

Corrections

This section of the FEDERAL REGISTER contains editorial corrections of previously published Presidential, Rule, Proposed Rule, and Notice documents. These corrections are prepared by the Office of the Federal Register. Agency prepared corrections are issued as signed documents and appear in the appropriate document categories elsewhere in the issue.

COMMITTEE FOR THE IMPLEMENTATION OF TEXTILE AGREEMENTS

Reduction of Charges for Certain Cotton Textile Products Produced or Manufactured in the Republic of Turkey

November 16, 2001.

Correction

In notice document 01-29109 appearing on page 58123 in the issue of Tuesday, November 20, 2001, make the following corrections:

(1) On page 58123, beginning in the first column, the last paragraph, the **Authority** citation, should have appeared as follows;

“**Authority:** Section 204 of the Agricultural Act of 1956, as amended (7 U.S.C. 1854); Executive Order 11651 of March 3, 1972, as amended.”

(2) On the same page, in the third column, the first paragraph should have appeared as follows;

“The Committee for the Implementation of Textile Agreements has determined that this action falls within the foreign affairs exception of the rulemaking provisions of 5 U.S.C. 553(a)(1).”

[FR Doc. C1-29109 Filed 11-28-01; 8:45 am]

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ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 92

Control of Air Pollution From Locomotives and Locomotive Engines; Republication

CFR Correction

Editorial Note: On Monday, November 26, 2001, this rule document FR Doc. 01-55530 appeared on 66 FR 58953-58964. Due to additional text being inadvertently added, it is being reprinted in its entirety.

In Title 40 of the Code of Federal Regulations, Parts 87 to 99, revised as of July 1, 2001, part 92 is corrected in § 92.120 by revising equations (1) and (2) in paragraph (c)(2)(v), in § 92.121 by revising paragraphs (b)(2)(vi), (b)(2)(ix), (b)(2)(xi)(A), and (b)(4)(iv), and by revising § 92.132 to read as follows:

§ 92.120 NDIR analyzer calibration and checks.

* * * * *

(c) * * *

(2) * * *

(v) * * *

$$y = Ax^4 + Bx^3 + Cx^2 + Dx + E \quad (1)$$

$$y = x/(Ax^4 + Bx^3 + Cx^2 + Dx + E) \quad (2)$$

where:

y = concentration.
x = chart deflection.

* * * * *

§ 92.121 Oxides of nitrogen analyzer calibration and check.

* * * * *

(b) * * *

(2) * * *

(vi) Turn on the NO_x generator O₂ (or air) supply and adjust the O₂ (or air) flow rate so that the NO indicated by the analyzer is about 10 percent less than indicated in step in paragraph (b)(2)(v) of this section. Record the concentration of NO in this NO + O₂ mixture.

* * * * *

(ix) Switch off the NO_x generation, but maintain gas flow through the system. The oxides of nitrogen analyzer

will indicate the total NO_x in the NO + O₂ mixture. Record this value.

* * * * *

(xi) * * *

$$(A) \text{ Percent Efficiency} = (1 + (a - b)/(c - d))(100)$$

where:

a=concentration obtained in paragraph (b)(2)(viii) of this section.

b=concentration obtained in paragraph (b)(2)(ix) of this section.

c=concentration obtained in paragraph (b)(2)(vi) of this section.

d=concentration obtained in paragraph (b)(2)(vii) of this section.

* * * * *

(4) * * *

(iv) Calculate the concentration of the converter checking gas using the results from step in paragraph (b)(4)(iii) of this section and the converter efficiency from paragraph (b)(2) of this section as follows:

$$\text{Concentration} = ((X - Y)(100)) / (\text{Efficiency} + Y)$$

* * * * *

§ 92.132 Calculations.

