




**Engine Control Systems**

## Strategic Direction of the Mining Diesel Emissions Council & Conference Activities

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### MDEC 2006




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## MDEC Current Focus

For nearly 30 years, the Mining Diesel Emissions Council has focused on the following strategic goals:


- To ensure Clean Air for all our employees serving within the mining industry;
- To promote awareness of suppliers who bring Clean Air solutions to the mining industry through the development and application of new diesel technologies; and
- To strengthen the mining industry position with respect to safety, health and environmental matters.



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## MDEC Influencers/Drivers


- Underground mine worker health & safety
- Underground air quality
- Diesel powered equipment & associated exhaust emissions
- Government regulations



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## What's changing?


- New EPA non-road engine certification standards (2011) for PM and NO<sub>x</sub>; and
- New diesel fuel standards for on-road (2006) and non-road (2010) vehicles, reducing sulfur levels to 15 ppm.



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**US-EPA Non-Road Diesel Engine Emission Standards [g/bhp-hr]**

Engine Power	Tier	Year	CO	HC	NMHC + NOx	NOx	PM
100 ≤ hp < 175	Tier 1	1997	-	-	-	6.9	-
	Tier 2	2003	3.7	-	4.9	-	0.22
	Tier 3	2007	3.7	-	3.0	-	0.22
	Tier 4	2012	3.7	0.14	-	0.3	0.015
175 ≤ hp < 300	Tier 1	1996	8.5	1.00	-	6.9	0.4
	Tier 2	2003	2.6	-	4.9	-	0.15
	Tier 3	2006	2.6	-	3.0	-	0.15
	Tier 4	2011	2.6	0.14	-	0.3	0.015
300 ≤ hp < 600	Tier 1	1996	8.5	1	-	6.9	0.4
	Tier 2	2001	2.6	-	4.8	-	0.15
	Tier 3	2006	2.6	-	3.0	-	0.15
	Tier 4	2011	2.6	0.14	-	0.3	0.015



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**Non-Road Diesel Engine rated 175 ≤ hp ≤ 300 regulated @ 0.4 g/bhp-hr PM**

- A 1996 Equipment powered by 200 hp Tier 1 will produce 0.64 kg PM every 8-hr shift
- A 2003 Equipment powered by 200 hp Tier 2 or 3 will produce 0.24 kg PM every 8-hr shift
- A 2011 Equipment powered by 200 hp Tier 4 will produce 0.032 kg PM every 8-hr shift



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### **Mining equipment are part of the non-road applications family**

- Current mining production machines & utility vehicles are equipped with non-road engines Tier 1, 2 & 3;
- Worker exposure limits are controlled by ventilation and enhanced by exhaust after-treatment, alternative fuels & comprehensive equipment/engine preventive maintenance;
- Effective 2011 mining equipment will be powered by Tier 4 diesel engines factory-equipped with after-treatment systems such as diesel particulate filters and/or NOx reduction strategy;
- Tier 1 engines can meet 2011 Tier 4 PM standard by using DPF of 95% filtration efficiency.



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### **MDEC Emerging Focus**

In addition to our founding principles, and to remain viable, MDEC will incorporate into future conferences:

- Broadened look at all non-road diesel engine/equipment and fuel applications in adjacent markets
  - Mining, tunneling, construction, etc.
- Examine best practices from all non-road applications for applicability in the underground mining industry