87.06	-	-	0.00	0.00	-	0.00
205	6,587	6,588	9.21	108.0	0.00	87.37	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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Calculated:

6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG **Wind speed: 8.0 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
206	5,043	5,043	12.79	108.0	0.00	85.05	-	-	0.00	0.00	-	0.00
207	5,082	5,083	12.68	108.0	0.00	85.12	-	-	0.00	0.00	-	0.00
208	2,376	2,377	21.76	108.0	0.00	78.52	-	-	0.00	0.00	-	0.00
209	2,593	2,594	20.79	108.0	0.00	79.28	-	-	0.00	0.00	-	0.00
210	3,023	3,025	19.07	108.0	0.00	80.61	-	-	0.00	0.00	-	0.00
211	3,973	3,974	15.81	108.0	0.00	82.98	-	-	0.00	0.00	-	0.00
212	4,383	4,384	14.58	108.0	0.00	83.84	-	-	0.00	0.00	-	0.00
213	4,835	4,836	13.33	108.0	0.00	84.69	-	-	0.00	0.00	-	0.00
214	5,113	5,114	12.61	108.0	0.00	85.17	-	-	0.00	0.00	-	0.00
215	5,429	5,430	11.82	108.0	0.00	85.70	-	-	0.00	0.00	-	0.00
216	6,020	6,020	10.44	108.0	0.00	86.59	-	-	0.00	0.00	-	0.00
217	6,418	6,419	9.57	108.0	0.00	87.15	-	-	0.00	0.00	-	0.00
218	6,227	6,227	9.98	108.0	0.00	86.89	-	-	0.00	0.00	-	0.00
219	7,044	7,045	8.29	108.0	0.00	87.96	-	-	0.00	0.00	-	0.00
220	7,309	7,310	7.78	108.0	0.00	88.28	-	-	0.00	0.00	-	0.00
221	7,931	7,931	6.63	108.0	0.00	88.99	-	-	0.00	0.00	-	0.00
222	10,698	10,698	2.31	108.0	0.00	91.59	-	-	0.00	0.00	-	0.00
223	10,370	10,370	2.77	108.0	0.00	91.32	-	-	0.00	0.00	-	0.00
224	8,932	8,932	4.94	108.0	0.00	90.02	-	-	0.00	0.00	-	0.00
225	8,771	8,771	5.20	108.0	0.00	89.86	-	-	0.00	0.00	-	0.00
226	9,246	9,246	4.44	108.0	0.00	90.32	-	-	0.00	0.00	-	0.00
227	8,856	8,856	5.06	108.0	0.00	89.95	-	-	0.00	0.00	-	0.00
228	10,051	10,051	3.23	108.0	0.00	91.04	-	-	0.00	0.00	-	0.00
229	8,219	8,219	6.13	108.0	0.00	89.30	-	-	0.00	0.00	-	0.00
230	7,899	7,900	6.69	108.0	0.00	88.95	-	-	0.00	0.00	-	0.00
231	7,670	7,670	7.10	108.0	0.00	88.70	-	-	0.00	0.00	-	0.00
232	8,512	8,513	5.63	108.0	0.00	89.60	-	-	0.00	0.00	-	0.00
233	8,293	8,294	6.00	108.0	0.00	89.38	-	-	0.00	0.00	-	0.00
234	8,281	8,282	6.02	108.0	0.00	89.36	-	-	0.00	0.00	-	0.00
235	7,579	7,580	7.27	108.0	0.00	88.59	-	-	0.00	0.00	-	0.00
Sum			31.50									

- Data undefined due to calculation with octave data

Noise sensitive area: NSP011 NSP011

WTG **Wind speed: 8.0 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	3,718	3,720	16.62	108.0	0.00	82.41	-	-	0.00	0.00	-	0.00
2	4,729	4,731	13.61	108.0	0.00	84.50	-	-	0.00	0.00	-	0.00
3	3,462	3,464	15.75	107.0	0.00	81.79	-	-	0.00	0.00	-	0.00
4	2,251	2,254	20.81	107.0	0.00	78.06	-	-	0.00	0.00	-	0.00
5	3,889	3,890	14.35	107.0	0.00	82.80	-	-	0.00	0.00	-	0.00
6	5,829	5,831	10.87	108.0	0.00	86.31	-	-	0.00	0.00	-	0.00
7	5,475	5,476	11.70	108.0	0.00	85.77	-	-	0.00	0.00	-	0.00
8	3,112	3,114	17.02	107.0	0.00	80.87	-	-	0.00	0.00	-	0.00
9	3,353	3,354	17.86	108.0	0.00	81.51	-	-	0.00	0.00	-	0.00
10	4,119	4,121	15.36	108.0	0.00	83.30	-	-	0.00	0.00	-	0.00
11	3,964	3,965	15.84	108.0	0.00	82.97	-	-	0.00	0.00	-	0.00
12	1,407	1,409	26.59	107.0	0.00	73.98	-	-	0.00	0.00	-	0.00
13	2,147	2,150	21.41	107.0	0.00	77.65	-	-	0.00	0.00	-	0.00
14	3,154	3,155	16.87	107.0	0.00	80.98	-	-	0.00	0.00	-	0.00
15	4,903	4,905	13.15	108.0	0.00	84.81	-	-	0.00	0.00	-	0.00
16	2,872	2,874	17.96	107.0	0.00	80.17	-	-	0.00	0.00	-	0.00
17	6,384	6,385	9.64	108.0	0.00	87.10	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:
Minnesota Power - BISON Wind Energy Center

Description:
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 Calculated:
 6/23/2011 1:32 PM/2.7.486

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
18	3,794	3,795	14.65	107.0	0.00	82.58	-	-	0.00	0.00	-	0.00
19	2,736	2,738	18.52	107.0	0.00	79.75	-	-	0.00	0.00	-	0.00
20	5,953	5,954	10.59	108.0	0.00	86.50	-	-	0.00	0.00	-	0.00
22	1,708	1,711	24.24	107.0	0.00	75.67	-	-	0.00	0.00	-	0.00
23	3,475	3,478	15.70	107.0	0.00	81.83	-	-	0.00	0.00	-	0.00
25	6,384	6,385	9.64	108.0	0.00	87.10	-	-	0.00	0.00	-	0.00
26	6,673	6,674	9.04	108.0	0.00	87.49	-	-	0.00	0.00	-	0.00
27	3,639	3,641	16.88	108.0	0.00	82.22	-	-	0.00	0.00	-	0.00
28	5,407	5,409	11.87	108.0	0.00	85.66	-	-	0.00	0.00	-	0.00
29	1,010	1,014	30.46	107.0	0.00	71.12	-	-	0.00	0.00	-	0.00
30	4,691	4,692	13.72	108.0	0.00	84.43	-	-	0.00	0.00	-	0.00
31	1,288	1,291	27.63	107.0	0.00	73.22	-	-	0.00	0.00	-	0.00
32	3,783	3,784	14.68	107.0	0.00	82.56	-	-	0.00	0.00	-	0.00
33	1,598	1,602	25.05	107.0	0.00	75.09	-	-	0.00	0.00	-	0.00
201	6,004	6,005	10.47	108.0	0.00	86.57	-	-	0.00	0.00	-	0.00
202	6,236	6,236	9.96	108.0	0.00	86.90	-	-	0.00	0.00	-	0.00
203	5,587	5,587	11.44	108.0	0.00	85.94	-	-	0.00	0.00	-	0.00
204	6,027	6,028	10.42	108.0	0.00	86.60	-	-	0.00	0.00	-	0.00
205	6,370	6,371	9.67	108.0	0.00	87.08	-	-	0.00	0.00	-	0.00
206	5,014	5,014	12.86	108.0	0.00	85.00	-	-	0.00	0.00	-	0.00
207	5,302	5,303	12.13	108.0	0.00	85.49	-	-	0.00	0.00	-	0.00
208	1,224	1,227	29.44	108.0	0.00	72.78	-	-	0.00	0.00	-	0.00
209	1,613	1,616	26.34	108.0	0.00	75.17	-	-	0.00	0.00	-	0.00
210	2,152	2,155	22.95	108.0	0.00	77.67	-	-	0.00	0.00	-	0.00
211	2,683	2,686	20.41	108.0	0.00	79.58	-	-	0.00	0.00	-	0.00
212	3,068	3,070	18.89	108.0	0.00	80.74	-	-	0.00	0.00	-	0.00
213	3,512	3,513	17.31	108.0	0.00	81.91	-	-	0.00	0.00	-	0.00
214	3,835	3,837	16.24	108.0	0.00	82.68	-	-	0.00	0.00	-	0.00
215	3,847	3,849	16.20	108.0	0.00	82.71	-	-	0.00	0.00	-	0.00
216	4,578	4,579	14.03	108.0	0.00	84.22	-	-	0.00	0.00	-	0.00
217	5,060	5,061	12.74	108.0	0.00	85.09	-	-	0.00	0.00	-	0.00
218	5,305	5,306	12.12	108.0	0.00	85.49	-	-	0.00	0.00	-	0.00
219	6,078	6,079	10.31	108.0	0.00	86.68	-	-	0.00	0.00	-	0.00
220	6,416	6,417	9.57	108.0	0.00	87.15	-	-	0.00	0.00	-	0.00
221	7,064	7,065	8.25	108.0	0.00	87.98	-	-	0.00	0.00	-	0.00
222	9,470	9,471	4.09	108.0	0.00	90.53	-	-	0.00	0.00	-	0.00
223	9,084	9,085	4.69	108.0	0.00	90.17	-	-	0.00	0.00	-	0.00
224	7,802	7,803	6.86	108.0	0.00	88.85	-	-	0.00	0.00	-	0.00
225	7,602	7,603	7.23	108.0	0.00	88.62	-	-	0.00	0.00	-	0.00
226	7,971	7,971	6.56	108.0	0.00	89.03	-	-	0.00	0.00	-	0.00
227	7,497	7,498	7.42	108.0	0.00	88.50	-	-	0.00	0.00	-	0.00
228	8,846	8,846	5.07	108.0	0.00	89.94	-	-	0.00	0.00	-	0.00
229	6,833	6,834	8.71	108.0	0.00	87.69	-	-	0.00	0.00	-	0.00
230	6,502	6,503	9.39	108.0	0.00	87.26	-	-	0.00	0.00	-	0.00
231	6,224	6,225	9.99	108.0	0.00	86.88	-	-	0.00	0.00	-	0.00
232	6,981	6,982	8.41	108.0	0.00	87.88	-	-	0.00	0.00	-	0.00
233	6,740	6,741	8.90	108.0	0.00	87.57	-	-	0.00	0.00	-	0.00
234	6,709	6,710	8.96	108.0	0.00	87.53	-	-	0.00	0.00	-	0.00
235	5,994	5,995	10.50	108.0	0.00	86.56	-	-	0.00	0.00	-	0.00

Sum 37.68

- Data undefined due to calculation with octave data

Project:

Minnesota Power - BISON Wind Energy Center

Description:

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Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