(a) *Duty-cycle emissions.* This section describes the calculation of duty-cycle emissions, in terms of grams per brake horsepower hour (g/bhp-hr). The calculation involves the weighted summing of the product of the throttle notch mass emission rates and dividing by the weighted sum of the brake horsepower. The final reported duty-cycle emission test results are calculated as follows:

$$(1)(i) E_{idc} = (\sum(M_{ij})(F_j)) / (\sum(BHP_j)(F_j))$$

Where:

E_{idc}=Duty-cycle weighted, brake-specific mass emission rate of pollutant i (i.e., HC, CO, NO_x or PM and, if appropriate, THCE or NMHC) in grams per brake horsepower-hour;

M_{ij}=the mass emission rate pollutant i for mode j;

F_j=the applicable weighting factor listed in Table B132-1 for mode j;

BHP_j=the measured brake horsepower for mode j.

(ii) Table B132-1 follows:

TABLE B132-1—WEIGHTING FACTORS FOR CALCULATING EMISSION RATES

Throttle notch setting	Test mode	Locomotive not equipped with multiple idle notches		Locomotive equipped with multiple idle notches	
		Line-haul	Switch	Line-haul	Switch
Low Idle	1a	NA	NA	0.190	0.299

TABLE B132-1—WEIGHTING FACTORS FOR CALCULATING EMISSION RATES—Continued

Throttle notch setting	Test mode	Locomotive not equipped with multiple idle notches		Locomotive equipped with multiple idle notches	
		Line-haul	Switch	Line-haul	Switch
Normal Idle	1	0.380	0.598	0.190	0.299
Dynamic Brake	2	0.125	0.000	0.125	0.000
Notch 1	3	0.065	0.124	0.065	0.124
Notch 2	4	0.065	0.123	0.065	0.123
Notch 3	5	0.052	0.058	0.052	0.058
Notch 4	6	0.044	0.036	0.044	0.036
Notch 5	7	0.038	0.036	0.038	0.036
Notch 6	8	0.039	0.015	0.039	0.015
Notch 7	9	0.030	0.002	0.030	0.002
Notch 8	10	0.162	0.008	0.162	0.008

(2) Example: For the line-haul cycle, for locomotives equipped with normal and low idle, and with dynamic brake, the brake-specific emission rate for HC would be calculated as:

$$E_{HCdc} = [(M_{HC1a})(0.190) + (M_{HC1})(0.190) + (M_{HC2})(0.125) + (M_{HC3})(0.065) + (M_{HC4})(0.065) + (M_{HC5})(0.052) + (M_{HC6})(0.044) + (M_{HC7})(0.038) + (M_{HC8})(0.039) + (M_{HC9})(0.030) + (M_{HC10})(0.162)] / [(BHP_{1a})(0.190) + (BHP_1)(0.190) + (BHP_2)(0.125) + (BHP_3)(0.065) + (BHP_4)(0.065) + (BHP_5)(0.052) + (BHP_6)(0.044) + (BHP_7)(0.038) + (BHP_8)(0.039) + (BHP_9)(0.030) + (BHP_{10})(0.162)]$$

(3) In each mode, brake horsepower output is the power that the engine delivers as output (normally at the flywheel), as defined in § 92.2.

(i) For locomotive testing (or engine testing using a locomotive alternator/generator instead of a dynamometer), brake horsepower is calculated as:

$$BHP = HP_{out} / A_{eff} + HP_{acc}$$

Where:

HP_{out}=Measured horsepower output of the alternator/generator.

A_{eff}=Efficiency of the alternator/generator.

HP_{acc}=Accessory horsepower.

(ii) For engine dynamometer testing, brake horsepower is determined from the engine speed and torque.

(4) For locomotive equipped with features that shut the engine off after prolonged periods of idle, the measured mass emission rate M_{ij} (and M_{ij1a} as applicable) shall be multiplied by a factor equal to one minus the estimated fraction reduction in idling time that will result in use from the shutdown feature. Application of this adjustment is subject to the Administrator's approval.

