

Prepared for:  
**Wolverine Power Cooperative**  
**Cadillac, Michigan**

# Addendum to the Air Quality Dispersion Modeling Report – Class I Area Impacts

## Wolverine Clean Energy Venture

ENSR Corporation  
June 2008  
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## Wolverine Clean Energy Venture

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## 1.0 Description of New Emission Case

ENSR has performed Class I modeling of an additional emission case in support of the Wolverine Power Cooperative generating facility (Wolverine) to be located in the southeast of Rogers City, Michigan. A Class I modeling report was prepared in April 2008 and submitted to the Michigan Department of Environmental Quality (MDEQ) and to the Fish and Wildlife Service (FWS). For additional operational flexibility, the proposed project developer would like to allow for slightly higher 24-hour average NO<sub>x</sub> emissions; no other short-term emission rates are affected. This addendum to the Class I report provides Class I modeling results for this additional emission case. Class I modeling results presented in this document are based on the same modeling procedures that were used in the April modeling report; these procedures were approved by the FWS.

The proposed emission limits and stack parameters are summarized in Tables 1-1 and 1-2, respectively. Except for the NO<sub>x</sub> emission rate increase and a small correction change (less than 3% lower) to the exhaust flow rate, the inputs to CALPUFF are the same as those already submitted.

**Table 1-1 Modeled Worst-Case 24-hr Average Emission Rates per Boiler**

Emission Parameter	Units	Emission Rate <sup>(1)</sup>
NO <sub>x</sub>	lb/hr	281.79
SO <sub>2</sub>	lb/hr	303.00
Total PM <sub>10</sub>	lb/hr	90.90
PM <sub>10</sub> Filterable Total	lb/hr	30.30
Coarse PM	lb/hr	16.85
Fine PM Total	lb/hr	13.45
Fine Soil PM	lb/hr	12.97
Elemental Carbon	lb/hr	0.485
PM <sub>10</sub> Condensable Total	lb/hr	60.60
H <sub>2</sub> SO <sub>4</sub>	lb/hr	18.18
SO <sub>4</sub>	lb/hr	17.81
Secondary Organic Aerosols	lb/hr	42.42
(1) Emission rates are per unit. Two units were modeled.		

**Table 1-2 Modeled Stack Parameters**

		Units 1-2		Units 1-2
Stack Diameter <sup>(1)</sup>	meters	8.19	feet	26.87
Stack Height	meters	137.16	feet	450.00
Flow Rate	acfm	947,000	acfm	947,000
Exhaust Velocity	m/sec	16.97	ft/sec	55.67
Temperature	°K	347.04	°F	165.00
Stack Coordinates		Lambert Conformal <sup>(2)</sup>		UTM Zone 17, NAD27
	X (km)	92.356	X (m)	280934.76
	Y (km)	-52.457	Y (m)	5030395.10
Base Elevation	meters	191.11	feet	627
<p>(1) Effective diameter of two flues = 5.79 m * sqrt(2) = 8.19 m.                      (2) Lambert Conformal coordinate system is based on 45.89°N/85.02°W projection origin and 30°N/60°N standard parallels, NWS-84 datum.</p>				

## 2.0 Modeling Results for the New Emission Case

Tables 2-1, 2-2, and 2-3 present Class I modeling results for the new emission case. The modeling results indicate that the proposed project still has insignificant impacts for all pollutants and averaging times for all years modeled. Therefore, the project does not have any adverse impact on air quality and no additional modeling is required for Seney Wilderness.

**Table 2-1 PSD Class I Increment Modeling Results**

Pollutant	Averaging Period	Maximum Modeled Concentration ( $\mu\text{g}/\text{m}^3$ )			Class I Significant Impact Level ( $\mu\text{g}/\text{m}^3$ )	PSD Class I Increment ( $\mu\text{g}/\text{m}^3$ )
		2002	2003	2004		
SO <sub>2</sub>	3-hr	0.596	0.948	0.732	1	25
	24-hr	0.154	0.189	0.118	0.2	5
	Annual	0.003	0.005	0.004	0.1	2
PM <sub>10</sub>	24-hr	0.071	0.069	0.043	0.32	8
	Annual	0.0013	0.0017	0.0015	0.16	4
NO <sub>x</sub>	Annual	0.0011	0.0018	0.0017	0.1	2.5

**Table 2-2 Regional Haze Modeling Results**

Class I Area	2002			2003			2004		
	Days > than		MAX % Change in B <sub>ext</sub>	Days > than		MAX % Change in B <sub>ext</sub>	Days > than		MAX % Change in B <sub>ext</sub>
	5% Δ B <sub>ext</sub>	10% Δ B <sub>ext</sub>		5% Δ B <sub>ext</sub>	10% Δ B <sub>ext</sub>		5% Δ B <sub>ext</sub>	10% Δ B <sub>ext</sub>	
Seney Wilderness	0	0	4.99	0	0	4.78	0	0	4.48

**Table 2-3 Acidic Deposition Modeling Results**

Pollutant	Averaging Period	Maximum Modeled Deposition			NPS Class I Deposition Analysis Threshold (DAT)
		2002	2003	2004	
(kg/ha/yr)					
Sulfur	Annual	0.004	0.007	0.004	0.01
Nitrogen	Annual	0.002	0.004	0.002	0.01

### 3.0 References

ENSR. 2008. Air Quality Dispersion Modeling Report – Class I Area Impacts. Prepared by ENSR. April 2008.  
[http://www.deq.state.mi.us/aps/downloads/permits/CFPP/2007/317-07/Wolverine\\_Class\\_I\\_Report\\_2008\\_04.pdf](http://www.deq.state.mi.us/aps/downloads/permits/CFPP/2007/317-07/Wolverine_Class_I_Report_2008_04.pdf)

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