



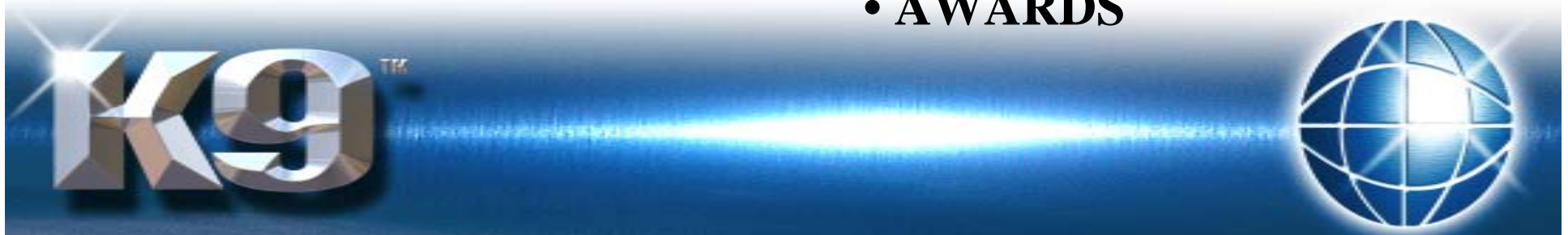
K9

Auxiliary Power Unit (APU)

ECOTRANS K9 APU Locomotive Application



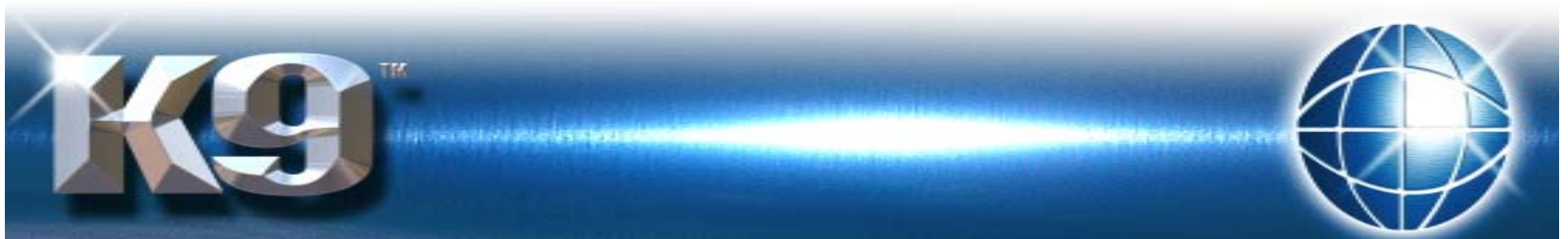
- **PURPOSE**
- **VISION**
- **DESCRIPTION**
- **BENEFITS**
- **AWARDS**





PURPOSE.....

- **EPA set emissions standards for new and remanufactured locomotives.**
- **APU's reduce NOx emissions and conserve fuel by reducing main engine idle regardless of weather conditions.**

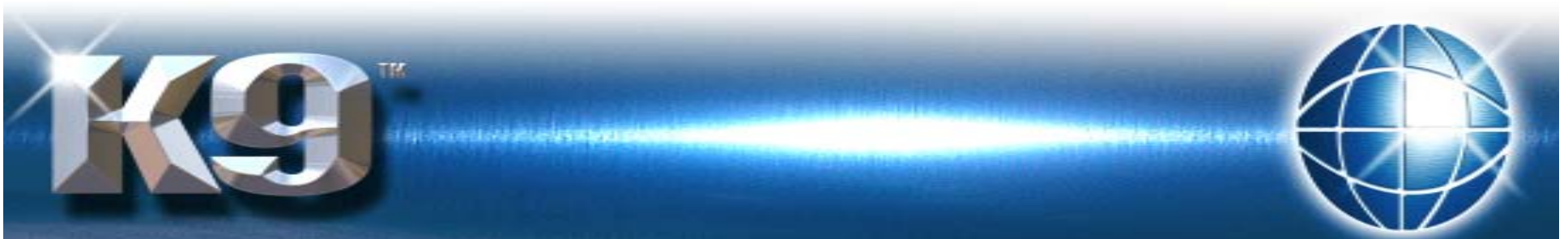
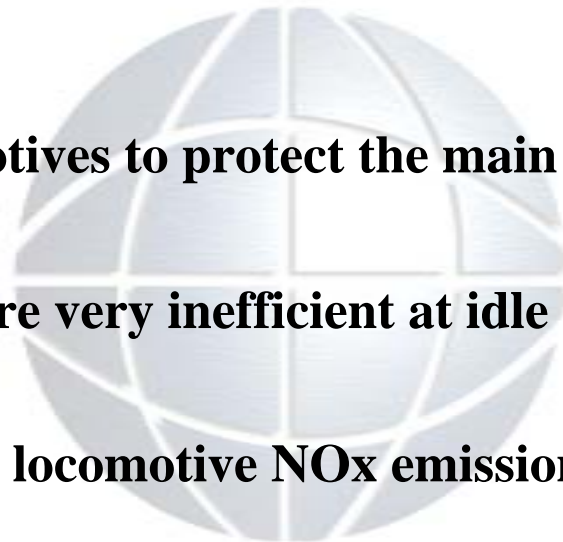