(b) *Throttle notch emissions.* This paragraph (b) describes the calculation of throttle notch emissions for all operating modes, including: idle (normal and low, as applicable); dynamic brake; and traction power

points. The throttle notch (operating mode) emission test results, final reported values and values used in paragraph (a)(1) of this section are calculated as follows:

(1) Brake specific emissions (E_{ij}) in grams per brake horsepower-hour of each species i (i.e., HC, CO, NO_x or PM and, if appropriate, THCE or NMHC) for each mode j:

$$(i) E_{HC mode} = HC \text{ grams/BHP-hr} = M_{HC mode} / \text{Measured BHP in mode.}$$

Where:

M_{HC mode}=Mass HC emissions (grams per hour) for each test mode.

$$(ii) E_{THCE mode} = THCE \text{ grams/BHP-hr} = M_{THCE mode} / \text{Measured BHP in mode.}$$

Where:

M_{THCE mode} (Total hydrocarbon equivalent mass emissions (grams per hour) for each test mode):

$$= M_{HCj} + \sum (M_{ij}) (MWC_p) / MWC_i$$

M_{ij}=the mass emission rate oxygenated pollutant i for mode j.

MWC_i=the molecular weight of pollutant i divided by the number of carbon atoms per molecule of pollutant i.

MWC_p=the molecular weight of a typical petroleum fuel component divided by the number of carbon atoms per molecule of a typical petroleum fuel component=13.8756.

$$(iii) E_{NMHC mode} = NMHC \text{ grams/BHP-hr} = M_{NMHC mode} / \text{Measured BHP in mode.}$$

Where:

M_{NMHC mode}=Mass NMHC emissions (grams per hour) for each test mode.

$$(iv) E_{CO mode} = CO \text{ grams/BHP-hr} = M_{CO mode} / \text{Measured BHP in mode.}$$

Where:

M_{CO mode}=Mass CO emissions (grams per hour) for each test mode.

$$(v) E_{NOx mode} = NOx \text{ grams/BHP-hr} = M_{NOx mode} / \text{Measured BHP in mode.}$$

Where:

M_{NOx mode}=Mass NO_x emissions (grams per hour) for each test mode.

$$(vi) E_{PM mode} = PM \text{ grams/BHP-hr} = M_{PM mode} / \text{Measured BHP in mode.}$$

Where:

M_{PM mode}=Mass PM emissions (grams per hour) for each test mode.

(vii) E_{AL mode}=Aldehydes grams/BHP-hr=M_{AL mode}/Measured BHP in mode.

(vii) E_{AL mode}=Aldehydes grams/BHP-hr=M_{AL mode}/Measured BHP in mode.

Where:

M_{AL mode}=Total aldehyde mass emissions (grams per hour) for each test mode.

(2) Mass Emissions—Raw exhaust measurements. For raw exhaust measurements mass emissions (grams per hour) of each species for each mode:

(i) General equations. (A) The mass emission rate, M_{X mode} (g/hr), of each pollutant (HC, NO_x, CO₂, CO, CH₄, CH₃OH, CH₃CH₂OH, CH₂O, CH₃CH₂O) for each operating mode for raw measurements is determined based on one of the following equations:

$$M_{X mode} = (DX/10^6)(DVol)(MW_X/V_m)$$

$$M_{X mode} = (WX/10^6)(WVol)(MW_X/V_m)$$

Where:

X designates the pollutant (e.g., HC), DX is the concentration of pollutant X (ppm or ppmC) on a dry basis, MW_X is the molecular weight of the pollutant (g/mol), DVol is the total exhaust flow rate (ft³/hr) on a dry basis, WX is the concentration of pollutant X (ppm or ppmC) on a wet basis, WVol is the total exhaust flow rate (ft³/hr) on a wet basis, V_m is the volume of one mole of gas at standard temperature and pressure (ft³/mol).

(B) All measured volumes and volumetric flow rates must be corrected to standard temperature and pressure prior to calculations.