Noise sensitive area: NSP012 NSP012

WTG

Wind speed: 8.0 m/s

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	6,969	6,970	8.44	108.0	0.00	87.86	-	-	0.00	0.00	-	0.00
2	8,015	8,016	6.48	108.0	0.00	89.08	-	-	0.00	0.00	-	0.00
3	5,755	5,756	9.46	107.0	0.00	86.20	-	-	0.00	0.00	-	0.00
4	4,739	4,740	11.90	107.0	0.00	84.51	-	-	0.00	0.00	-	0.00
5	6,655	6,655	7.61	107.0	0.00	87.46	-	-	0.00	0.00	-	0.00
6	9,082	9,083	4.70	108.0	0.00	90.16	-	-	0.00	0.00	-	0.00
7	8,597	8,597	5.48	108.0	0.00	89.69	-	-	0.00	0.00	-	0.00
8	5,026	5,027	11.17	107.0	0.00	85.03	-	-	0.00	0.00	-	0.00
9	6,653	6,654	9.08	108.0	0.00	87.46	-	-	0.00	0.00	-	0.00
10	7,400	7,401	7.60	108.0	0.00	88.39	-	-	0.00	0.00	-	0.00
11	7,213	7,213	7.96	108.0	0.00	88.16	-	-	0.00	0.00	-	0.00
12	4,680	4,681	12.06	107.0	0.00	84.41	-	-	0.00	0.00	-	0.00
13	4,865	4,866	11.58	107.0	0.00	84.74	-	-	0.00	0.00	-	0.00
14	6,063	6,064	8.80	107.0	0.00	86.65	-	-	0.00	0.00	-	0.00
15	8,077	8,077	6.37	108.0	0.00	89.15	-	-	0.00	0.00	-	0.00
16	5,262	5,262	10.59	107.0	0.00	85.42	-	-	0.00	0.00	-	0.00
17	9,626	9,627	3.85	108.0	0.00	90.67	-	-	0.00	0.00	-	0.00
18	6,837	6,838	7.26	107.0	0.00	87.70	-	-	0.00	0.00	-	0.00
19	5,809	5,810	9.34	107.0	0.00	86.28	-	-	0.00	0.00	-	0.00
20	9,137	9,138	4.61	108.0	0.00	90.22	-	-	0.00	0.00	-	0.00
22	3,807	3,808	14.61	107.0	0.00	82.61	-	-	0.00	0.00	-	0.00
23	4,850	4,851	11.61	107.0	0.00	84.72	-	-	0.00	0.00	-	0.00
25	9,660	9,660	3.80	108.0	0.00	90.70	-	-	0.00	0.00	-	0.00
26	9,842	9,842	3.53	108.0	0.00	90.86	-	-	0.00	0.00	-	0.00
27	6,835	6,835	8.71	108.0	0.00	87.69	-	-	0.00	0.00	-	0.00
28	8,620	8,621	5.44	108.0	0.00	89.71	-	-	0.00	0.00	-	0.00
29	4,308	4,309	13.09	107.0	0.00	83.69	-	-	0.00	0.00	-	0.00
30	7,991	7,992	6.52	108.0	0.00	89.05	-	-	0.00	0.00	-	0.00
31	4,406	4,407	12.81	107.0	0.00	83.88	-	-	0.00	0.00	-	0.00
32	6,318	6,319	8.27	107.0	0.00	87.01	-	-	0.00	0.00	-	0.00
33	4,261	4,262	13.22	107.0	0.00	83.59	-	-	0.00	0.00	-	0.00
201	9,301	9,301	4.35	108.0	0.00	90.37	-	-	0.00	0.00	-	0.00
202	9,526	9,527	4.01	108.0	0.00	90.58	-	-	0.00	0.00	-	0.00
203	8,768	8,768	5.20	108.0	0.00	89.86	-	-	0.00	0.00	-	0.00
204	9,225	9,225	4.47	108.0	0.00	90.30	-	-	0.00	0.00	-	0.00
205	9,518	9,518	4.02	108.0	0.00	90.57	-	-	0.00	0.00	-	0.00
206	8,038	8,038	6.44	108.0	0.00	89.10	-	-	0.00	0.00	-	0.00
207	8,145	8,146	6.25	108.0	0.00	89.22	-	-	0.00	0.00	-	0.00
208	2,577	2,578	20.86	108.0	0.00	79.23	-	-	0.00	0.00	-	0.00
209	2,276	2,278	22.28	108.0	0.00	78.15	-	-	0.00	0.00	-	0.00
210	2,070	2,071	23.43	108.0	0.00	77.32	-	-	0.00	0.00	-	0.00
211	3,268	3,269	18.16	108.0	0.00	81.29	-	-	0.00	0.00	-	0.00
212	3,576	3,577	17.09	108.0	0.00	82.07	-	-	0.00	0.00	-	0.00
213	3,897	3,898	16.05	108.0	0.00	82.82	-	-	0.00	0.00	-	0.00
214	3,971	3,972	15.82	108.0	0.00	82.98	-	-	0.00	0.00	-	0.00
215	5,365	5,366	11.97	108.0	0.00	85.59	-	-	0.00	0.00	-	0.00
216	5,184	5,185	12.42	108.0	0.00	85.30	-	-	0.00	0.00	-	0.00
217	5,236	5,236	12.29	108.0	0.00	85.38	-	-	0.00	0.00	-	0.00
218	4,053	4,054	15.56	108.0	0.00	83.16	-	-	0.00	0.00	-	0.00
219	4,851	4,851	13.29	108.0	0.00	84.72	-	-	0.00	0.00	-	0.00
220	4,962	4,963	13.00	108.0	0.00	84.91	-	-	0.00	0.00	-	0.00
221	5,494	5,494	11.66	108.0	0.00	85.80	-	-	0.00	0.00	-	0.00
222	8,793	8,794	5.16	108.0	0.00	89.88	-	-	0.00	0.00	-	0.00
223	8,626	8,626	5.44	108.0	0.00	89.72	-	-	0.00	0.00	-	0.00
224	6,905	6,905	8.57	108.0	0.00	87.78	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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Calculated:

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DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
225	6,839	6,840	8.70	108.0	0.00	87.70	-	-	0.00	0.00	-	0.00
226	7,539	7,540	7.34	108.0	0.00	88.55	-	-	0.00	0.00	-	0.00
227	7,411	7,412	7.58	108.0	0.00	88.40	-	-	0.00	0.00	-	0.00
228	8,124	8,124	6.29	108.0	0.00	89.20	-	-	0.00	0.00	-	0.00
229	6,909	6,910	8.56	108.0	0.00	87.79	-	-	0.00	0.00	-	0.00
230	6,659	6,660	9.07	108.0	0.00	87.47	-	-	0.00	0.00	-	0.00
231	6,624	6,624	9.14	108.0	0.00	87.42	-	-	0.00	0.00	-	0.00
232	7,762	7,763	6.93	108.0	0.00	88.80	-	-	0.00	0.00	-	0.00
233	7,683	7,683	7.08	108.0	0.00	88.71	-	-	0.00	0.00	-	0.00
234	7,796	7,796	6.87	108.0	0.00	88.84	-	-	0.00	0.00	-	0.00
235	7,252	7,253	7.89	108.0	0.00	88.21	-	-	0.00	0.00	-	0.00
Sum	30.92											

- Data undefined due to calculation with octave data

Noise sensitive area: NSP013 NSP013

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	3,910	3,912	16.00	108.0	0.00	82.85	-	-	0.00	0.00	-	0.00
2	4,905	4,906	13.14	108.0	0.00	84.81	-	-	0.00	0.00	-	0.00
3	888	893	31.92	107.0	0.00	70.02	-	-	0.00	0.00	-	0.00
4	1,651	1,653	24.66	107.0	0.00	75.37	-	-	0.00	0.00	-	0.00
5	2,111	2,113	21.62	107.0	0.00	77.50	-	-	0.00	0.00	-	0.00
6	5,401	5,402	11.89	108.0	0.00	85.65	-	-	0.00	0.00	-	0.00
7	4,375	4,376	14.61	108.0	0.00	83.82	-	-	0.00	0.00	-	0.00
8	664	671	35.13	107.0	0.00	67.53	-	-	0.00	0.00	-	0.00
9	4,370	4,370	14.62	108.0	0.00	83.81	-	-	0.00	0.00	-	0.00
10	4,439	4,440	14.42	108.0	0.00	83.95	-	-	0.00	0.00	-	0.00
11	5,494	5,495	11.66	108.0	0.00	85.80	-	-	0.00	0.00	-	0.00
12	3,379	3,380	16.05	107.0	0.00	81.58	-	-	0.00	0.00	-	0.00
13	1,950	1,952	22.62	107.0	0.00	76.81	-	-	0.00	0.00	-	0.00
14	2,246	2,248	20.85	107.0	0.00	78.03	-	-	0.00	0.00	-	0.00
15	4,192	4,193	15.14	108.0	0.00	83.45	-	-	0.00	0.00	-	0.00
16	1,184	1,186	28.63	107.0	0.00	72.49	-	-	0.00	0.00	-	0.00
17	5,772	5,773	11.00	108.0	0.00	86.23	-	-	0.00	0.00	-	0.00
18	2,930	2,930	17.73	107.0	0.00	80.34	-	-	0.00	0.00	-	0.00
19	2,663	2,664	18.84	107.0	0.00	79.51	-	-	0.00	0.00	-	0.00
20	5,058	5,059	12.75	108.0	0.00	85.08	-	-	0.00	0.00	-	0.00
22	2,114	2,115	21.61	107.0	0.00	77.51	-	-	0.00	0.00	-	0.00
23	818	825	32.82	107.0	0.00	69.33	-	-	0.00	0.00	-	0.00
25	6,068	6,069	10.33	108.0	0.00	86.66	-	-	0.00	0.00	-	0.00
26	5,581	5,581	11.45	108.0	0.00	85.93	-	-	0.00	0.00	-	0.00
27	3,514	3,515	17.30	108.0	0.00	81.92	-	-	0.00	0.00	-	0.00
28	4,788	4,789	13.46	108.0	0.00	84.60	-	-	0.00	0.00	-	0.00
29	3,765	3,766	14.74	107.0	0.00	82.52	-	-	0.00	0.00	-	0.00
30	5,199	5,200	12.39	108.0	0.00	85.32	-	-	0.00	0.00	-	0.00
31	2,916	2,917	17.79	107.0	0.00	80.30	-	-	0.00	0.00	-	0.00
32	1,485	1,487	25.94	107.0	0.00	74.45	-	-	0.00	0.00	-	0.00
33	2,248	2,249	20.84	107.0	0.00	78.04	-	-	0.00	0.00	-	0.00
201	6,537	6,537	9.32	108.0	0.00	87.31	-	-	0.00	0.00	-	0.00
202	6,835	6,836	8.71	108.0	0.00	87.70	-	-	0.00	0.00	-	0.00
203	7,068	7,069	8.24	108.0	0.00	87.99	-	-	0.00	0.00	-	0.00
204	7,356	7,357	7.69	108.0	0.00	88.33	-	-	0.00	0.00	-	0.00
205	7,852	7,852	6.77	108.0	0.00	88.90	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:
Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:
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 6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
206	7,100	7,100	8.18	108.0	0.00	88.03	-	-	0.00	0.00	-	0.00
207	7,709	7,709	7.03	108.0	0.00	88.74	-	-	0.00	0.00	-	0.00
208	3,312	3,313	18.01	108.0	0.00	81.40	-	-	0.00	0.00	-	0.00
209	3,416	3,417	17.64	108.0	0.00	81.67	-	-	0.00	0.00	-	0.00
210	3,494	3,495	17.37	108.0	0.00	81.87	-	-	0.00	0.00	-	0.00
211	2,351	2,353	21.88	108.0	0.00	78.43	-	-	0.00	0.00	-	0.00
212	2,177	2,179	22.82	108.0	0.00	77.77	-	-	0.00	0.00	-	0.00
213	2,128	2,130	23.09	108.0	0.00	77.57	-	-	0.00	0.00	-	0.00
214	2,371	2,372	21.78	108.0	0.00	78.50	-	-	0.00	0.00	-	0.00
215	434	446	40.07	108.0	0.00	63.98	-	-	0.00	0.00	-	0.00
216	1,835	1,836	24.85	108.0	0.00	76.28	-	-	0.00	0.00	-	0.00
217	2,551	2,552	20.98	108.0	0.00	79.14	-	-	0.00	0.00	-	0.00
218	4,317	4,318	14.78	108.0	0.00	83.70	-	-	0.00	0.00	-	0.00
219	4,705	4,705	13.68	108.0	0.00	84.45	-	-	0.00	0.00	-	0.00
220	5,178	5,178	12.44	108.0	0.00	85.28	-	-	0.00	0.00	-	0.00
221	5,757	5,757	11.04	108.0	0.00	86.20	-	-	0.00	0.00	-	0.00
222	6,749	6,749	8.88	108.0	0.00	87.59	-	-	0.00	0.00	-	0.00
223	6,208	6,209	10.02	108.0	0.00	86.86	-	-	0.00	0.00	-	0.00
224	5,556	5,557	11.51	108.0	0.00	85.90	-	-	0.00	0.00	-	0.00
225	5,256	5,257	12.24	108.0	0.00	85.41	-	-	0.00	0.00	-	0.00
226	5,222	5,223	12.33	108.0	0.00	85.36	-	-	0.00	0.00	-	0.00
227	4,507	4,508	14.23	108.0	0.00	84.08	-	-	0.00	0.00	-	0.00
228	6,245	6,245	9.94	108.0	0.00	86.91	-	-	0.00	0.00	-	0.00
229	3,819	3,820	16.30	108.0	0.00	82.64	-	-	0.00	0.00	-	0.00
230	3,484	3,485	17.40	108.0	0.00	81.84	-	-	0.00	0.00	-	0.00
231	3,043	3,044	18.99	108.0	0.00	80.67	-	-	0.00	0.00	-	0.00
232	3,399	3,400	17.70	108.0	0.00	81.63	-	-	0.00	0.00	-	0.00
233	3,091	3,092	18.81	108.0	0.00	80.81	-	-	0.00	0.00	-	0.00
234	2,998	3,000	19.16	108.0	0.00	80.54	-	-	0.00	0.00	-	0.00
235	2,257	2,258	22.38	108.0	0.00	78.08	-	-	0.00	0.00	-	0.00
Sum	43.38											

- Data undefined due to calculation with octave data

Noise sensitive area: NSP014 NSP014

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	4,410	4,411	14.50	108.0	0.00	83.89	-	-	0.00	0.00	-	0.00
2	5,496	5,497	11.66	108.0	0.00	85.80	-	-	0.00	0.00	-	0.00
3	1,749	1,752	23.95	107.0	0.00	75.87	-	-	0.00	0.00	-	0.00
4	1,596	1,598	25.07	107.0	0.00	75.07	-	-	0.00	0.00	-	0.00
5	2,988	2,989	17.50	107.0	0.00	80.51	-	-	0.00	0.00	-	0.00
6	6,182	6,183	10.08	108.0	0.00	86.82	-	-	0.00	0.00	-	0.00
7	5,276	5,277	12.19	108.0	0.00	85.45	-	-	0.00	0.00	-	0.00
8	911	916	31.62	107.0	0.00	70.24	-	-	0.00	0.00	-	0.00
9	4,665	4,666	13.79	108.0	0.00	84.38	-	-	0.00	0.00	-	0.00
10	4,953	4,954	13.02	108.0	0.00	84.90	-	-	0.00	0.00	-	0.00
11	5,723	5,723	11.12	108.0	0.00	86.15	-	-	0.00	0.00	-	0.00
12	3,181	3,181	16.77	107.0	0.00	81.05	-	-	0.00	0.00	-	0.00
13	1,964	1,966	22.53	107.0	0.00	76.87	-	-	0.00	0.00	-	0.00
14	2,819	2,820	18.18	107.0	0.00	80.01	-	-	0.00	0.00	-	0.00
15	4,980	4,981	12.95	108.0	0.00	84.95	-	-	0.00	0.00	-	0.00
16	1,584	1,586	25.16	107.0	0.00	75.01	-	-	0.00	0.00	-	0.00
17	6,614	6,615	9.16	108.0	0.00	87.41	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Description:

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Calculated:

6/23/2011 1:32 PM/2.7.486

Minnesota Power
Frank Frederickson
30 West Superior Street
Duluth, MN 55802-2093

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
18	3,633	3,634	15.17	107.0	0.00	82.21	-	-	0.00	0.00	-	0.00
19	3,022	3,022	17.37	107.0	0.00	80.61	-	-	0.00	0.00	-	0.00
20	5,941	5,941	10.62	108.0	0.00	86.48	-	-	0.00	0.00	-	0.00
22	1,425	1,426	26.44	107.0	0.00	74.08	-	-	0.00	0.00	-	0.00
23	470	482	38.72	107.0	0.00	64.66	-	-	0.00	0.00	-	0.00
25	6,847	6,848	8.68	108.0	0.00	87.71	-	-	0.00	0.00	-	0.00
26	6,529	6,529	9.34	108.0	0.00	87.30	-	-	0.00	0.00	-	0.00
27	4,063	4,064	15.53	108.0	0.00	83.18	-	-	0.00	0.00	-	0.00
28	5,588	5,589	11.43	108.0	0.00	85.95	-	-	0.00	0.00	-	0.00
29	3,408	3,409	15.95	107.0	0.00	81.65	-	-	0.00	0.00	-	0.00
30	5,714	5,715	11.14	108.0	0.00	86.14	-	-	0.00	0.00	-	0.00
31	2,644	2,645	18.92	107.0	0.00	79.45	-	-	0.00	0.00	-	0.00
32	2,427	2,428	19.88	107.0	0.00	78.71	-	-	0.00	0.00	-	0.00
33	1,900	1,901	22.94	107.0	0.00	76.58	-	-	0.00	0.00	-	0.00
201	7,109	7,109	8.16	108.0	0.00	88.04	-	-	0.00	0.00	-	0.00
202	7,399	7,399	7.61	108.0	0.00	88.38	-	-	0.00	0.00	-	0.00
203	7,383	7,383	7.64	108.0	0.00	88.37	-	-	0.00	0.00	-	0.00
204	7,727	7,727	7.00	108.0	0.00	88.76	-	-	0.00	0.00	-	0.00
205	8,190	8,190	6.18	108.0	0.00	89.27	-	-	0.00	0.00	-	0.00
206	7,223	7,224	7.94	108.0	0.00	88.18	-	-	0.00	0.00	-	0.00
207	7,739	7,740	6.98	108.0	0.00	88.77	-	-	0.00	0.00	-	0.00
208	2,337	2,338	21.96	108.0	0.00	78.38	-	-	0.00	0.00	-	0.00
209	2,344	2,345	21.92	108.0	0.00	78.40	-	-	0.00	0.00	-	0.00
210	2,332	2,333	21.98	108.0	0.00	78.36	-	-	0.00	0.00	-	0.00
211	1,136	1,140	30.25	108.0	0.00	72.14	-	-	0.00	0.00	-	0.00
212	973	976	31.94	108.0	0.00	70.79	-	-	0.00	0.00	-	0.00
213	1,038	1,041	31.24	108.0	0.00	71.35	-	-	0.00	0.00	-	0.00
214	1,363	1,366	28.25	108.0	0.00	73.71	-	-	0.00	0.00	-	0.00
215	982	987	31.82	108.0	0.00	70.88	-	-	0.00	0.00	-	0.00
216	1,522	1,524	27.01	108.0	0.00	74.66	-	-	0.00	0.00	-	0.00
217	2,127	2,129	23.10	108.0	0.00	77.56	-	-	0.00	0.00	-	0.00
218	3,363	3,364	17.82	108.0	0.00	81.54	-	-	0.00	0.00	-	0.00
219	3,893	3,894	16.06	108.0	0.00	82.81	-	-	0.00	0.00	-	0.00
220	4,344	4,345	14.70	108.0	0.00	83.76	-	-	0.00	0.00	-	0.00
221	4,968	4,968	12.98	108.0	0.00	84.92	-	-	0.00	0.00	-	0.00
222	6,593	6,593	9.20	108.0	0.00	87.38	-	-	0.00	0.00	-	0.00
223	6,135	6,135	10.18	108.0	0.00	86.76	-	-	0.00	0.00	-	0.00
224	5,132	5,132	12.56	108.0	0.00	85.21	-	-	0.00	0.00	-	0.00
225	4,872	4,872	13.23	108.0	0.00	84.75	-	-	0.00	0.00	-	0.00
226	5,056	5,057	12.75	108.0	0.00	85.08	-	-	0.00	0.00	-	0.00
227	4,482	4,483	14.30	108.0	0.00	84.03	-	-	0.00	0.00	-	0.00
228	6,015	6,015	10.45	108.0	0.00	86.58	-	-	0.00	0.00	-	0.00
229	3,798	3,799	16.36	108.0	0.00	82.59	-	-	0.00	0.00	-	0.00
230	3,458	3,459	17.49	108.0	0.00	81.78	-	-	0.00	0.00	-	0.00
231	3,138	3,139	18.64	108.0	0.00	80.94	-	-	0.00	0.00	-	0.00
232	3,894	3,895	16.06	108.0	0.00	82.81	-	-	0.00	0.00	-	0.00
233	3,681	3,682	16.74	108.0	0.00	82.32	-	-	0.00	0.00	-	0.00
234	3,691	3,692	16.71	108.0	0.00	82.35	-	-	0.00	0.00	-	0.00
235	3,029	3,030	19.05	108.0	0.00	80.63	-	-	0.00	0.00	-	0.00

Sum 42.87

- Data undefined due to calculation with octave data

Project:
Minnesota Power - BISON Wind Energy Center

 Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:
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DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

Noise sensitive area: NSP015 NSP015

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	4,515	4,516	14.21	108.0	0.00	84.10	-	-	0.00	0.00	-	0.00
2	5,611	5,612	11.38	108.0	0.00	85.98	-	-	0.00	0.00	-	0.00
3	1,955	1,958	22.58	107.0	0.00	76.83	-	-	0.00	0.00	-	0.00
4	1,663	1,665	24.57	107.0	0.00	75.43	-	-	0.00	0.00	-	0.00
5	3,173	3,175	16.79	107.0	0.00	81.03	-	-	0.00	0.00	-	0.00
6	6,332	6,333	9.75	108.0	0.00	87.03	-	-	0.00	0.00	-	0.00
7	5,452	5,453	11.76	108.0	0.00	85.73	-	-	0.00	0.00	-	0.00
8	1,112	1,116	29.34	107.0	0.00	71.95	-	-	0.00	0.00	-	0.00
9	4,728	4,729	13.62	108.0	0.00	84.50	-	-	0.00	0.00	-	0.00
10	5,056	5,057	12.75	108.0	0.00	85.08	-	-	0.00	0.00	-	0.00
11	5,766	5,766	11.02	108.0	0.00	86.22	-	-	0.00	0.00	-	0.00
12	3,161	3,161	16.84	107.0	0.00	81.00	-	-	0.00	0.00	-	0.00
13	2,025	2,026	22.15	107.0	0.00	77.13	-	-	0.00	0.00	-	0.00
14	2,957	2,958	17.63	107.0	0.00	80.42	-	-	0.00	0.00	-	0.00
15	5,136	5,137	12.55	108.0	0.00	85.21	-	-	0.00	0.00	-	0.00
16	1,736	1,738	24.05	107.0	0.00	75.80	-	-	0.00	0.00	-	0.00
17	6,775	6,775	8.83	108.0	0.00	87.62	-	-	0.00	0.00	-	0.00
18	3,783	3,783	14.69	107.0	0.00	82.56	-	-	0.00	0.00	-	0.00
19	3,117	3,118	17.01	107.0	0.00	80.88	-	-	0.00	0.00	-	0.00
20	6,111	6,112	10.24	108.0	0.00	86.72	-	-	0.00	0.00	-	0.00
22	1,342	1,344	27.15	107.0	0.00	73.57	-	-	0.00	0.00	-	0.00
23	712	720	34.35	107.0	0.00	68.15	-	-	0.00	0.00	-	0.00
25	6,995	6,995	8.39	108.0	0.00	87.90	-	-	0.00	0.00	-	0.00
26	6,711	6,711	8.96	108.0	0.00	87.54	-	-	0.00	0.00	-	0.00
27	4,181	4,181	15.18	108.0	0.00	83.43	-	-	0.00	0.00	-	0.00
28	5,744	5,745	11.07	108.0	0.00	86.19	-	-	0.00	0.00	-	0.00
29	3,350	3,350	16.15	107.0	0.00	81.50	-	-	0.00	0.00	-	0.00
30	5,814	5,814	10.91	108.0	0.00	86.29	-	-	0.00	0.00	-	0.00
31	2,619	2,620	19.03	107.0	0.00	79.37	-	-	0.00	0.00	-	0.00
32	2,629	2,631	18.98	107.0	0.00	79.40	-	-	0.00	0.00	-	0.00
33	1,883	1,884	23.05	107.0	0.00	76.50	-	-	0.00	0.00	-	0.00
201	7,214	7,215	7.96	108.0	0.00	88.16	-	-	0.00	0.00	-	0.00
202	7,502	7,502	7.41	108.0	0.00	88.50	-	-	0.00	0.00	-	0.00
203	7,436	7,437	7.54	108.0	0.00	88.43	-	-	0.00	0.00	-	0.00
204	7,790	7,790	6.88	108.0	0.00	88.83	-	-	0.00	0.00	-	0.00
205	8,245	8,246	6.08	108.0	0.00	89.32	-	-	0.00	0.00	-	0.00
206	7,238	7,239	7.91	108.0	0.00	88.19	-	-	0.00	0.00	-	0.00
207	7,734	7,734	6.99	108.0	0.00	88.77	-	-	0.00	0.00	-	0.00
208	2,144	2,145	23.01	108.0	0.00	77.63	-	-	0.00	0.00	-	0.00
209	2,125	2,126	23.11	108.0	0.00	77.55	-	-	0.00	0.00	-	0.00
210	2,091	2,092	23.30	108.0	0.00	77.41	-	-	0.00	0.00	-	0.00
211	888	892	32.91	108.0	0.00	70.01	-	-	0.00	0.00	-	0.00
212	747	752	34.72	108.0	0.00	68.52	-	-	0.00	0.00	-	0.00
213	888	892	32.91	108.0	0.00	70.00	-	-	0.00	0.00	-	0.00
214	1,237	1,240	29.33	108.0	0.00	72.87	-	-	0.00	0.00	-	0.00
215	1,227	1,231	29.41	108.0	0.00	72.80	-	-	0.00	0.00	-	0.00
216	1,605	1,606	26.41	108.0	0.00	75.12	-	-	0.00	0.00	-	0.00
217	2,154	2,155	22.95	108.0	0.00	77.67	-	-	0.00	0.00	-	0.00
218	3,219	3,220	18.34	108.0	0.00	81.16	-	-	0.00	0.00	-	0.00
219	3,786	3,787	16.40	108.0	0.00	82.57	-	-	0.00	0.00	-	0.00
220	4,228	4,228	15.04	108.0	0.00	83.52	-	-	0.00	0.00	-	0.00
221	4,860	4,860	13.27	108.0	0.00	84.73	-	-	0.00	0.00	-	0.00
222	6,623	6,624	9.14	108.0	0.00	87.42	-	-	0.00	0.00	-	0.00
223	6,185	6,185	10.07	108.0	0.00	86.83	-	-	0.00	0.00	-	0.00
224	5,112	5,113	12.61	108.0	0.00	85.17	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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 6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
225	4,863	4,864	13.26	108.0	0.00	84.74	-	-	0.00	0.00	-	0.00
226	5,093	5,094	12.66	108.0	0.00	85.14	-	-	0.00	0.00	-	0.00
227	4,552	4,553	14.10	108.0	0.00	84.17	-	-	0.00	0.00	-	0.00
228	6,033	6,033	10.41	108.0	0.00	86.61	-	-	0.00	0.00	-	0.00
229	3,875	3,876	16.12	108.0	0.00	82.77	-	-	0.00	0.00	-	0.00
230	3,539	3,541	17.22	108.0	0.00	81.98	-	-	0.00	0.00	-	0.00
231	3,247	3,248	18.24	108.0	0.00	81.23	-	-	0.00	0.00	-	0.00
232	4,060	4,061	15.54	108.0	0.00	83.17	-	-	0.00	0.00	-	0.00
233	3,863	3,864	16.15	108.0	0.00	82.74	-	-	0.00	0.00	-	0.00
234	3,888	3,889	16.08	108.0	0.00	82.80	-	-	0.00	0.00	-	0.00
235	3,240	3,241	18.26	108.0	0.00	81.21	-	-	0.00	0.00	-	0.00
Sum	42.14											