PURPOSE



WHY focus on idle.....

- **Railroads idle locomotives to protect the main engine**
- **Locomotive engines are very inefficient at idle**
- **20%-30% of switcher locomotive NO_x emissions occur at idle**

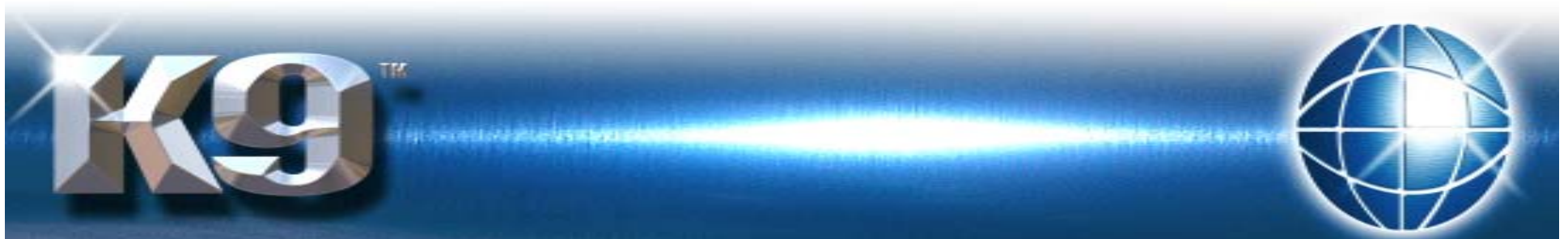


PURPOSE



WHY do railroad need credits.....

- To reduce the high Nox emissions
- To accelerate application of emission friendly technology
- Additional funds are required in order to meet investment targets of the railroads (from grants, offsets or seasonal Nox credits)

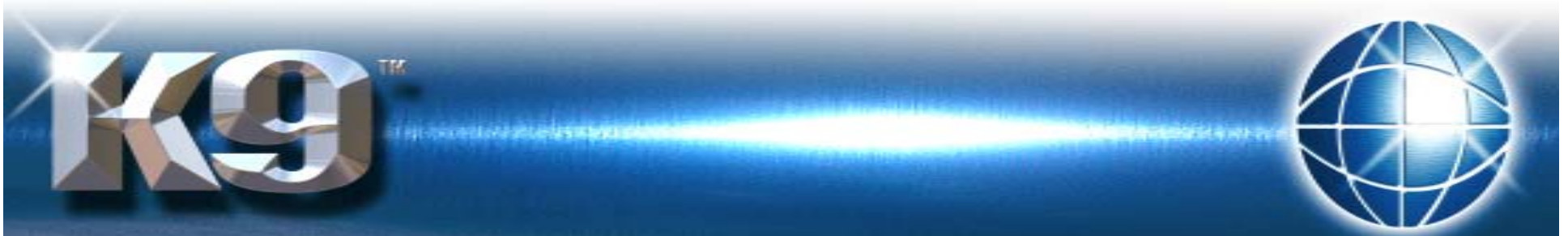


VISION



Three-Fold Objective

- Satisfy emission requirements on remanufactured locomotives
- Conserve diesel fuel
- Participate in emission credits for voluntary reductions (Reg 3 potential is 2,922 tons/yr for CSXT of which 35% is associated with idle reduction)