(ii) The following abbreviations and equations apply to this paragraph (b)(2):

α=Atomic hydrogen/carbon ratio of the fuel.

β=Atomic oxygen/carbon ratio of the fuel.

CMW_f=Molecular weight of the fuel per carbon atom, or carbon molecular weight (g/moleC)=(12.011 + 1.008α + 16.000β).

DCO=CO concentration in exhaust, ppm (dry).

DCO₂=CO₂ concentration in exhaust, percent (dry).

DHC=HC carbon concentration in exhaust, ppm C (dry).

DNOX=NO_x concentration in exhaust, in ppm (dry).
 DVol=Total exhaust flow rate (ft³/hr) on a dry basis; or

$$=(V_m)(W_f)/((CMW_f)(DHC/10^6 + DCO/10^6 + DCO_2/100))$$

 K=Water gas equilibrium constant=3.5.
 K_w=Wet to dry correction factor.
 M_f=Mass flow-rate of fuel used in the engine in lb/hr= $W_f/453.59$.
 MW_C=Atomic weight of carbon=12.011.
 MW_{CO}=Molecular weight of CO=28.011.
 MW_H=Atomic weight of hydrogen=1.008.
 MW_{NO₂}=Molecular weight of nitrogen dioxide (NO₂)=46.008.
 MW_O=Molecular weight of atomic oxygen=16.000.
 T=Temperature of inlet air (°F).
 V_m=Volume of one mole of gas at standard temperature and pressure (ft³/mole).
 W_f=Mass flow-rate of fuel used in the engine, in grams/hr= $(453.59)(M_f \text{ lbs/hr})$.
 WCO₂=CO₂ concentration in exhaust, percent (wet).
 WHC=HC concentration in exhaust, ppm C (wet).
 WVol=Total exhaust flow rate (ft³/hr) on a wet basis; or

$$=(V_m)(W_f)/((CMW_f)(WHC/10^6 + WCO/10^6 + WCO_2/100))$$

(iii) Calculation of individual pollutant masses. Calculations for mass emission are shown here in multiple forms. One set of equations is used when sample is analyzed dry (equations where the concentrations are expressed as DX), and the other set is used when the sample is analyzed wet (equations where the concentrations are expressed as WX). When samples are analyzed for some constituents dry and for some constituents wet, the wet concentrations must be converted to dry concentrations, and the equations for dry concentrations used. Also, the equations for HC, NMHC, CO, and NO_x have multiple forms that are algebraically equivalent: An explicit form that requires intermediate calculation of V_m and DVol or WVol; and an implicit form that uses only the concentrations (e.g., DCO) and the mass flow rate of the fuel. For these calculations, either form may be used.

(A) Hydrocarbons and nonmethane hydrocarbons.

(1) Hydrocarbons. (i) For petroleum-fueled engines:

$$M_{HC \text{ mode}} = (DHC)CMW_f(DVol)(10^6)/V_m \\ = ((DHC/10^6)(W_f)/((DCO/10^6 + (DCO_2/100) + (DHC/10^6) + (\Sigma DX/10^6)))$$

$$M_{HC \text{ mode}} = (WHC)CMW_f(WVol)(10^6)/V_m \\ = ((WHC/10^6)(W_f)/((WCO/10^6 + (WCO_2/100) + (WHC/10^6) + (\Sigma(WX/10^6)))$$

(ii) For alcohol-fueled engines:

$$DHC = FID \text{ HC} - \Sigma(r_x)(DX)$$

$$WHC = FID \text{ HC} - \Sigma(r_x)(WX)$$

Where:

FID HC=Concentration of "hydrocarbon" plus other organics such as methanol in exhaust as measured by the FID, ppm carbon equivalent.

r_x=FID response to oxygenated species (methanol, ethanol, or acetaldehyde).

DX=Concentration of oxygenated species (methanol, ethanol, or acetaldehyde) in exhaust as determined from the dry exhaust sample, ppm carbon (e.g., DCH₃OH, 2(DCH₃CH₂OH)).