- Data undefined due to calculation with octave data

Noise sensitive area: NSP016 NSP016

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	4,851	4,852	13.29	108.0	0.00	84.72	-	-	0.00	0.00	-	0.00
2	5,936	5,937	10.63	108.0	0.00	86.47	-	-	0.00	0.00	-	0.00
3	2,145	2,147	21.42	107.0	0.00	77.64	-	-	0.00	0.00	-	0.00
4	2,028	2,030	22.13	107.0	0.00	77.15	-	-	0.00	0.00	-	0.00
5	3,400	3,401	15.97	107.0	0.00	81.63	-	-	0.00	0.00	-	0.00
6	6,614	6,615	9.16	108.0	0.00	87.41	-	-	0.00	0.00	-	0.00
7	5,693	5,694	11.19	108.0	0.00	86.11	-	-	0.00	0.00	-	0.00
8	1,324	1,327	27.30	107.0	0.00	73.46	-	-	0.00	0.00	-	0.00
9	5,098	5,099	12.64	108.0	0.00	85.15	-	-	0.00	0.00	-	0.00
10	5,393	5,394	11.90	108.0	0.00	85.64	-	-	0.00	0.00	-	0.00
11	6,148	6,149	10.15	108.0	0.00	86.78	-	-	0.00	0.00	-	0.00
12	3,565	3,565	15.41	107.0	0.00	82.04	-	-	0.00	0.00	-	0.00
13	2,395	2,396	20.04	107.0	0.00	78.59	-	-	0.00	0.00	-	0.00
14	3,257	3,258	16.49	107.0	0.00	81.26	-	-	0.00	0.00	-	0.00
15	5,410	5,411	11.86	108.0	0.00	85.67	-	-	0.00	0.00	-	0.00
16	2,020	2,022	22.18	107.0	0.00	77.11	-	-	0.00	0.00	-	0.00
17	7,041	7,041	8.30	108.0	0.00	87.95	-	-	0.00	0.00	-	0.00
18	4,067	4,067	13.80	107.0	0.00	83.19	-	-	0.00	0.00	-	0.00
19	3,461	3,462	15.76	107.0	0.00	81.79	-	-	0.00	0.00	-	0.00
20	6,361	6,362	9.69	108.0	0.00	87.07	-	-	0.00	0.00	-	0.00
22	1,748	1,749	23.97	107.0	0.00	75.86	-	-	0.00	0.00	-	0.00
23	686	694	34.76	107.0	0.00	67.82	-	-	0.00	0.00	-	0.00
25	7,280	7,281	7.83	108.0	0.00	88.24	-	-	0.00	0.00	-	0.00
26	6,940	6,940	8.50	108.0	0.00	87.83	-	-	0.00	0.00	-	0.00
27	4,504	4,505	14.24	108.0	0.00	84.07	-	-	0.00	0.00	-	0.00
28	6,018	6,019	10.44	108.0	0.00	86.59	-	-	0.00	0.00	-	0.00
29	3,756	3,757	14.77	107.0	0.00	82.50	-	-	0.00	0.00	-	0.00
30	6,155	6,155	10.14	108.0	0.00	86.78	-	-	0.00	0.00	-	0.00
31	3,024	3,024	17.37	107.0	0.00	80.61	-	-	0.00	0.00	-	0.00
32	2,823	2,824	18.16	107.0	0.00	80.02	-	-	0.00	0.00	-	0.00
33	2,285	2,286	20.63	107.0	0.00	78.18	-	-	0.00	0.00	-	0.00
201	7,550	7,550	7.32	108.0	0.00	88.56	-	-	0.00	0.00	-	0.00
202	7,840	7,840	6.79	108.0	0.00	88.89	-	-	0.00	0.00	-	0.00
203	7,813	7,813	6.84	108.0	0.00	88.86	-	-	0.00	0.00	-	0.00
204	8,160	8,161	6.23	108.0	0.00	89.23	-	-	0.00	0.00	-	0.00
205	8,621	8,621	5.44	108.0	0.00	89.71	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Description:

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Calculated:
6/23/2011 1:32 PM/2.7.486

Minnesota Power
Frank Frederickson
30 West Superior Street
Duluth, MN 55802-2093

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance	Sound distance	Calculated	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A	Cmet
	[m]	[m]	[dB(A)]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
206	7,634	7,634	7.17	108.0	0.00	88.66	-	-	0.00	0.00	-	0.00
207	8,136	8,136	6.27	108.0	0.00	89.21	-	-	0.00	0.00	-	0.00
208	2,470	2,471	21.32	108.0	0.00	78.86	-	-	0.00	0.00	-	0.00
209	2,402	2,404	21.62	108.0	0.00	78.62	-	-	0.00	0.00	-	0.00
210	2,289	2,291	22.21	108.0	0.00	78.20	-	-	0.00	0.00	-	0.00
211	1,029	1,033	31.33	108.0	0.00	71.28	-	-	0.00	0.00	-	0.00
212	724	729	35.05	108.0	0.00	68.25	-	-	0.00	0.00	-	0.00
213	634	640	36.40	108.0	0.00	67.12	-	-	0.00	0.00	-	0.00
214	933	937	32.38	108.0	0.00	70.43	-	-	0.00	0.00	-	0.00
215	1,166	1,170	29.96	108.0	0.00	72.37	-	-	0.00	0.00	-	0.00
216	1,215	1,217	29.53	108.0	0.00	72.71	-	-	0.00	0.00	-	0.00
217	1,747	1,748	25.43	108.0	0.00	75.85	-	-	0.00	0.00	-	0.00
218	2,935	2,936	19.41	108.0	0.00	80.36	-	-	0.00	0.00	-	0.00
219	3,453	3,454	17.51	108.0	0.00	81.77	-	-	0.00	0.00	-	0.00
220	3,905	3,906	16.02	108.0	0.00	82.83	-	-	0.00	0.00	-	0.00
221	4,527	4,528	14.17	108.0	0.00	84.12	-	-	0.00	0.00	-	0.00
222	6,217	6,217	10.00	108.0	0.00	86.87	-	-	0.00	0.00	-	0.00
223	5,779	5,779	10.99	108.0	0.00	86.24	-	-	0.00	0.00	-	0.00
224	4,716	4,716	13.65	108.0	0.00	84.47	-	-	0.00	0.00	-	0.00
225	4,463	4,464	14.36	108.0	0.00	83.99	-	-	0.00	0.00	-	0.00
226	4,686	4,687	13.73	108.0	0.00	84.42	-	-	0.00	0.00	-	0.00
227	4,150	4,151	15.27	108.0	0.00	83.36	-	-	0.00	0.00	-	0.00
228	5,627	5,627	11.34	108.0	0.00	86.01	-	-	0.00	0.00	-	0.00
229	3,476	3,478	17.43	108.0	0.00	81.83	-	-	0.00	0.00	-	0.00
230	3,142	3,143	18.62	108.0	0.00	80.95	-	-	0.00	0.00	-	0.00
231	2,865	2,866	19.68	108.0	0.00	80.15	-	-	0.00	0.00	-	0.00
232	3,730	3,731	16.58	108.0	0.00	82.44	-	-	0.00	0.00	-	0.00
233	3,556	3,558	17.16	108.0	0.00	82.02	-	-	0.00	0.00	-	0.00
234	3,606	3,607	16.99	108.0	0.00	82.14	-	-	0.00	0.00	-	0.00
235	2,996	2,997	19.17	108.0	0.00	80.53	-	-	0.00	0.00	-	0.00
Sum	42.82											

Sum 42.82

- Data undefined due to calculation with octave data

Noise sensitive area: NSP017 NSP017

WTG		Wind speed: 8.0 m/s										
No.	Distance	Sound distance	Calculated	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A	Cmet
	[m]	[m]	[dB(A)]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
1	6,635	6,636	9.11	108.0	0.00	87.44	-	-	0.00	0.00	-	0.00
2	7,710	7,711	7.03	108.0	0.00	88.74	-	-	0.00	0.00	-	0.00
3	3,797	3,798	14.64	107.0	0.00	82.59	-	-	0.00	0.00	-	0.00
4	3,820	3,821	14.56	107.0	0.00	82.64	-	-	0.00	0.00	-	0.00
5	5,064	5,065	11.07	107.0	0.00	85.09	-	-	0.00	0.00	-	0.00
6	8,334	8,335	5.93	108.0	0.00	89.42	-	-	0.00	0.00	-	0.00
7	7,350	7,350	7.70	108.0	0.00	88.33	-	-	0.00	0.00	-	0.00
8	3,048	3,050	17.27	107.0	0.00	80.69	-	-	0.00	0.00	-	0.00
9	6,890	6,890	8.60	108.0	0.00	87.76	-	-	0.00	0.00	-	0.00
10	7,178	7,179	8.03	108.0	0.00	88.12	-	-	0.00	0.00	-	0.00
11	7,931	7,931	6.63	108.0	0.00	88.99	-	-	0.00	0.00	-	0.00
12	5,285	5,285	10.54	107.0	0.00	85.46	-	-	0.00	0.00	-	0.00
13	4,185	4,186	13.44	107.0	0.00	83.44	-	-	0.00	0.00	-	0.00
14	5,018	5,018	11.19	107.0	0.00	85.01	-	-	0.00	0.00	-	0.00
15	7,124	7,125	8.13	108.0	0.00	88.06	-	-	0.00	0.00	-	0.00
16	3,781	3,782	14.69	107.0	0.00	82.55	-	-	0.00	0.00	-	0.00
17	8,733	8,734	5.26	108.0	0.00	89.82	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
18	5,804	5,804	9.35	107.0	0.00	86.27	-	-	0.00	0.00	-	0.00
19	5,252	5,252	10.62	107.0	0.00	85.41	-	-	0.00	0.00	-	0.00
20	8,030	8,030	6.46	108.0	0.00	89.09	-	-	0.00	0.00	-	0.00
22	3,419	3,420	15.90	107.0	0.00	81.68	-	-	0.00	0.00	-	0.00
23	2,292	2,295	20.58	107.0	0.00	78.22	-	-	0.00	0.00	-	0.00
25	9,003	9,003	4.82	108.0	0.00	90.09	-	-	0.00	0.00	-	0.00
26	8,563	8,564	5.54	108.0	0.00	89.65	-	-	0.00	0.00	-	0.00
27	6,280	6,280	9.87	108.0	0.00	86.96	-	-	0.00	0.00	-	0.00
28	7,729	7,729	6.99	108.0	0.00	88.76	-	-	0.00	0.00	-	0.00
29	5,403	5,404	10.26	107.0	0.00	85.65	-	-	0.00	0.00	-	0.00
30	7,941	7,941	6.61	108.0	0.00	89.00	-	-	0.00	0.00	-	0.00
31	4,743	4,743	11.89	107.0	0.00	84.52	-	-	0.00	0.00	-	0.00
32	4,451	4,452	12.68	107.0	0.00	83.97	-	-	0.00	0.00	-	0.00
33	4,025	4,026	13.93	107.0	0.00	83.10	-	-	0.00	0.00	-	0.00
201	9,331	9,331	4.31	108.0	0.00	90.40	-	-	0.00	0.00	-	0.00
202	9,623	9,623	3.86	108.0	0.00	90.67	-	-	0.00	0.00	-	0.00
203	9,601	9,602	3.89	108.0	0.00	90.65	-	-	0.00	0.00	-	0.00
204	9,952	9,953	3.37	108.0	0.00	90.96	-	-	0.00	0.00	-	0.00
205	10,410	10,410	2.71	108.0	0.00	91.35	-	-	0.00	0.00	-	0.00
206	9,388	9,389	4.22	108.0	0.00	90.45	-	-	0.00	0.00	-	0.00
207	9,859	9,859	3.51	108.0	0.00	90.88	-	-	0.00	0.00	-	0.00
208	3,709	3,710	16.65	108.0	0.00	82.39	-	-	0.00	0.00	-	0.00
209	3,463	3,464	17.48	108.0	0.00	81.79	-	-	0.00	0.00	-	0.00
210	3,086	3,087	18.83	108.0	0.00	80.79	-	-	0.00	0.00	-	0.00
211	2,145	2,148	22.99	108.0	0.00	77.64	-	-	0.00	0.00	-	0.00
212	1,772	1,774	25.26	108.0	0.00	75.98	-	-	0.00	0.00	-	0.00
213	1,355	1,359	28.31	108.0	0.00	73.66	-	-	0.00	0.00	-	0.00
214	1,003	1,008	31.60	108.0	0.00	71.07	-	-	0.00	0.00	-	0.00
215	2,551	2,553	20.97	108.0	0.00	79.14	-	-	0.00	0.00	-	0.00
216	1,273	1,276	29.01	108.0	0.00	73.12	-	-	0.00	0.00	-	0.00
217	805	809	33.94	108.0	0.00	69.16	-	-	0.00	0.00	-	0.00
218	1,443	1,446	27.61	108.0	0.00	74.20	-	-	0.00	0.00	-	0.00
219	1,722	1,724	25.59	108.0	0.00	75.73	-	-	0.00	0.00	-	0.00
220	2,195	2,196	22.72	108.0	0.00	77.83	-	-	0.00	0.00	-	0.00
221	2,782	2,783	20.02	108.0	0.00	79.89	-	-	0.00	0.00	-	0.00
222	4,654	4,655	13.82	108.0	0.00	84.36	-	-	0.00	0.00	-	0.00
223	4,316	4,317	14.78	108.0	0.00	83.70	-	-	0.00	0.00	-	0.00
224	2,993	2,994	19.18	108.0	0.00	80.52	-	-	0.00	0.00	-	0.00
225	2,776	2,777	20.04	108.0	0.00	79.87	-	-	0.00	0.00	-	0.00
226	3,192	3,193	18.44	108.0	0.00	81.09	-	-	0.00	0.00	-	0.00
227	2,887	2,888	19.59	108.0	0.00	80.21	-	-	0.00	0.00	-	0.00
228	4,020	4,021	15.66	108.0	0.00	83.09	-	-	0.00	0.00	-	0.00
229	2,343	2,345	21.92	108.0	0.00	78.40	-	-	0.00	0.00	-	0.00
230	2,092	2,094	23.29	108.0	0.00	77.42	-	-	0.00	0.00	-	0.00
231	2,115	2,117	23.16	108.0	0.00	77.52	-	-	0.00	0.00	-	0.00
232	3,348	3,349	17.88	108.0	0.00	81.50	-	-	0.00	0.00	-	0.00
233	3,374	3,376	17.78	108.0	0.00	81.57	-	-	0.00	0.00	-	0.00
234	3,580	3,581	17.08	108.0	0.00	82.08	-	-	0.00	0.00	-	0.00
235	3,281	3,282	18.12	108.0	0.00	81.32	-	-	0.00	0.00	-	0.00
Sum	39.66											

- Data undefined due to calculation with octave data

Project:

Minnesota Power - BISON Wind Energy Center

Description:

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 6/23/2011 1:32 PM/2.7.486

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DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