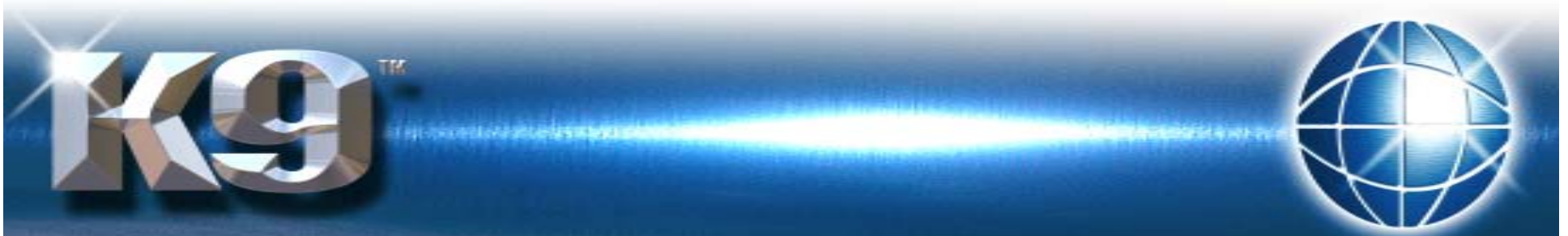
DESCRIPTION.....



- The APU is a diesel engine genset that consists of a 48 HP, 1800 rpm, 4 cylinder turbocharged engine that produces 16 kW, 240/120VAC, 60Hz power.



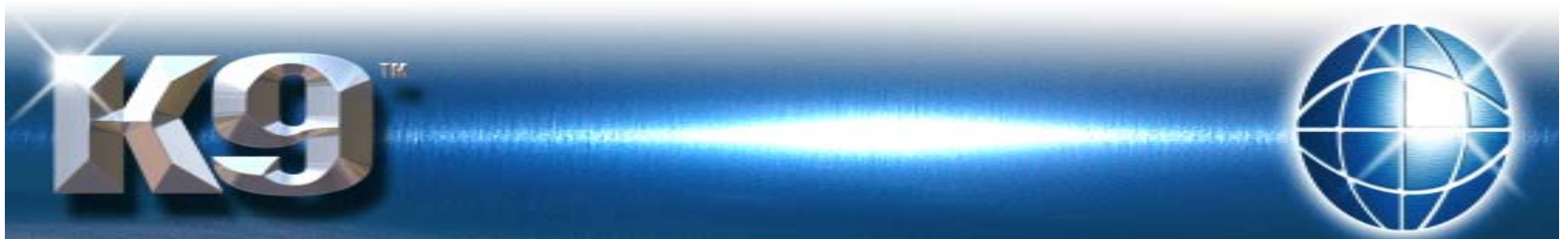
- The system protects the main locomotive engine, (4000 HP), during shutdown times by monitoring and maintaining the lube oil and water temperatures.





EMISSIONS.....

- **The Auxiliary Power Unit is part of a locomotive Tier 0 package certified to meet EPA's 1997 locomotive rule.**
- **The APU serves as the foundation for future locomotive engine emissions reductions strategies.**





EMISSIONS (cont')