WX=Concentration of oxygenated species (methanol, ethanol, or acetaldehyde) in exhaust as determined from the wet exhaust sample, ppm carbon.

ΣDX=The sum of concentrations DX for all oxygenated species.

ΣWX=The sum of concentrations WX for all oxygenated species.

(2) Nonmethane hydrocarbons:

$$M_{NMHC \text{ mode}} = (DNMHC)CMW_f(DVol)(10^6)/V_m \\ = ((DNMHC/10^6)(W_f)/((DCO/10^6 + (DCO_2/100) + (DHC/10^6)))$$

$$M_{NMHC \text{ mode}} = (WNMHC)CMW_f(WVol)(10^6)/V_m \\ = ((WNMHC/10^6)(W_f)/((WCO/10^6 + (WCO_2/100) + (WHC/10^6)))$$

Where:

$$DNMHC = FID \text{ HC} - (r_{CH_4})(DCH_4)$$

$$WNMHC = FID \text{ HC} - (r_{CH_4})(WCH_4)$$

FID HC=Concentration of "hydrocarbon" plus other organics such as methane in exhaust as measured by the FID, ppm carbon equivalent.

r_{CH₄}=FID response to methane.

DCH₄=Concentration of methane in exhaust as determined from the dry exhaust sample, ppm.

WCH₄=Concentration of methane in exhaust as determined from the wet exhaust sample, ppm.

(B) Carbon monoxide:

$$M_{CO \text{ mode}} = (DCO)MW_{CO}(DVOL)/10^6/V_m \\ = ((MW_{CO}(DCO/10^6)(W_f)/((CMW_f)(DCO/10^6 + (DCO_2/100) + (DHC/10^6) + (\Sigma DX/10^6)))$$

$$M_{CO \text{ mode}} = (WCO)MW_{CO}(DVOL)(10^6)/V_m \\ + ((MW_{CO}(WCO/10^6)(W_f)/((CMW_f)(WCO/10^6 + (WCO_2/100) + (WHC/10^6) + (\Sigma WX/10^6)))$$

(C) Oxides of nitrogen:

$$M_{NO_x \text{ mode}} = (DNO_x)MW_{NO_2}(DVOL)(10^6)/V_m \\ = ((MW_{NO_2}(DNO_x/10^6)(W_f)/((CMW_f)(DCO/10^6 + (DCO_2/100) + (DHC/10^6) + (\Sigma DX/10^6)))$$

$$M_{NO_x \text{ mode}} = (WNO_x)MW_{NO_2}(DVOL)(10^6)/V_m \\ = ((MW_{NO_2}(WNO_x/10^6)(W_f)/((CMW_f)(WCO/10^6 + (WCO_2/100) + (WHC/10^6) + (\Sigma WX/10^6)))$$

(D) Methanol:

$$M_{CH_3OH \text{ mode}} = (DCH_3OH/10^6)32.042(DVol)/V_m$$

$$M_{CH_3OH \text{ mode}} = (WCH_3OH/10^6)32.042(WVol)/V_m$$

Where:

$$DCH_3OH = (V_m)(10^6)[(C_1 \times AV_1) + (C_2 \times AV_2)]/DVOL_{MS}$$

$$WCH_3OH = (V_m)(10^6)[(C_1 \times AV_1) + (C_2 \times AV_2)]/WVOL_{MS}$$

C_i=concentration of methanol in impinger i (1 or 2) in mol/ml.

AV_i=Volume of absorbing reagent in impinger i (1 or 2) in ml.

DVOL_{MS}=Volume (standard ft³) of exhaust sample drawn through methanol impingers (dry).

WVOL_{MS}=Volume (standard ft³) of exhaust sample drawn through methanol impingers (wet).