Noise sensitive area: NSP018 NSP018

WTG

Wind speed: 8.0 m/s

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	7,607	7,608	7.22	108.0	0.00	88.63	-	-	0.00	0.00	-	0.00
2	8,697	8,698	5.32	108.0	0.00	89.79	-	-	0.00	0.00	-	0.00
3	4,834	4,835	11.65	107.0	0.00	84.69	-	-	0.00	0.00	-	0.00
4	4,756	4,757	11.86	107.0	0.00	84.55	-	-	0.00	0.00	-	0.00
5	6,103	6,104	8.71	107.0	0.00	86.71	-	-	0.00	0.00	-	0.00
6	9,360	9,360	4.26	108.0	0.00	90.43	-	-	0.00	0.00	-	0.00
7	8,394	8,394	5.83	108.0	0.00	89.48	-	-	0.00	0.00	-	0.00
8	4,062	4,063	13.81	107.0	0.00	83.18	-	-	0.00	0.00	-	0.00
9	7,808	7,809	6.85	108.0	0.00	88.85	-	-	0.00	0.00	-	0.00
10	8,149	8,150	6.24	108.0	0.00	89.22	-	-	0.00	0.00	-	0.00
11	8,815	8,815	5.13	108.0	0.00	89.90	-	-	0.00	0.00	-	0.00
12	6,099	6,099	8.72	107.0	0.00	86.71	-	-	0.00	0.00	-	0.00
13	5,113	5,114	10.95	107.0	0.00	85.18	-	-	0.00	0.00	-	0.00
14	6,017	6,018	8.89	107.0	0.00	86.59	-	-	0.00	0.00	-	0.00
15	8,151	8,152	6.24	108.0	0.00	89.22	-	-	0.00	0.00	-	0.00
16	4,779	4,780	11.80	107.0	0.00	84.59	-	-	0.00	0.00	-	0.00
17	9,769	9,769	3.64	108.0	0.00	90.80	-	-	0.00	0.00	-	0.00
18	6,819	6,819	7.30	107.0	0.00	87.67	-	-	0.00	0.00	-	0.00
19	6,212	6,212	8.49	107.0	0.00	86.86	-	-	0.00	0.00	-	0.00
20	9,072	9,072	4.71	108.0	0.00	90.15	-	-	0.00	0.00	-	0.00
22	4,237	4,238	13.29	107.0	0.00	83.54	-	-	0.00	0.00	-	0.00
23	3,321	3,323	16.25	107.0	0.00	81.43	-	-	0.00	0.00	-	0.00
25	10,027	10,028	3.26	108.0	0.00	91.02	-	-	0.00	0.00	-	0.00
26	9,614	9,615	3.87	108.0	0.00	90.66	-	-	0.00	0.00	-	0.00
27	7,265	7,266	7.86	108.0	0.00	88.23	-	-	0.00	0.00	-	0.00
28	8,757	8,758	5.22	108.0	0.00	89.85	-	-	0.00	0.00	-	0.00
29	6,149	6,149	8.62	107.0	0.00	86.78	-	-	0.00	0.00	-	0.00
30	8,908	8,909	4.97	108.0	0.00	90.00	-	-	0.00	0.00	-	0.00
31	5,564	5,565	9.89	107.0	0.00	85.91	-	-	0.00	0.00	-	0.00
32	5,495	5,496	10.04	107.0	0.00	85.80	-	-	0.00	0.00	-	0.00
33	4,880	4,880	11.54	107.0	0.00	84.77	-	-	0.00	0.00	-	0.00
201	10,307	10,307	2.86	108.0	0.00	91.26	-	-	0.00	0.00	-	0.00
202	10,596	10,596	2.45	108.0	0.00	91.50	-	-	0.00	0.00	-	0.00
203	10,497	10,498	2.59	108.0	0.00	91.42	-	-	0.00	0.00	-	0.00
204	10,865	10,865	2.08	108.0	0.00	91.72	-	-	0.00	0.00	-	0.00
205	11,308	11,309	1.50	108.0	0.00	92.07	-	-	0.00	0.00	-	0.00
206	10,215	10,216	2.99	108.0	0.00	91.19	-	-	0.00	0.00	-	0.00
207	10,640	10,640	2.39	108.0	0.00	91.54	-	-	0.00	0.00	-	0.00
208	4,264	4,265	14.93	108.0	0.00	83.60	-	-	0.00	0.00	-	0.00
209	3,945	3,946	15.90	108.0	0.00	82.92	-	-	0.00	0.00	-	0.00
210	3,476	3,477	17.43	108.0	0.00	81.82	-	-	0.00	0.00	-	0.00
211	2,846	2,848	19.75	108.0	0.00	80.09	-	-	0.00	0.00	-	0.00
212	2,549	2,551	20.98	108.0	0.00	79.13	-	-	0.00	0.00	-	0.00
213	2,218	2,220	22.59	108.0	0.00	77.93	-	-	0.00	0.00	-	0.00
214	1,859	1,861	24.69	108.0	0.00	76.40	-	-	0.00	0.00	-	0.00
215	3,606	3,608	16.99	108.0	0.00	82.14	-	-	0.00	0.00	-	0.00
216	2,318	2,320	22.05	108.0	0.00	78.31	-	-	0.00	0.00	-	0.00
217	1,733	1,735	25.52	108.0	0.00	75.78	-	-	0.00	0.00	-	0.00
218	579	586	37.30	108.0	0.00	66.36	-	-	0.00	0.00	-	0.00
219	691	697	35.51	108.0	0.00	67.86	-	-	0.00	0.00	-	0.00
220	1,149	1,151	30.14	108.0	0.00	72.22	-	-	0.00	0.00	-	0.00
221	1,766	1,767	25.30	108.0	0.00	75.95	-	-	0.00	0.00	-	0.00
222	4,303	4,304	14.82	108.0	0.00	83.68	-	-	0.00	0.00	-	0.00
223	4,109	4,109	15.39	108.0	0.00	83.28	-	-	0.00	0.00	-	0.00
224	2,454	2,455	21.39	108.0	0.00	78.80	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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 Calculated:
 6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG **Wind speed: 8.0 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
225	2,341	2,343	21.94	108.0	0.00	78.39	-	-	0.00	0.00	-	0.00
226	3,029	3,030	19.05	108.0	0.00	80.63	-	-	0.00	0.00	-	0.00
227	3,017	3,018	19.09	108.0	0.00	80.59	-	-	0.00	0.00	-	0.00
228	3,636	3,637	16.89	108.0	0.00	82.21	-	-	0.00	0.00	-	0.00
229	2,673	2,675	20.45	108.0	0.00	79.55	-	-	0.00	0.00	-	0.00
230	2,537	2,539	21.03	108.0	0.00	79.09	-	-	0.00	0.00	-	0.00
231	2,750	2,752	20.14	108.0	0.00	79.79	-	-	0.00	0.00	-	0.00
232	4,015	4,017	15.68	108.0	0.00	83.08	-	-	0.00	0.00	-	0.00
233	4,126	4,127	15.34	108.0	0.00	83.31	-	-	0.00	0.00	-	0.00
234	4,377	4,379	14.60	108.0	0.00	83.83	-	-	0.00	0.00	-	0.00
235	4,194	4,194	15.14	108.0	0.00	83.45	-	-	0.00	0.00	-	0.00
Sum	41.15											

- Data undefined due to calculation with octave data

Noise sensitive area: NSP019 NSP019

WTG **Wind speed: 8.0 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	8,441	8,442	5.74	108.0	0.00	89.53	-	-	0.00	0.00	-	0.00
2	9,447	9,448	4.13	108.0	0.00	90.51	-	-	0.00	0.00	-	0.00
3	5,430	5,431	10.19	107.0	0.00	85.70	-	-	0.00	0.00	-	0.00
4	5,797	5,798	9.37	107.0	0.00	86.27	-	-	0.00	0.00	-	0.00
5	6,618	6,618	7.68	107.0	0.00	87.41	-	-	0.00	0.00	-	0.00
6	9,884	9,885	3.47	108.0	0.00	90.90	-	-	0.00	0.00	-	0.00
7	8,782	8,783	5.18	108.0	0.00	89.87	-	-	0.00	0.00	-	0.00
8	4,860	4,861	11.59	107.0	0.00	84.73	-	-	0.00	0.00	-	0.00
9	8,824	8,825	5.11	108.0	0.00	89.91	-	-	0.00	0.00	-	0.00
10	8,975	8,975	4.87	108.0	0.00	90.06	-	-	0.00	0.00	-	0.00
11	9,917	9,917	3.42	108.0	0.00	90.93	-	-	0.00	0.00	-	0.00
12	7,401	7,402	6.24	107.0	0.00	88.39	-	-	0.00	0.00	-	0.00
13	6,166	6,166	8.58	107.0	0.00	86.80	-	-	0.00	0.00	-	0.00
14	6,776	6,777	7.38	107.0	0.00	87.62	-	-	0.00	0.00	-	0.00
15	8,689	8,690	5.33	108.0	0.00	89.78	-	-	0.00	0.00	-	0.00
16	5,599	5,600	9.81	107.0	0.00	85.96	-	-	0.00	0.00	-	0.00
17	10,204	10,204	3.00	108.0	0.00	91.18	-	-	0.00	0.00	-	0.00
18	7,469	7,470	6.12	107.0	0.00	88.47	-	-	0.00	0.00	-	0.00
19	7,127	7,127	6.73	107.0	0.00	88.06	-	-	0.00	0.00	-	0.00
20	9,464	9,465	4.10	108.0	0.00	90.52	-	-	0.00	0.00	-	0.00
22	5,569	5,570	9.88	107.0	0.00	85.92	-	-	0.00	0.00	-	0.00
23	4,108	4,110	13.67	107.0	0.00	83.28	-	-	0.00	0.00	-	0.00
25	10,545	10,545	2.52	108.0	0.00	91.46	-	-	0.00	0.00	-	0.00
26	9,891	9,891	3.46	108.0	0.00	90.90	-	-	0.00	0.00	-	0.00
27	8,051	8,052	6.42	108.0	0.00	89.12	-	-	0.00	0.00	-	0.00
28	9,268	9,269	4.40	108.0	0.00	90.34	-	-	0.00	0.00	-	0.00
29	7,577	7,578	5.94	107.0	0.00	88.59	-	-	0.00	0.00	-	0.00
30	9,738	9,738	3.69	108.0	0.00	90.77	-	-	0.00	0.00	-	0.00
31	6,860	6,861	7.22	107.0	0.00	87.73	-	-	0.00	0.00	-	0.00
32	5,990	5,991	8.95	107.0	0.00	86.55	-	-	0.00	0.00	-	0.00
33	6,121	6,121	8.68	107.0	0.00	86.74	-	-	0.00	0.00	-	0.00
201	11,080	11,080	1.80	108.0	0.00	91.89	-	-	0.00	0.00	-	0.00
202	11,378	11,378	1.40	108.0	0.00	92.12	-	-	0.00	0.00	-	0.00
203	11,548	11,548	1.19	108.0	0.00	92.25	-	-	0.00	0.00	-	0.00
204	11,863	11,863	0.79	108.0	0.00	92.48	-	-	0.00	0.00	-	0.00
205	12,345	12,345	0.20	108.0	0.00	92.83	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:
Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:
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 6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG **Wind speed: 8.0 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
206	11,447	11,448	1.32	108.0	0.00	92.17	-	-	0.00	0.00	-	0.00
207	11,968	11,969	0.66	108.0	0.00	92.56	-	-	0.00	0.00	-	0.00
208	5,962	5,963	10.57	108.0	0.00	86.51	-	-	0.00	0.00	-	0.00
209	5,715	5,716	11.14	108.0	0.00	86.14	-	-	0.00	0.00	-	0.00
210	5,321	5,322	12.08	108.0	0.00	85.52	-	-	0.00	0.00	-	0.00
211	4,386	4,388	14.57	108.0	0.00	83.84	-	-	0.00	0.00	-	0.00
212	3,997	3,998	15.74	108.0	0.00	83.04	-	-	0.00	0.00	-	0.00
213	3,556	3,557	17.16	108.0	0.00	82.02	-	-	0.00	0.00	-	0.00
214	3,230	3,232	18.30	108.0	0.00	81.19	-	-	0.00	0.00	-	0.00
215	4,137	4,138	15.31	108.0	0.00	83.34	-	-	0.00	0.00	-	0.00
216	2,775	2,777	20.04	108.0	0.00	79.87	-	-	0.00	0.00	-	0.00
217	2,104	2,105	23.23	108.0	0.00	77.47	-	-	0.00	0.00	-	0.00
218	2,624	2,626	20.66	108.0	0.00	79.39	-	-	0.00	0.00	-	0.00
219	2,012	2,015	23.76	108.0	0.00	77.08	-	-	0.00	0.00	-	0.00
220	2,257	2,258	22.38	108.0	0.00	78.08	-	-	0.00	0.00	-	0.00
221	2,347	2,348	21.91	108.0	0.00	78.41	-	-	0.00	0.00	-	0.00
222	2,406	2,407	21.61	108.0	0.00	78.63	-	-	0.00	0.00	-	0.00
223	2,076	2,077	23.39	108.0	0.00	77.35	-	-	0.00	0.00	-	0.00
224	1,070	1,074	30.91	108.0	0.00	71.62	-	-	0.00	0.00	-	0.00
225	740	746	34.80	108.0	0.00	68.46	-	-	0.00	0.00	-	0.00
226	958	963	32.08	108.0	0.00	70.68	-	-	0.00	0.00	-	0.00
227	1,065	1,070	30.95	108.0	0.00	71.59	-	-	0.00	0.00	-	0.00
228	1,793	1,794	25.13	108.0	0.00	76.08	-	-	0.00	0.00	-	0.00
229	1,149	1,154	30.12	108.0	0.00	72.24	-	-	0.00	0.00	-	0.00
230	1,312	1,317	28.66	108.0	0.00	73.39	-	-	0.00	0.00	-	0.00
231	1,806	1,809	25.03	108.0	0.00	76.15	-	-	0.00	0.00	-	0.00
232	2,764	2,766	20.08	108.0	0.00	79.84	-	-	0.00	0.00	-	0.00
233	3,049	3,051	18.97	108.0	0.00	80.69	-	-	0.00	0.00	-	0.00
234	3,375	3,377	17.78	108.0	0.00	81.57	-	-	0.00	0.00	-	0.00
235	3,565	3,567	17.13	108.0	0.00	82.05	-	-	0.00	0.00	-	0.00
Sum	40.65											