•The following EMD engine families have Certified Emission Reduction Kits

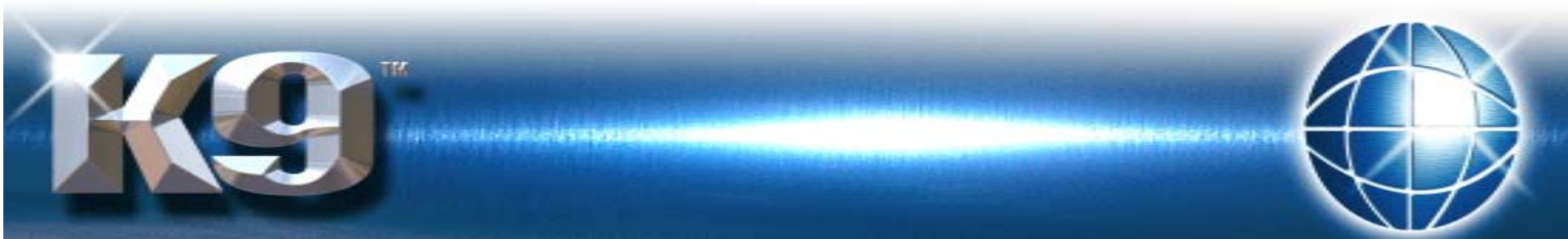
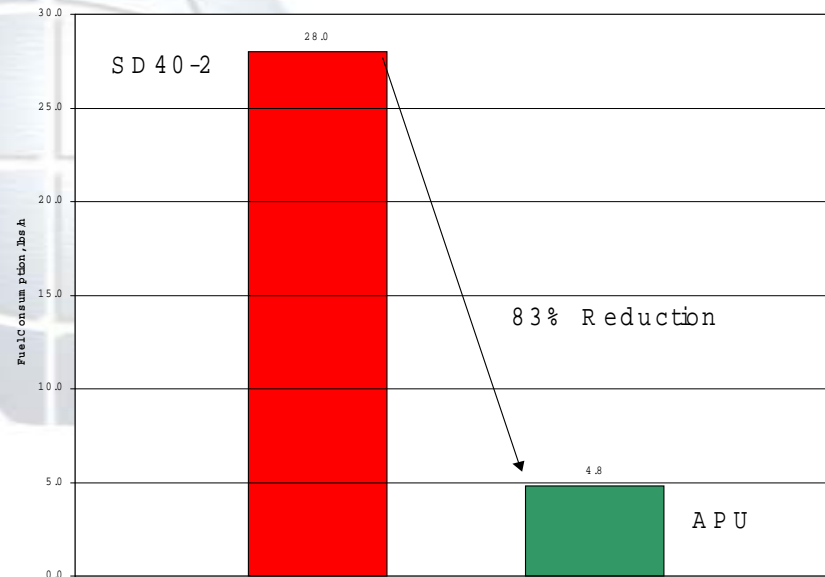
- 8, 12, & 16-645E**
- 12 & 16-645E3**
- 16-645E3B, & E3M**
- 8 & 16-645E3C**
- 16-645F3B**
- 16-710G3B, G3B-EC**
- 16-710G3B-ES**
- 20-710G3B-ES**



BENEFITS

Fuel Consumption

- **APU reduces Idle fuel consumption by 83%**
- **For certain locomotive applications, (Switchers), this equates to over 20,000 gallons/year.**