(E) Ethanol:

$$M_{CH_3CH_2OH \text{ mode}} = (DCH_3CH_2OH/10^6)23.035(DVol)/V_m$$

$$M_{CH_3CH_2OH \text{ mode}} = (WCH_3CH_2OH/10^6)23.035(WVol)/V_m$$

Where:

$$DCH_3CH_2OH = (V_m)(10^6)[(C_1 \times AV_1) + (C_2 \times AV_2)]/DVOL_{ES}$$

$$WCH_3CH_2OH = (V_m)(10^6)[(C_1 \times AV_1) + (C_2 \times AV_2)]/WVOL_{ES}$$

C_i=concentration of ethanol in impinger i (1 or 2) in mol/ml.

AV_i=Volume of absorbing reagent in impinger i (1 or 2) in ml.

DVOL_{ES}=Volume (standard ft³) of exhaust sample drawn through ethanol impingers (dry).

WVOL_{ES}=Volume (standard ft³) of exhaust sample drawn through ethanol impingers (wet).

(F) Formaldehyde:

$$M_{CH_2O \text{ mode}} = (DCH_2O/10^6)30.026(DVol)/V_m$$

$$M_{CH_2O \text{ mode}} = (WCH_2O/10^6)30.026(WVol)/V_m$$

(1) If aldehydes are measured using impingers:

$$DCH_2O = (V_m)(10^6)[(C_1 \times AV_1) + (C_2 \times AV_2)]/DVOL_{FS}$$

$$WCH_2O = (V_m)(10^6)[(C_1 \times AV_1) + (C_2 \times AV_2)]/WVOL_{FS}$$

(2) If aldehydes are measured using cartridges:

$$DCH_2O = (V_m)(10^6)(C_R \times AV_R)/DVOL_{FS}$$

$$WCH_2O = (V_m)(10^6)(C_R \times AV_R)/WVOL_{FS}$$

(3) The following definitions apply to this paragraph (b)(2)(iii)(F):

AV_i=Volume of absorbing reagent in impinger i (1 or 2) in ml.

AV_R=Volume of absorbing reagent use to rinse the cartridge in ml.

C_i=concentration of formaldehyde in impinger i (1 or 2) in mol/ml.

C_R=concentration of formaldehyde in solvent rinse in mol/ml.

DVOL_{FS}=Volume (standard ft³) of exhaust sample drawn through formaldehyde sampling system (dry).

WVOL_{FS}=Volume (standard ft³) of exhaust sample drawn through formaldehyde sampling system (wet).

(G) Acetaldehyde:

$$M_{CH_3CHO \text{ mode}} = (DCH_3CHO/10^6)27.027(DVol)/V_m$$

$$M_{CH_3CHO\ mode} = (W_{CH_3CHO} / 10^6) 27.027 (WVol) / V_m$$

(1) If aldehydes are measured using impingers:

$$DCH_3CHO = (V_m)(10^6) [(C_1 \times AV_1) + (C_2 \times AV_2)] / DVol_{AS}$$

$$WCH_3CHO = (V_m)(10^6) [(C_1 \times AV_1) + C_2 \times AV_2] / WVol_{AS}$$

(2) If aldehydes are measured using cartridges:

$$DCH_3CHO = (V_m)(10^6) (C_R \times AV_R) / DVol_{AS}$$

$$WCH_3CHO = (V_m)(10^6) (C_R \times AV_R) / WVol_{AS}$$

(3) The following definitions apply to this paragraph (b)(2)(iii)(G):

AV_i = Volume of absorbing reagent in impinger i (1 or 2) in ml.

AV_R = Volume of absorbing reagent use to rinse the cartridge in ml.

C_i = concentration of acetaldehyde in impinger i (1 or 2) in mol/ml.

C_R = concentration of acetaldehyde in solvent rinse in mol/ml.

$DVol_{AS}$ = Volume (standard ft³) of exhaust sample drawn through acetaldehyde sampling system (dry).