- Data undefined due to calculation with octave data

Noise sensitive area: NSP020 NSP020

WTG **Wind speed: 8.0 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	11,207	11,208	1.63	108.0	0.00	91.99	-	-	0.00	0.00	-	0.00
2	12,067	12,067	0.53	108.0	0.00	92.63	-	-	0.00	0.00	-	0.00
3	8,236	8,237	4.86	107.0	0.00	89.32	-	-	0.00	0.00	-	0.00
4	8,937	8,937	3.79	107.0	0.00	90.02	-	-	0.00	0.00	-	0.00
5	9,201	9,202	3.41	107.0	0.00	90.28	-	-	0.00	0.00	-	0.00
6	12,215	12,215	0.35	108.0	0.00	92.74	-	-	0.00	0.00	-	0.00
7	11,022	11,023	1.87	108.0	0.00	91.85	-	-	0.00	0.00	-	0.00
8	7,908	7,909	5.38	107.0	0.00	88.96	-	-	0.00	0.00	-	0.00
9	11,755	11,756	0.92	108.0	0.00	92.40	-	-	0.00	0.00	-	0.00
10	11,702	11,702	0.99	108.0	0.00	92.37	-	-	0.00	0.00	-	0.00
11	12,887	12,887	-0.44	108.0	0.00	93.20	-	-	0.00	0.00	-	0.00
12	10,650	10,651	1.48	107.0	0.00	91.55	-	-	0.00	0.00	-	0.00
13	9,285	9,286	3.29	107.0	0.00	90.36	-	-	0.00	0.00	-	0.00
14	9,589	9,590	2.87	107.0	0.00	90.64	-	-	0.00	0.00	-	0.00
15	11,114	11,115	1.75	108.0	0.00	91.92	-	-	0.00	0.00	-	0.00
16	8,580	8,580	4.32	107.0	0.00	89.67	-	-	0.00	0.00	-	0.00
17	12,403	12,404	0.13	108.0	0.00	92.87	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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 Calculated:
 6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
18	10,114	10,114	2.17	107.0	0.00	91.10	-	-	0.00	0.00	-	0.00
19	10,059	10,060	2.24	107.0	0.00	91.05	-	-	0.00	0.00	-	0.00
20	11,659	11,659	1.04	108.0	0.00	92.33	-	-	0.00	0.00	-	0.00
22	8,928	8,929	3.80	107.0	0.00	90.02	-	-	0.00	0.00	-	0.00
23	7,253	7,254	6.50	107.0	0.00	88.21	-	-	0.00	0.00	-	0.00
25	12,829	12,829	-0.38	108.0	0.00	93.16	-	-	0.00	0.00	-	0.00
26	11,904	11,905	0.74	108.0	0.00	92.51	-	-	0.00	0.00	-	0.00
27	10,794	10,794	2.18	108.0	0.00	91.66	-	-	0.00	0.00	-	0.00
28	11,621	11,621	1.09	108.0	0.00	92.31	-	-	0.00	0.00	-	0.00
29	10,917	10,918	1.15	107.0	0.00	91.76	-	-	0.00	0.00	-	0.00
30	12,430	12,430	0.09	108.0	0.00	92.89	-	-	0.00	0.00	-	0.00
31	10,128	10,129	2.15	107.0	0.00	91.11	-	-	0.00	0.00	-	0.00
32	8,627	8,628	4.25	107.0	0.00	89.72	-	-	0.00	0.00	-	0.00
33	9,387	9,387	3.15	107.0	0.00	90.45	-	-	0.00	0.00	-	0.00
201	13,646	13,646	-1.30	108.0	0.00	93.70	-	-	0.00	0.00	-	0.00
202	13,943	13,944	-1.62	108.0	0.00	93.89	-	-	0.00	0.00	-	0.00
203	14,411	14,411	-2.11	108.0	0.00	94.17	-	-	0.00	0.00	-	0.00
204	14,658	14,658	-2.37	108.0	0.00	94.32	-	-	0.00	0.00	-	0.00
205	15,170	15,170	-2.88	108.0	0.00	94.62	-	-	0.00	0.00	-	0.00
206	14,503	14,503	-2.21	108.0	0.00	94.23	-	-	0.00	0.00	-	0.00
207	15,109	15,109	-2.82	108.0	0.00	94.58	-	-	0.00	0.00	-	0.00
208	9,517	9,517	4.02	108.0	0.00	90.57	-	-	0.00	0.00	-	0.00
209	9,308	9,309	4.34	108.0	0.00	90.38	-	-	0.00	0.00	-	0.00
210	8,949	8,949	4.91	108.0	0.00	90.04	-	-	0.00	0.00	-	0.00
211	7,920	7,920	6.65	108.0	0.00	88.97	-	-	0.00	0.00	-	0.00
212	7,512	7,513	7.39	108.0	0.00	88.52	-	-	0.00	0.00	-	0.00
213	7,060	7,061	8.26	108.0	0.00	87.98	-	-	0.00	0.00	-	0.00
214	6,776	6,777	8.83	108.0	0.00	87.62	-	-	0.00	0.00	-	0.00
215	7,090	7,091	8.20	108.0	0.00	88.01	-	-	0.00	0.00	-	0.00
216	5,991	5,992	10.50	108.0	0.00	86.55	-	-	0.00	0.00	-	0.00
217	5,485	5,486	11.68	108.0	0.00	85.79	-	-	0.00	0.00	-	0.00
218	6,228	6,229	9.98	108.0	0.00	86.89	-	-	0.00	0.00	-	0.00
219	5,498	5,499	11.65	108.0	0.00	85.81	-	-	0.00	0.00	-	0.00
220	5,563	5,563	11.50	108.0	0.00	85.91	-	-	0.00	0.00	-	0.00
221	5,308	5,309	12.11	108.0	0.00	85.50	-	-	0.00	0.00	-	0.00
222	1,715	1,716	25.64	108.0	0.00	75.69	-	-	0.00	0.00	-	0.00
223	1,634	1,636	26.19	108.0	0.00	75.28	-	-	0.00	0.00	-	0.00
224	3,494	3,495	17.37	108.0	0.00	81.87	-	-	0.00	0.00	-	0.00
225	3,462	3,464	17.48	108.0	0.00	81.79	-	-	0.00	0.00	-	0.00
226	2,711	2,713	20.30	108.0	0.00	79.67	-	-	0.00	0.00	-	0.00
227	3,045	3,047	18.98	108.0	0.00	80.68	-	-	0.00	0.00	-	0.00
228	2,296	2,297	22.17	108.0	0.00	78.22	-	-	0.00	0.00	-	0.00
229	3,716	3,717	16.63	108.0	0.00	82.40	-	-	0.00	0.00	-	0.00
230	4,053	4,055	15.56	108.0	0.00	83.16	-	-	0.00	0.00	-	0.00
231	4,403	4,404	14.53	108.0	0.00	83.88	-	-	0.00	0.00	-	0.00
232	4,201	4,203	15.11	108.0	0.00	83.47	-	-	0.00	0.00	-	0.00
233	4,597	4,598	13.98	108.0	0.00	84.25	-	-	0.00	0.00	-	0.00
234	4,860	4,862	13.26	108.0	0.00	84.74	-	-	0.00	0.00	-	0.00
235	5,509	5,510	11.62	108.0	0.00	85.82	-	-	0.00	0.00	-	0.00

Sum 32.12

- Data undefined due to calculation with octave data

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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 +1 701 775 3000

wind@eapc.net

Calculated:

6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

Noise sensitive area: NSP021 NSP021

WTG

Wind speed: 8.0 m/s

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	10,873	10,874	2.07	108.0	0.00	91.73	-	-	0.00	0.00	-	0.00
2	11,755	11,756	0.92	108.0	0.00	92.41	-	-	0.00	0.00	-	0.00
3	7,882	7,883	5.43	107.0	0.00	88.93	-	-	0.00	0.00	-	0.00
4	8,545	8,546	4.38	107.0	0.00	89.64	-	-	0.00	0.00	-	0.00
5	8,881	8,882	3.87	107.0	0.00	89.97	-	-	0.00	0.00	-	0.00
6	11,942	11,943	0.69	108.0	0.00	92.54	-	-	0.00	0.00	-	0.00
7	10,756	10,757	2.23	108.0	0.00	91.63	-	-	0.00	0.00	-	0.00
8	7,523	7,524	6.03	107.0	0.00	88.53	-	-	0.00	0.00	-	0.00
9	11,401	11,401	1.38	108.0	0.00	92.14	-	-	0.00	0.00	-	0.00
10	11,375	11,375	1.41	108.0	0.00	92.12	-	-	0.00	0.00	-	0.00
11	12,530	12,530	-0.02	108.0	0.00	92.96	-	-	0.00	0.00	-	0.00
12	10,249	10,249	1.99	107.0	0.00	91.21	-	-	0.00	0.00	-	0.00
13	8,898	8,898	3.85	107.0	0.00	89.99	-	-	0.00	0.00	-	0.00
14	9,243	9,243	3.35	107.0	0.00	90.32	-	-	0.00	0.00	-	0.00
15	10,825	10,825	2.14	108.0	0.00	91.69	-	-	0.00	0.00	-	0.00
16	8,207	8,207	4.90	107.0	0.00	89.28	-	-	0.00	0.00	-	0.00
17	12,149	12,149	0.43	108.0	0.00	92.69	-	-	0.00	0.00	-	0.00
18	9,791	9,792	2.59	107.0	0.00	90.82	-	-	0.00	0.00	-	0.00
19	9,699	9,700	2.72	107.0	0.00	90.73	-	-	0.00	0.00	-	0.00
20	11,402	11,402	1.37	108.0	0.00	92.14	-	-	0.00	0.00	-	0.00
22	8,507	8,508	4.43	107.0	0.00	89.60	-	-	0.00	0.00	-	0.00
23	6,852	6,854	7.23	107.0	0.00	87.72	-	-	0.00	0.00	-	0.00
25	12,565	12,565	-0.07	108.0	0.00	92.98	-	-	0.00	0.00	-	0.00
26	11,672	11,673	1.03	108.0	0.00	92.34	-	-	0.00	0.00	-	0.00
27	10,461	10,462	2.64	108.0	0.00	91.39	-	-	0.00	0.00	-	0.00
28	11,343	11,344	1.45	108.0	0.00	92.10	-	-	0.00	0.00	-	0.00
29	10,503	10,503	1.67	107.0	0.00	91.43	-	-	0.00	0.00	-	0.00
30	12,110	12,110	0.48	108.0	0.00	92.66	-	-	0.00	0.00	-	0.00
31	9,723	9,723	2.68	107.0	0.00	90.76	-	-	0.00	0.00	-	0.00
32	8,297	8,298	4.76	107.0	0.00	89.38	-	-	0.00	0.00	-	0.00
33	8,980	8,980	3.73	107.0	0.00	90.07	-	-	0.00	0.00	-	0.00
201	13,346	13,347	-0.97	108.0	0.00	93.51	-	-	0.00	0.00	-	0.00
202	13,645	13,645	-1.30	108.0	0.00	93.70	-	-	0.00	0.00	-	0.00
203	14,072	14,072	-1.76	108.0	0.00	93.97	-	-	0.00	0.00	-	0.00
204	14,329	14,329	-2.03	108.0	0.00	94.12	-	-	0.00	0.00	-	0.00
205	14,837	14,838	-2.55	108.0	0.00	94.43	-	-	0.00	0.00	-	0.00
206	14,137	14,137	-1.83	108.0	0.00	94.01	-	-	0.00	0.00	-	0.00
207	14,731	14,731	-2.44	108.0	0.00	94.36	-	-	0.00	0.00	-	0.00
208	9,067	9,067	4.72	108.0	0.00	90.15	-	-	0.00	0.00	-	0.00
209	8,851	8,851	5.07	108.0	0.00	89.94	-	-	0.00	0.00	-	0.00
210	8,484	8,484	5.67	108.0	0.00	89.57	-	-	0.00	0.00	-	0.00
211	7,471	7,472	7.47	108.0	0.00	88.47	-	-	0.00	0.00	-	0.00
212	7,065	7,066	8.25	108.0	0.00	87.98	-	-	0.00	0.00	-	0.00
213	6,614	6,615	9.16	108.0	0.00	87.41	-	-	0.00	0.00	-	0.00
214	6,323	6,323	9.77	108.0	0.00	87.02	-	-	0.00	0.00	-	0.00
215	6,711	6,712	8.96	108.0	0.00	87.54	-	-	0.00	0.00	-	0.00
216	5,573	5,574	11.47	108.0	0.00	85.92	-	-	0.00	0.00	-	0.00
217	5,046	5,047	12.78	108.0	0.00	85.06	-	-	0.00	0.00	-	0.00
218	5,738	5,739	11.08	108.0	0.00	86.18	-	-	0.00	0.00	-	0.00
219	5,007	5,008	12.88	108.0	0.00	84.99	-	-	0.00	0.00	-	0.00
220	5,072	5,073	12.71	108.0	0.00	85.11	-	-	0.00	0.00	-	0.00
221	4,825	4,826	13.36	108.0	0.00	84.67	-	-	0.00	0.00	-	0.00
222	1,267	1,269	29.07	108.0	0.00	73.07	-	-	0.00	0.00	-	0.00
223	1,143	1,146	30.19	108.0	0.00	72.19	-	-	0.00	0.00	-	0.00
224	3,004	3,006	19.14	108.0	0.00	80.56	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Description:

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 6/23/2011 1:32 PM/2.7.486

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
225	2,971	2,972	19.27	108.0	0.00	80.46	-	-	0.00	0.00	-	0.00
226	2,230	2,233	22.52	108.0	0.00	77.98	-	-	0.00	0.00	-	0.00
227	2,615	2,617	20.70	108.0	0.00	79.36	-	-	0.00	0.00	-	0.00
228	1,816	1,818	24.97	108.0	0.00	76.19	-	-	0.00	0.00	-	0.00
229	3,298	3,300	18.05	108.0	0.00	81.37	-	-	0.00	0.00	-	0.00
230	3,639	3,640	16.88	108.0	0.00	82.22	-	-	0.00	0.00	-	0.00
231	4,013	4,014	15.68	108.0	0.00	83.07	-	-	0.00	0.00	-	0.00
232	3,920	3,921	15.97	108.0	0.00	82.87	-	-	0.00	0.00	-	0.00
233	4,320	4,322	14.76	108.0	0.00	83.71	-	-	0.00	0.00	-	0.00
234	4,602	4,603	13.96	108.0	0.00	84.26	-	-	0.00	0.00	-	0.00
235	5,217	5,218	12.34	108.0	0.00	85.35	-	-	0.00	0.00	-	0.00
Sum	34.93											

- Data undefined due to calculation with octave data

Noise sensitive area: NSP022 NSP022

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	11,131	11,132	1.73	108.0	0.00	91.93	-	-	0.00	0.00	-	0.00
2	12,078	12,079	0.52	108.0	0.00	92.64	-	-	0.00	0.00	-	0.00
3	8,106	8,107	5.06	107.0	0.00	89.18	-	-	0.00	0.00	-	0.00
4	8,616	8,617	4.27	107.0	0.00	89.71	-	-	0.00	0.00	-	0.00
5	9,202	9,203	3.41	107.0	0.00	90.28	-	-	0.00	0.00	-	0.00
6	12,376	12,377	0.16	108.0	0.00	92.85	-	-	0.00	0.00	-	0.00
7	11,215	11,216	1.62	108.0	0.00	92.00	-	-	0.00	0.00	-	0.00
8	7,635	7,636	5.84	107.0	0.00	88.66	-	-	0.00	0.00	-	0.00
9	11,586	11,587	1.14	108.0	0.00	92.28	-	-	0.00	0.00	-	0.00
10	11,652	11,652	1.05	108.0	0.00	92.33	-	-	0.00	0.00	-	0.00
11	12,699	12,699	-0.22	108.0	0.00	93.08	-	-	0.00	0.00	-	0.00
12	10,262	10,262	1.97	107.0	0.00	91.22	-	-	0.00	0.00	-	0.00
13	8,980	8,981	3.73	107.0	0.00	90.07	-	-	0.00	0.00	-	0.00
14	9,473	9,473	3.03	107.0	0.00	90.53	-	-	0.00	0.00	-	0.00
15	11,218	11,219	1.61	108.0	0.00	92.00	-	-	0.00	0.00	-	0.00
16	8,355	8,356	4.67	107.0	0.00	89.44	-	-	0.00	0.00	-	0.00
17	12,629	12,630	-0.14	108.0	0.00	93.03	-	-	0.00	0.00	-	0.00
18	10,095	10,095	2.19	107.0	0.00	91.08	-	-	0.00	0.00	-	0.00
19	9,878	9,878	2.48	107.0	0.00	90.89	-	-	0.00	0.00	-	0.00
20	11,880	11,881	0.77	108.0	0.00	92.50	-	-	0.00	0.00	-	0.00
22	8,448	8,448	4.53	107.0	0.00	89.54	-	-	0.00	0.00	-	0.00
23	6,911	6,912	7.12	107.0	0.00	87.79	-	-	0.00	0.00	-	0.00
25	13,018	13,018	-0.59	108.0	0.00	93.29	-	-	0.00	0.00	-	0.00
26	12,212	12,212	0.36	108.0	0.00	92.74	-	-	0.00	0.00	-	0.00
27	10,728	10,729	2.27	108.0	0.00	91.61	-	-	0.00	0.00	-	0.00
28	11,766	11,767	0.91	108.0	0.00	92.41	-	-	0.00	0.00	-	0.00
29	10,458	10,458	1.72	107.0	0.00	91.39	-	-	0.00	0.00	-	0.00
30	12,404	12,405	0.12	108.0	0.00	92.87	-	-	0.00	0.00	-	0.00
31	9,724	9,724	2.68	107.0	0.00	90.76	-	-	0.00	0.00	-	0.00
32	8,592	8,593	4.30	107.0	0.00	89.68	-	-	0.00	0.00	-	0.00
33	8,981	8,981	3.73	107.0	0.00	90.07	-	-	0.00	0.00	-	0.00
201	13,696	13,697	-1.35	108.0	0.00	93.73	-	-	0.00	0.00	-	0.00
202	13,996	13,996	-1.68	108.0	0.00	93.92	-	-	0.00	0.00	-	0.00
203	14,296	14,296	-1.99	108.0	0.00	94.10	-	-	0.00	0.00	-	0.00
204	14,584	14,585	-2.29	108.0	0.00	94.28	-	-	0.00	0.00	-	0.00
205	15,081	15,081	-2.79	108.0	0.00	94.57	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Description:

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 Calculated:
 6/23/2011 1:32 PM/2.7.486

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
206	14,265	14,265	-1.96	108.0	0.00	94.09	-	-	0.00	0.00	-	0.00
207	14,812	14,813	-2.52	108.0	0.00	94.41	-	-	0.00	0.00	-	0.00
208	8,843	8,844	5.08	108.0	0.00	89.93	-	-	0.00	0.00	-	0.00
209	8,582	8,583	5.51	108.0	0.00	89.67	-	-	0.00	0.00	-	0.00
210	8,165	8,165	6.22	108.0	0.00	89.24	-	-	0.00	0.00	-	0.00
211	7,275	7,276	7.84	108.0	0.00	88.24	-	-	0.00	0.00	-	0.00
212	6,887	6,888	8.60	108.0	0.00	87.76	-	-	0.00	0.00	-	0.00
213	6,447	6,448	9.51	108.0	0.00	87.19	-	-	0.00	0.00	-	0.00
214	6,120	6,121	10.21	108.0	0.00	86.74	-	-	0.00	0.00	-	0.00
215	6,858	6,859	8.66	108.0	0.00	87.73	-	-	0.00	0.00	-	0.00
216	5,582	5,583	11.45	108.0	0.00	85.94	-	-	0.00	0.00	-	0.00
217	4,959	4,960	13.00	108.0	0.00	84.91	-	-	0.00	0.00	-	0.00
218	5,176	5,177	12.44	108.0	0.00	85.28	-	-	0.00	0.00	-	0.00
219	4,381	4,383	14.59	108.0	0.00	83.83	-	-	0.00	0.00	-	0.00
220	4,346	4,347	14.69	108.0	0.00	83.76	-	-	0.00	0.00	-	0.00
221	3,984	3,985	15.78	108.0	0.00	83.01	-	-	0.00	0.00	-	0.00
222	489	497	38.99	108.0	0.00	64.92	-	-	0.00	0.00	-	0.00
223	1,068	1,073	30.92	108.0	0.00	71.61	-	-	0.00	0.00	-	0.00
224	2,323	2,325	22.03	108.0	0.00	78.33	-	-	0.00	0.00	-	0.00
225	2,418	2,420	21.55	108.0	0.00	78.68	-	-	0.00	0.00	-	0.00
226	2,028	2,031	23.66	108.0	0.00	77.16	-	-	0.00	0.00	-	0.00
227	2,736	2,738	20.19	108.0	0.00	79.75	-	-	0.00	0.00	-	0.00
228	1,125	1,128	30.37	108.0	0.00	72.05	-	-	0.00	0.00	-	0.00
229	3,413	3,415	17.65	108.0	0.00	81.67	-	-	0.00	0.00	-	0.00
230	3,745	3,747	16.53	108.0	0.00	82.47	-	-	0.00	0.00	-	0.00
231	4,205	4,206	15.10	108.0	0.00	83.48	-	-	0.00	0.00	-	0.00
232	4,460	4,461	14.36	108.0	0.00	83.99	-	-	0.00	0.00	-	0.00
233	4,858	4,860	13.27	108.0	0.00	84.73	-	-	0.00	0.00	-	0.00
234	5,172	5,174	12.45	108.0	0.00	85.28	-	-	0.00	0.00	-	0.00
235	5,685	5,686	11.21	108.0	0.00	86.10	-	-	0.00	0.00	-	0.00
Sum	40.56											

- Data undefined due to calculation with octave data

Noise sensitive area: NSP023 NSP023

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	11,820	11,821	0.84	108.0	0.00	92.45	-	-	0.00	0.00	-	0.00
2	12,821	12,822	-0.37	108.0	0.00	93.16	-	-	0.00	0.00	-	0.00
3	8,806	8,807	3.98	107.0	0.00	89.90	-	-	0.00	0.00	-	0.00
4	9,155	9,155	3.48	107.0	0.00	90.23	-	-	0.00	0.00	-	0.00
5	9,977	9,977	2.35	107.0	0.00	90.98	-	-	0.00	0.00	-	0.00
6	13,221	13,222	-0.83	108.0	0.00	93.43	-	-	0.00	0.00	-	0.00
7	12,094	12,095	0.50	108.0	0.00	92.65	-	-	0.00	0.00	-	0.00
8	8,236	8,237	4.86	107.0	0.00	89.32	-	-	0.00	0.00	-	0.00
9	12,198	12,198	0.37	108.0	0.00	92.73	-	-	0.00	0.00	-	0.00
10	12,354	12,354	0.19	108.0	0.00	92.84	-	-	0.00	0.00	-	0.00
11	13,282	13,283	-0.89	108.0	0.00	93.47	-	-	0.00	0.00	-	0.00
12	10,710	10,710	1.41	107.0	0.00	91.60	-	-	0.00	0.00	-	0.00
13	9,524	9,525	2.96	107.0	0.00	90.58	-	-	0.00	0.00	-	0.00
14	10,156	10,156	2.11	107.0	0.00	91.13	-	-	0.00	0.00	-	0.00
15	12,036	12,037	0.57	108.0	0.00	92.61	-	-	0.00	0.00	-	0.00
16	8,977	8,978	3.73	107.0	0.00	90.06	-	-	0.00	0.00	-	0.00
17	13,516	13,517	-1.15	108.0	0.00	93.62	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

Minnesota Power - BISON Wind Energy Center

Minnesota Power
 Frank Frederickson
 30 West Superior Street
 Duluth, MN 55802-2093

Description:

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Calculated:

6/23/2011 1:32 PM/2.7.486

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG

Wind speed: 8.0 m/s

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
18	10,840	10,840	1.25	107.0	0.00	91.70	-	-	0.00	0.00	-	0.00
19	10,504	10,504	1.66	107.0	0.00	91.43	-	-	0.00	0.00	-	0.00
20	12,771	12,772	-0.31	108.0	0.00	93.12	-	-	0.00	0.00	-	0.00
22	8,851	8,852	3.92	107.0	0.00	89.94	-	-	0.00	0.00	-	0.00
23	7,479	7,481	6.10	107.0	0.00	88.48	-	-	0.00	0.00	-	0.00
25	13,877	13,877	-1.55	108.0	0.00	93.85	-	-	0.00	0.00	-	0.00
26	13,155	13,155	-0.75	108.0	0.00	93.38	-	-	0.00	0.00	-	0.00
27	11,430	11,430	1.34	108.0	0.00	92.16	-	-	0.00	0.00	-	0.00
28	12,606	12,607	-0.12	108.0	0.00	93.01	-	-	0.00	0.00	-	0.00
29	10,840	10,840	1.25	107.0	0.00	91.70	-	-	0.00	0.00	-	0.00
30	13,116	13,117	-0.71	108.0	0.00	93.36	-	-	0.00	0.00	-	0.00
31	10,167	10,168	2.10	107.0	0.00	91.14	-	-	0.00	0.00	-	0.00
32	9,352	9,353	3.20	107.0	0.00	90.42	-	-	0.00	0.00	-	0.00
33	9,438	9,438	3.08	107.0	0.00	90.50	-	-	0.00	0.00	-	0.00
201	14,452	14,453	-2.16	108.0	0.00	94.20	-	-	0.00	0.00	-	0.00
202	14,751	14,751	-2.46	108.0	0.00	94.38	-	-	0.00	0.00	-	0.00
203	14,922	14,923	-2.64	108.0	0.00	94.48	-	-	0.00	0.00	-	0.00
204	15,241	15,241	-2.95	108.0	0.00	94.66	-	-	0.00	0.00	-	0.00
205	15,721	15,722	-3.42	108.0	0.00	94.93	-	-	0.00	0.00	-	0.00
206	14,792	14,792	-2.50	108.0	0.00	94.40	-	-	0.00	0.00	-	0.00
207	15,286	15,287	-3.00	108.0	0.00	94.69	-	-	0.00	0.00	-	0.00
208	9,054	9,055	4.74	108.0	0.00	90.14	-	-	0.00	0.00	-	0.00
209	8,746	8,747	5.24	108.0	0.00	89.84	-	-	0.00	0.00	-	0.00
210	8,278	8,279	6.02	108.0	0.00	89.36	-	-	0.00	0.00	-	0.00
211	7,559	7,560	7.31	108.0	0.00	88.57	-	-	0.00	0.00	-	0.00
212	7,204	7,205	7.98	108.0	0.00	88.15	-	-	0.00	0.00	-	0.00
213	6,791	6,792	8.79	108.0	0.00	87.64	-	-	0.00	0.00	-	0.00
214	6,439	6,440	9.53	108.0	0.00	87.18	-	-	0.00	0.00	-	0.00
215	7,516	7,517	7.39	108.0	0.00	88.52	-	-	0.00	0.00	-	0.00
216	6,151	6,152	10.15	108.0	0.00	86.78	-	-	0.00	0.00	-	0.00
217	5,463	5,464	11.73	108.0	0.00	85.75	-	-	0.00	0.00	-	0.00
218	5,097	5,098	12.65	108.0	0.00	85.15	-	-	0.00	0.00	-	0.00
219	4,271	4,272	14.91	108.0	0.00	83.61	-	-	0.00	0.00	-	0.00
220	4,087	4,088	15.46	108.0	0.00	83.23	-	-	0.00	0.00	-	0.00
221	3,565	3,566	17.13	108.0	0.00	82.04	-	-	0.00	0.00	-	0.00
222	1,582	1,584	26.56	108.0	0.00	75.00	-	-	0.00	0.00	-	0.00
223	2,237	2,239	22.49	108.0	0.00	78.00	-	-	0.00	0.00	-	0.00
224	2,447	2,449	21.42	108.0	0.00	78.78	-	-	0.00	0.00	-	0.00
225	2,699	2,701	20.35	108.0	0.00	79.63	-	-	0.00	0.00	-	0.00
226	2,789	2,791	19.98	108.0	0.00	79.92	-	-	0.00	0.00	-	0.00
227	3,630	3,632	16.91	108.0	0.00	82.20	-	-	0.00	0.00	-	0.00
228	1,762	1,763	25.33	108.0	0.00	75.93	-	-	0.00	0.00	-	0.00
229	4,226	4,228	15.04	108.0	0.00	83.52	-	-	0.00	0.00	-	0.00
230	4,521	4,522	14.19	108.0	0.00	84.11	-	-	0.00	0.00	-	0.00
231	5,020	5,021	12.84	108.0	0.00	85.02	-	-	0.00	0.00	-	0.00
232	5,529	5,530	11.57	108.0	0.00	85.86	-	-	0.00	0.00	-	0.00
233	5,912	5,913	10.68	108.0	0.00	86.44	-	-	0.00	0.00	-	0.00
234	6,240	6,241	9.95	108.0	0.00	86.91	-	-	0.00	0.00	-	0.00
235	6,659	6,660	9.06	108.0	0.00	87.47	-	-	0.00	0.00	-	0.00

Sum 32.42

- Data undefined due to calculation with octave data

Project:

Minnesota Power - BISON Wind Energy Center

Description:

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 30 West Superior Street
 Duluth, MN 55802-2093

DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

Noise sensitive area: NSP024 NSP024

WTG

Wind speed: 8.0 m/s

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	12,697	12,697	-0.22	108.0	0.00	93.07	-	-	0.00	0.00	-	0.00
2	13,661	13,662	-1.31	108.0	0.00	93.71	-	-	0.00	0.00	-	0.00
3	9,670	9,670	2.76	107.0	0.00	90.71	-	-	0.00	0.00	-	0.00
4	10,117	10,117	2.16	107.0	0.00	91.10	-	-	0.00	0.00	-	0.00
5	10,791	10,791	1.31	107.0	0.00	91.66	-	-	0.00	0.00	-	0.00
6	13,983	13,984	-1.66	108.0	0.00	93.91	-	-	0.00	0.00	-	0.00
7	12,828	12,828	-0.37	108.0	0.00	93.16	-	-	0.00	0.00	-	0.00
8	9,160	9,160	3.47	107.0	0.00	90.24	-	-	0.00	0.00	-	0.00
9	13,124	13,124	-0.71	108.0	0.00	93.36	-	-	0.00	0.00	-	0.00
10	13,222	13,222	-0.83	108.0	0.00	93.43	-	-	0.00	0.00	-	0.00
11	14,226	14,226	-1.92	108.0	0.00	94.06	-	-	0.00	0.00	-	0.00
12	11,722	11,722	0.21	107.0	0.00	92.38	-	-	0.00	0.00	-	0.00
13	10,484	10,485	1.69	107.0	0.00	91.41	-	-	0.00	0.00	-	0.00
14	11,033	11,034	1.01	107.0	0.00	91.85	-	-	0.00	0.00	-	0.00
15	12,820	12,820	-0.37	108.0	0.00	93.16	-	-	0.00	0.00	-	0.00
16	9,891	9,891	2.46	107.0	0.00	90.91	-	-	0.00	0.00	-	0.00
17	14,243	14,244	-1.94	108.0	0.00	94.07	-	-	0.00	0.00	-	0.00
18	11,676	11,677	0.26	107.0	0.00	92.35	-	-	0.00	0.00	-	0.00
19	11,418	11,419	0.56	107.0	0.00	92.15	-	-	0.00	0.00	-	0.00
20	13,495	13,495	-1.13	108.0	0.00	93.60	-	-	0.00	0.00	-	0.00
22	9,880	9,881	2.47	107.0	0.00	90.90	-	-	0.00	0.00	-	0.00
23	8,420	8,420	4.57	107.0	0.00	89.51	-	-	0.00	0.00	-	0.00
25	14,628	14,628	-2.34	108.0	0.00	94.30	-	-	0.00	0.00	-	0.00
26	13,831	13,831	-1.50	108.0	0.00	93.82	-	-	0.00	0.00	-	0.00
27	12,297	12,297	0.25	108.0	0.00	92.80	-	-	0.00	0.00	-	0.00
28	13,372	13,373	-0.99	108.0	0.00	93.52	-	-	0.00	0.00	-	0.00
29	11,883	11,883	0.02	107.0	0.00	92.50	-	-	0.00	0.00	-	0.00
30	13,978	13,979	-1.66	108.0	0.00	93.91	-	-	0.00	0.00	-	0.00
31	11,181	11,181	0.84	107.0	0.00	91.97	-	-	0.00	0.00	-	0.00
32	10,176	10,176	2.08	107.0	0.00	91.15	-	-	0.00	0.00	-	0.00
33	10,443	10,443	1.74	107.0	0.00	91.38	-	-	0.00	0.00	-	0.00
201	15,284	15,285	-3.00	108.0	0.00	94.69	-	-	0.00	0.00	-	0.00
202	15,584	15,584	-3.29	108.0	0.00	94.85	-	-	0.00	0.00	-	0.00
203	15,842	15,842	-3.53	108.0	0.00	95.00	-	-	0.00	0.00	-	0.00
204	16,142	16,142	-3.81	108.0	0.00	95.16	-	-	0.00	0.00	-	0.00
205	16,632	16,633	-4.26	108.0	0.00	95.42	-	-	0.00	0.00	-	0.00
206	15,769	15,769	-3.46	108.0	0.00	94.96	-	-	0.00	0.00	-	0.00
207	16,292	16,292	-3.95	108.0	0.00	95.24	-	-	0.00	0.00	-	0.00
208	10,162	10,162	3.07	108.0	0.00	91.14	-	-	0.00	0.00	-	0.00
209	9,869	9,869	3.49	108.0	0.00	90.89	-	-	0.00	0.00	-	0.00
210	9,415	9,416	4.17	108.0	0.00	90.48	-	-	0.00	0.00	-	0.00
211	8,635	8,635	5.42	108.0	0.00	89.73	-	-	0.00	0.00	-	0.00
212	8,265	8,265	6.05	108.0	0.00	89.35	-	-	0.00	0.00	-	0.00
213	7,838	7,839	6.80	108.0	0.00	88.89	-	-	0.00	0.00	-	0.00
214	7,495	7,496	7.43	108.0	0.00	88.50	-	-	0.00	0.00	-	0.00
215	8,403	8,404	5.81	108.0	0.00	89.49	-	-	0.00	0.00	-	0.00
216	7,085	7,085	8.21	108.0	0.00	88.01	-	-	0.00	0.00	-	0.00
217	6,427	6,427	9.55	108.0	0.00	87.16	-	-	0.00	0.00	-	0.00
218	6,270	6,271	9.89	108.0	0.00	86.95	-	-	0.00	0.00	-	0.00
219	5,446	5,446	11.78	108.0	0.00	85.72	-	-	0.00	0.00	-	0.00
220	5,288	5,288	12.17	108.0	0.00	85.47	-	-	0.00	0.00	-	0.00
221	4,782	4,782	13.47	108.0	0.00	84.59	-	-	0.00	0.00	-	0.00
222	2,065	2,066	23.46	108.0	0.00	77.30	-	-	0.00	0.00	-	0.00
223	2,689	2,690	20.39	108.0	0.00	79.59	-	-	0.00	0.00	-	0.00
224	3,517	3,518	17.29	108.0	0.00	81.92	-	-	0.00	0.00	-	0.00

To be continued on next page...

Project:

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DECIBEL - Detailed results

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

...continued from previous page

WTG		Wind speed: 8.0 m/s										
No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
225	3,718	3,719	16.62	108.0	0.00	82.41	-	-	0.00	0.00	-	0.00
226	3,565	3,566	17.13	108.0	0.00	82.04	-	-	0.00	0.00	-	0.00
227	4,330	4,331	14.74	108.0	0.00	83.73	-	-	0.00	0.00	-	0.00
228	2,549	2,550	20.98	108.0	0.00	79.13	-	-	0.00	0.00	-	0.00
229	4,992	4,993	12.92	108.0	0.00	84.97	-	-	0.00	0.00	-	0.00
230	5,315	5,316	12.10	108.0	0.00	85.51	-	-	0.00	0.00	-	0.00
231	5,790	5,791	10.96	108.0	0.00	86.25	-	-	0.00	0.00	-	0.00
232	6,079	6,080	10.31	108.0	0.00	86.68	-	-	0.00	0.00	-	0.00
233	6,478	6,479	9.44	108.0	0.00	87.23	-	-	0.00	0.00	-	0.00
234	6,791	6,792	8.79	108.0	0.00	87.64	-	-	0.00	0.00	-	0.00
235	7,304	7,304	7.79	108.0	0.00	88.27	-	-	0.00	0.00	-	0.00
Sum	29.38											

- Data undefined due to calculation with octave data

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DECIBEL - Assumptions for noise calculation
Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

Noise calculation model:
 ISO 9613-2 General
Wind speed:
 8.0 m/s
Ground attenuation:
 General, Ground factor: 0.5
Meteorological coefficient, C0:
 0.0 dB
Type of demand in calculation:
 1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
 All noise values are mean values (Lwa) (Normal)
Pure tones:
 Pure and Impulse tone penalty are added to WTG source noise
Height above ground level, when no value in NSA object:
 0.0 m Don't allow override of model height with height from NSA object
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
 0.0 dB(A)
Octave data required
 Air absorption

63	125	250	500	1,000	2,000	4,000	8,000
[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]
0.1	0.4	1.0	1.9	3.7	9.7	32.8	117.0

WTG: Siemens SWT-2.3-101 60Hz 2300 101.0 !O!
Noise: SWT-2.3-101 Standard

Source	Source/Date	Creator	Edited	Octave data												
Siemens via MN Power	3/31/2009	USER	4/4/2011 3:12 PM	Status	Hub height	Wind speed	LwA,ref	Pure tones	63	125	250	500	1000	2000	4000	8000
					[m]	[m/s]	[dB(A)]		[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
				From Windcat	80.0	8.0	107.0	No	83.5	94.4	98.1	102.1	102.1	98.4	91.2	87.2

WTG: Siemens SWT-3.0-101 60Hz 3000 101.0 !O!
Noise: SWT-3.0-101 Standard

Source	Source/Date	Creator	Edited	Octave data												
Siemens via MN Power	5/17/2010	USER	4/4/2011 3:17 PM	Status	Hub height	Wind speed	LwA,ref	Pure tones	63	125	250	500	1000	2000	4000	8000
					[m]	[m/s]	[dB(A)]		[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
				From Windcat	80.0	8.0	108.0	No	82.8	94.7	101.4	104.7	101.4	93.5	82.6	79.3

NSA: NSP001-NSP001
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model
Noise demand: 45.0 dB(A)
Distance demand: 427.0 m

NSA: NSP002-NSP002
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model
Noise demand: 45.0 dB(A)
Distance demand: 427.0 m

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DECIBEL - Assumptions for noise calculation

Calculation: BISON 2 Noise (with existing BISON 1) **Noise calculation model:** ISO 9613-2 General 8.0 m/s

NSA: NSP003-NSP003

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP004-NSP004

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP005-NSP005

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP006-NSP006

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP007-NSP007

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP008-NSP008

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP009-NSP009

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP010-NSP010

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

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DECIBEL - Assumptions for noise calculation

Calculation: BISON 2 Noise (with existing BISON 1) **Noise calculation model:** ISO 9613-2 General 8.0 m/s

NSA: NSP011-NSP011

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP012-NSP012

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP013-NSP013

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP014-NSP014

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP015-NSP015

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP016-NSP016

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP017-NSP017

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP018-NSP018

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

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DECIBEL - Assumptions for noise calculation

Calculation: BISON 2 Noise (with existing BISON 1) Noise calculation model: ISO 9613-2 General 8.0 m/s

NSA: NSP019-NSP019

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP020-NSP020

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP021-NSP021

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP022-NSP022

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP023-NSP023

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m

NSA: NSP024-NSP024

Predefined calculation standard:

Imission height(a.g.l.): Use standard value from calculation model

Noise demand: 45.0 dB(A)

Distance demand: 427.0 m