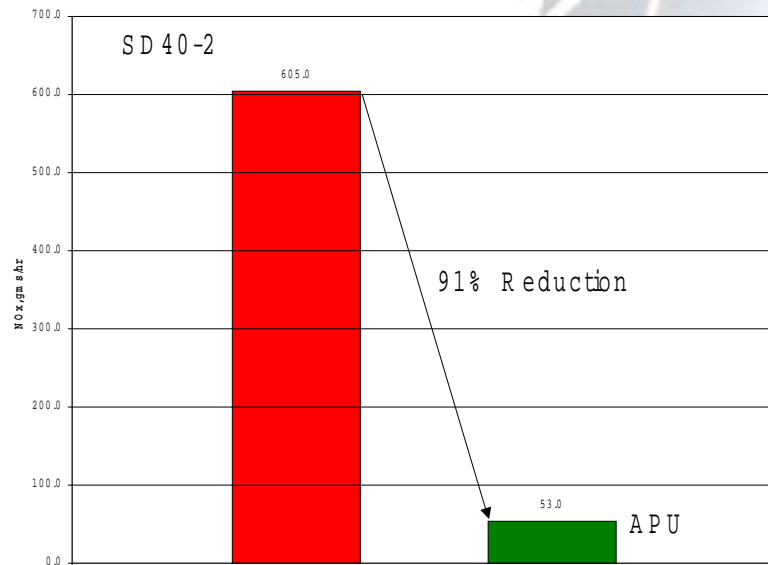
BENEFITS



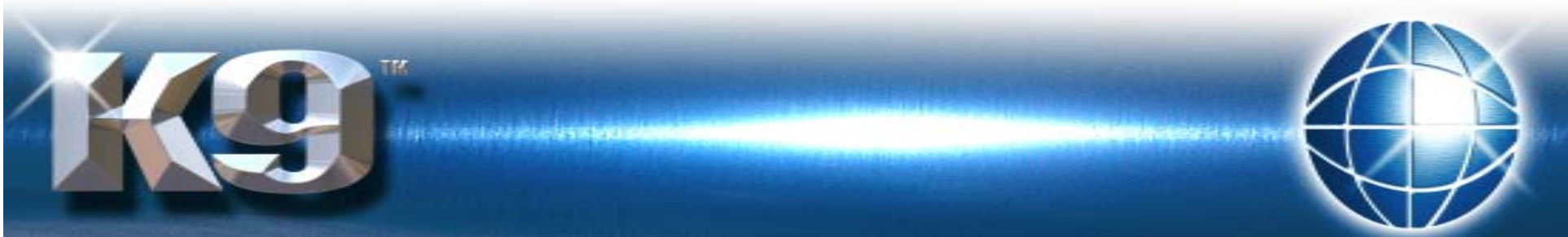
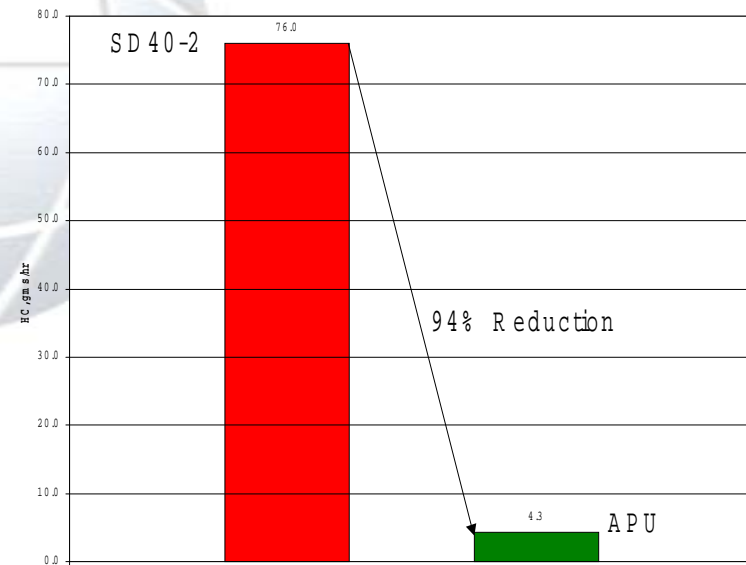
Idle Emission Reductions

(SD40-2 16-645E3 vs APU)*
(*test data from Southwest Research Institute)

