Appendix D

SUMMARY OF COST ANALYSIS METHODOLOGIES
Summary of Cost Analysis Methodologies
Proposed Regulation to Limit School Bus Idling and Idling at Schools

Definitions:
- CHP – California Highway Patrol
- DMV – Department of Motor Vehicles
- ARB – Air Resources Board

- 34 School bus contractors (Esbri, 2002)
- 999 school buses of all fuel types associated with private/independent schools (Esbri, 2002)
- 9,101 school buses of all fuel types operated by contractors (Esbri, 2002)
- 15,396 school buses of all fuel types operated by California school districts (Esbri, 2002)

- $15 per hour clerical salary (ARB staff estimation)
- $30 per hour bus and heavy duty vehicle driver salary (ARB staff estimation)

- 5 minutes for yearly reminder
  - 2.5 minutes for driver yearly reminder (ARB staff estimation)
  - 2.5 minutes for clerical to perform filing duties detailed by the proposed ATCM (ARB staff estimation)

- $2 per year per driver (Using above 2.5min. clerical labor and 2.5 min. driver labor, then rounding up to $2)
- One driver complaint approximately every 2-3 years. Derived from school district official stating that a fleet of 50 school buses will receive 1-2 complaints per month for the school year (10 months). (Miller, 2002)

- Initial implementation costs.
  - ARB $12,500 ($.05 X 4 pages X 20,000 stakeholders) + $7,500 postage + $1000 design costs. (ARB staff estimation)
  - DMV $1,150 ($850.00 for reproduction & $300 labor) (Boudreu, 2002)
  - CHP $100,000 CHP yearly salary, ¼ year ($25,000) needed for regulation development (ARB staff estimation)
  - CHP $600 Creating questions for new bus driver test (Esbri, 2002)

- Yearly statewide school bus fleet fuel savings (All California School Buses):
  - Using the formula: \( F_s = (B)(F_u)(M_i)(P)\left[.81(180) + .19(250)\right] \)
  - \( F_s = \) Fuel saved per year for entire school bus fleet in dollars
  - \( B = 25,176 \) school buses in California (gas & diesel) (Esbri, 2002)
  - \( F_u = \) Fuel used per minute idle. Use .5 gal/hour = .00833 gal/minute. (Oregon DOE, 1996; CenterViews, 2000; School Bus Fleet, 2000; Argonne National Laboratory, 2001 U.S. DOE, 2001)
- Mi = # of minutes idled per day by each bus. Range of 2min. – 20min. 
  (ARB staff estimation)
- P = Fuel price: 83.5 cents per gallon. (Miller, 2002)
- (.81)(180) represents 81% of fleet operates 180 days a year 
  (Green, 2002)
- (.19)(250) represents 19% of fleet operates 250 days a year 
  (Green, 2002)
- Running through the calculation for a range of 2 – 20 minutes less idling time per bus per day, yields the results: ~$68,000.00 - ~$680,000.00 dollars saved per year.
- ~81,000 – ~810,000 gallons ($68,000 / $.835 per gallon) & ($680,000 / $.835 per gallon)

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Yearly private school bus fleet fuel savings (999 Buses Statewide):
- Using the above formula: Fs = (B)(Fu)(Mi)(P)[(.81)(180) + (.19)(250)] and parameters, yearly fuel savings for private schools operating school buses are estimated to be $2,700 - $27,000.

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Yearly contractor school bus fleet fuel savings (9,101 Buses Statewide):
- Using the above formula: Fs = (B)(Fu)(Mi)(P)[(.81)(180) + (.19)(250)] and parameters,
  yearly fuel savings for private schools operating school buses are estimated to be $24,500 - $245,000.

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Yearly school district school bus fleet fuel savings (15,396 Buses Statewide):
- Using the above formula: Fs = (B)(Fu)(Mi)(P)[(.81)(180) + (.19)(250)] and parameters,
  yearly fuel savings for private schools operating school buses are estimated to be $41,400 - $414,000.

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Yearly statewide heavy-duty vehicle fuel savings (other than school buses):
- Using the formula:  Fs = (S)(Fu)(Mi)(Fp)[(.81)(36) + (.19)(50)] 
- Fs = Fuel saved per year for entire statewide fleet of other heavy-duty vehicles in dollars 
- S = Number of K-12 Public, Private and independent schools = Approx. 13,000 (CDE, 2002)
- Fu = Fuel used per minute idle. Use .5 gal/hour = .00833 gal/minute. 
  (Oregon DOE, 1996; CenterViews, 2000; School Bus Fleet, 2000; Argonne National Laboratory, 2001 U.S. DOE, 2001)
- Mi = Assume 10 – 15 trips per week per school and 2 – 4 excessive minutes idled per trip. Yields a range of 20 – 60 minutes excessive idling per week per school for other heavy-duty vehicles. 
  - 2 – 4 excessive minutes idled per trip (ARB staff estimation)
  - 10 – 15 trips per week per school (Miller, 2002; Sherrill, 2002)
- P = Fuel price: 83.5 cents per gallon. (Miller, 2002)
- (.81)(36) represents 81% of heavy-duty vehicles 36 weeks (180 days/5 days per week) a year (Green, 2002)
- (.19)(50) represents 19% of heavy-duty vehicles 50 weeks (250 days/5 days per week) a year (Green, 2002)
- Running through the calculation for a range of 20 – 60 minutes less idling time per week per school, yields the results: ~$70,000.00 - ~$210,000.00 dollars saved per year.
- ~83,000 – ~249,000 gallons ($70,000 / $.835 per gallon) & (83,000 gallons X 3)