$WVol_{AS}$ = Volume (standard ft³) of exhaust sample drawn through acetaldehyde sampling system (wet).

(iv) Conversion of wet concentrations to dry concentrations. Wet concentrations are converted to dry concentrations using the following equation:

$$DX = K_W WX$$

Where:

WX is the concentration of species X on a wet basis.

DX is the concentration of species X on a dry basis.

K_W is a conversion factor = $WVol / DVol = 1 + DH_2O$.

(A) Iterative calculation of conversion factor. The conversion factor K_W is calculated from the fractional volume of water in the exhaust on a dry basis (DH_2O = volume of water in exhaust/dry volume of exhaust). Precise calculation of the conversion factor K_W must be done by iteration, since it requires the dry concentration of HC, but HC emissions are measured wet.

(1) The conversion factor is calculated by first assuming $DHC = WHC$ to calculate $DVol$:

$$DVol = (V_m)(W_f) / ((CMW_f)(DHC/10^6 + DCO/10^6 + DCO_2/100))$$

(2) This estimate is then used in the following equations to calculate $DVol_{air}$, then DH_2O , then K_W , which allows DHC to be determined more accurately from WHC :

$$DH_2O = \left[\frac{\alpha \left(\frac{DCO_2}{10^2} + \frac{DCO}{10^6} \right)}{2} + \frac{(Y)(DVol_{air})}{DVol} \right] \left[\frac{1}{1 + \frac{DCO}{(DCO_2)(K)(10^4)}} \right]$$

Where:

Y = Water volume concentration in intake air, volume fraction (dry).

$DVol_{air}$ = Air intake flow rate (ft³/hr) on a dry basis, measured, or calculated as:

$$DVol_{air} = DVol \left[1 - \left(\frac{DCO_2}{10^2} \right) \left(\frac{\alpha}{4} \right) - \frac{DCO}{10^6} \left(\frac{\alpha}{4} + 0.5 \right) \right]$$

(3) The calculations are repeated using this estimate of DHC . If the new estimate for K_W is not within one percent of the previous estimate, the iteration is repeated until the difference

in K_W between iterations is less than one percent.

(B) Alternate calculation of DH_2O (approximation). The following approximation may be used for DH_2O

instead of the calculation in paragraph (b)(2)(iv)(A) of this section:

$$DH_2O = \left[\frac{\alpha \left(\frac{DCO_2}{10^2} + \frac{DCO}{10^6} \right)}{2} + (Y)(DVol_{Ratio}) \right] \left[\frac{1}{1 + \frac{DCO}{(DCO_2)(K)(10^4)}} \right]$$

Where:

$$DVol_{ratio} = \frac{DVol_{air}}{DVol} = \left[1 - \left(\frac{DCO_2}{10^2} \right) \left(\frac{\alpha}{4} \right) - \frac{DCO}{10^6} \left(\frac{\alpha}{4} + 0.5 \right) \right]$$

Y = Water volume concentration in intake air, volume fraction (dry).

(3) *Mass Emissions—Dilute exhaust measurements.* For dilute exhaust measurements mass emissions (grams per hour) of each species for each mode:

(i) *General equations.* The mass emission rate, $M_{x\ mode}$ (g/hr) of each

pollutant (HC, NO_x , CO_2 , CO , CH_4 , CH_3OH , CH_3CH_2OH , CH_2O , CH_3CH_2O) for each operating mode for bag measurements and diesel continuously heated sampling system measurements is determined from the following equation:

$$M_{x\ mode} = (V_{mix})(Density_x)(X_{conc}) / (V_f)$$

Where:

x designates the pollutant (e.g., HC), V_{mix} is the total diluted exhaust volumetric flow rate (ft³/hr), $Density_x$ is the specified density of the pollutant in the gas phase (g/ft³), X_{conc} is the fractional concentration of pollutant x (i.e., ppm/10⁶, ppmC/10⁶, or %/100), and V_f is the fraction of the raw exhaust that is diluted for analysis.