Nox Em ission Rates



Hydrocarbon Em ission Rates



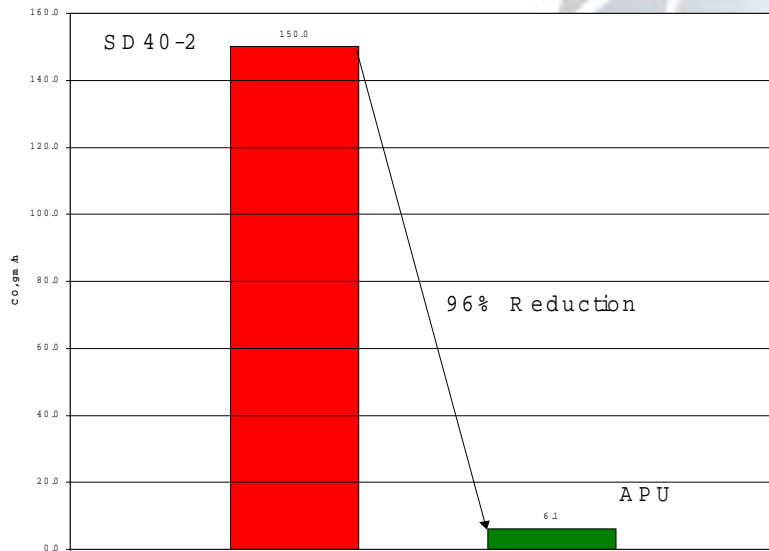
BENEFITS

Emissions

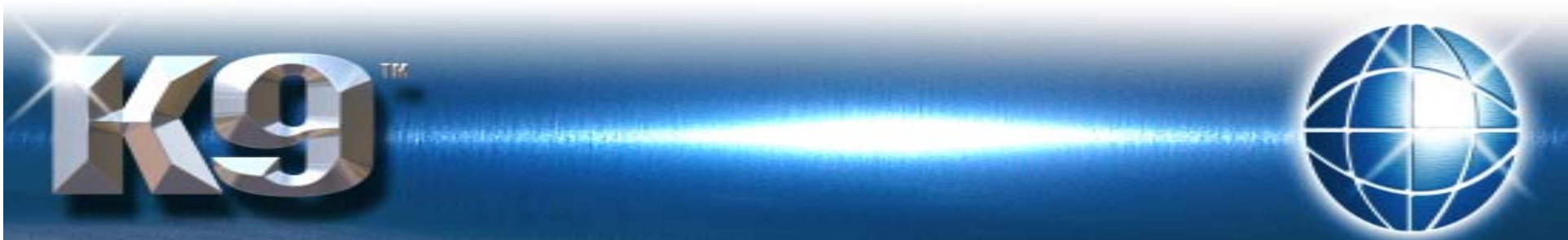
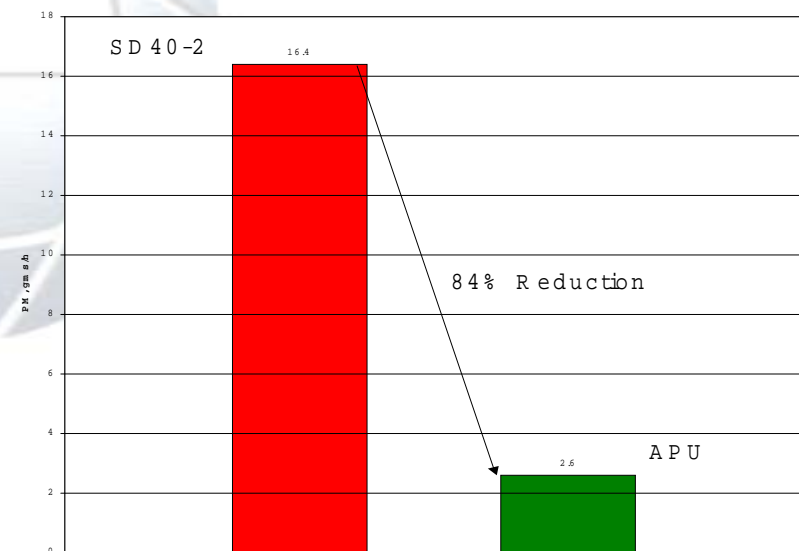


