

Implications of Cerium and Platinum in Diesel Fuel without a Particulate Matter Trap

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OVERVIEW

- **Potential adverse health effects**
- **Screening evaluation**
- **Results of HEI near-highway evaluation for Ce**
- **Conclusions**

POTENTIAL ADVERSE HEALTH EFFECTS

- Evaluation based on limited information
- Evaluation consisted of:
 - literature reviews
 - Screening of potential ambient levels vs. benchmark levels
- Interested in short-term and long-term noncancer adverse effects

EXPOSURE POINT CONCENTRATIONS VS. SCREENING LEVELS

Metal Additive	Maximum Suggested Concentration ^a (in ppm)	EPCs (in $\mu\text{g}/\text{m}^3$)	Screening Level (in $\mu\text{g}/\text{m}^3$)
Platinum	0.5 – 1.0	0.0185 – 0.0370	100 ^b / 15 ^c / 0.2 ^d
Cerium	4 – 8	0.148 – 0.296	250 ^e

^aJ. Valentine (Clean Diesel Technologies, Inc.), personal communications, May 25, 2001.

^bThreshold Limit Value (TLV), for metallic Pt, adjusted with MOS = 10.

^cZereini, et al., 2001; Merget, 2000.

^dTLV for Pt-soluble salts, adjusted with MOS = 10.

^eRisk-based screening level, as ceric oxide.

RESULTS OF SCREENING EVALUATION

- Scaled Pt levels vs. benchmarks:
 - ~ 3,000 - 5,000 times < 100 mg/m^3
 - ~ 400 - 800 times < 15 mg/m^3
 - ~ 5 - 10 times < 0.2 mg/m^3
- Scaled Ce levels vs. benchmark:
 - ~ 800 - 1,600 times < 250 mg/m^3

RESULTS OF HEI NEAR-HIGHWAY EVALUATION

- HIWAY2 model projected ambient levels from LD and HD vehicles
 - Worst-case levels (assuming no filter @ 100 ppm “Eolys” Ce additive):
 - 7.2 mg/m^3 at 10 m
 - 1.2 mg/m^3 at 150 m
- Street canyon model (LD only):
 - 1.25 mg/m^3 at 1 m
 - 0.25 mg/m^3 at 14 m
- EPCs range 0.25 - 7.2 mg/m^3
 - ~ 35 - 1,000 times < 250 mg/m^3 RfC

CONCLUSIONS

- **Neither Pt nor Ce, at proposed manufacturer's levels, will have significant adverse health effects via inhalation**
- **Uncertainties:**
 - **Screening evaluation, not exhaustive study**
 - **Unknown environmental effects for longer-term accumulation (e.g. 40 years or more) of these metals**
- **Future research:**
 - **Toxicity studies--human and ecological**
 - **Fate and transport studies**
 - **Cost-benefit analyses**