Idle Emission Reductions

Carbon Monoxide Emission Rates

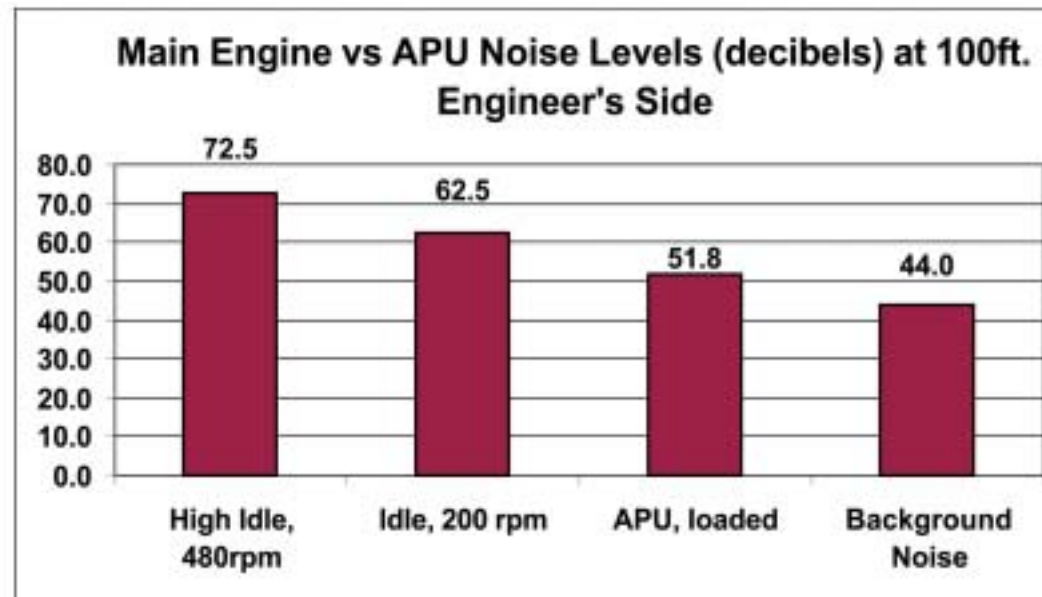


Particulate Matter Emission Rates



BENEFITS.....

NOISE ABATEMENT



- The noise level of the APU is roughly equivalent to normal background noise at 100 feet.



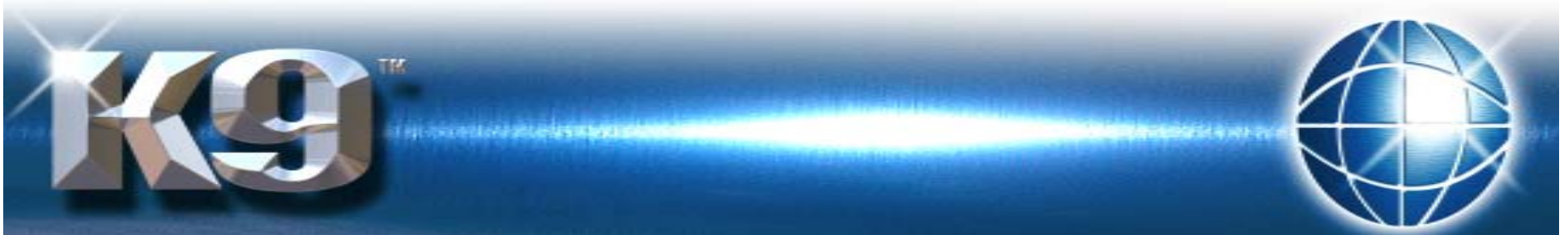
BENEFITS



SwRI Field Demonstration

- A one-year, two-unit field test by SwRI funded by TERP demonstrated avg. annual Nox reduction of 4.7 tons and fuel savings of 22,000 gals. for each locomotive.

- <https://vault.swri.org/apu/locoapu.htm>
- User name: locoapu
- Password: 2xAPU@SwRI



RECOGNITION

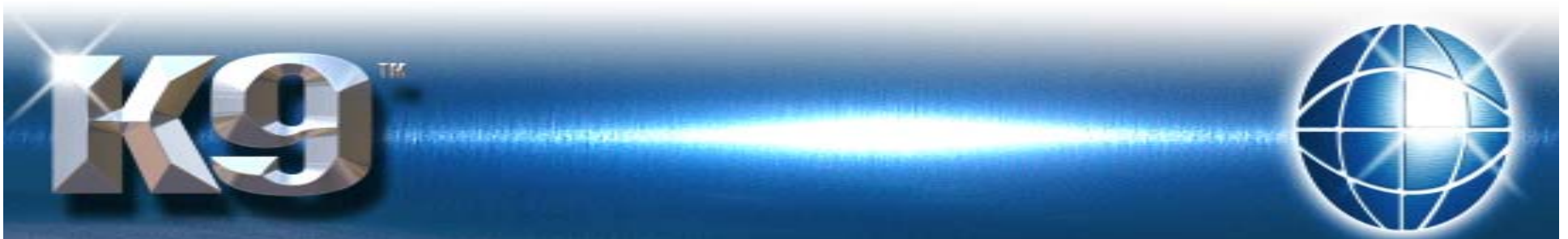
AND AWARDS



EPA
Environmental
Excellence
Award

Maryland
/D.O.E.
Grant
Award

Texas
Environmental
Excellence
Award





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