(ii) The following abbreviations and equations apply to paragraphs (b)(3)(i) through (b)(3)(iii)(J) of this section:

(A) DF=Dilution factor, which is the volumetric ratio of the dilution air to the raw exhaust sample for total dilution, calculated as:

$$DF = \frac{WCO_2 - WCO_{2d}}{WCO_{2e} - WCO_{2d}} - 1$$

Where:

WCO₂=Carbon dioxide concentration of the raw exhaust sample, in percent (wet).

WCO_{2e}=Carbon dioxide concentration of the dilute exhaust sample, in percent (wet).

WCO_{2d}=Carbon dioxide concentration of the dilution air, in percent (wet).

(B) V_{mix}=Diluted exhaust volumetric flow rate in cubic feet per hour corrected to standard conditions (528°R, and 760 mm Hg).

(C) V_f=Fraction of the total raw exhaust that is diluted for analysis.

$$= ((CO_{2conc}/10^2) + (CO_{conc}/10^6) + (HC_{conc}/10^6))(V_{mix})(CMWF_f)/V_m/M_f$$

(iii) Calculation of individual pollutants.

(A) M_{HC mode}=Hydrocarbon emissions, in grams per hour by mode, are calculated using the following equations:

$$M_{HC mode} = (V_{mix})(Density_{HC})(HC_{conc}/10^6)/V_f$$

$$HC_{conc} = HC_e - (HC_d)(1 - (1/DF))$$

$$HC_e = FID HC_e - \sum(r_x)(X_e)$$

Where:

Density_{HC}=Density of hydrocarbons=16.42 g/ft³ (0.5800 kg/m³) for #1 petroleum diesel fuel, 16.27 g/ft³ (0.5746 kg/m³) for #2 diesel, and 16.33 g/ft³ (0.5767 kg/m³) for other fuels, assuming an average carbon to hydrogen ratio of 1:1.93 for #1 petroleum diesel fuel, 1:1.80 for #2 petroleum diesel fuel, and 1:1.85 for hydrocarbons in other fuels at standard conditions.

HC_{conc}=Hydrocarbon concentration of the dilute exhaust sample corrected for background, in ppm carbon equivalent (i.e., equivalent propane×3).

HC_e=Hydrocarbon concentration of the dilute exhaust bag sample, or for diesel continuous heated sampling systems, average hydrocarbon concentration of the dilute exhaust sample as determined from the integrated HC traces, in ppm carbon equivalent. For petroleum-fueled engines, HC_e is the FID measurement. For methanol-fueled and ethanol-fueled engines:

FID HC_e=Concentration of hydrocarbon plus methanol, ethanol and acetaldehyde in dilute exhaust as measured by the FID, ppm carbon equivalent.

r_x=FID response to oxygenated species x (methanol, ethanol or acetaldehyde).

X_e=Concentration of species x (methanol, ethanol or acetaldehyde) in dilute exhaust as determined from the dilute exhaust sample, ppm carbon.

HC_d=Hydrocarbon concentration of the dilution air as measured, in ppm carbon equivalent.

(B) M_{NO_x mode} = Oxides of nitrogen emissions, in grams per hour by mode, are calculated using the following equations:

$$M_{NO_x mode} = (V_{mix})(Density_{NO_2})(NO_{xconc}/10^6)/V_f$$

$$NO_{xconc} = (NO_{xe} - NO_{xd})(1 - (1/DF))$$

Where:

Density_{NO₂}=Density of oxides of nitrogen is 54.16 g/ft³ (1.913 kg/m³), assuming they are in the form of nitrogen dioxide, at standard conditions.

NO_{xconc}=Oxides of nitrogen concentration of the dilute exhaust sample corrected for background, in ppm.

NO_{xe}=Oxides of nitrogen concentration of the dilute exhaust bag sample as measured, in ppm.

NO_{xd}=Oxides of nitrogen concentration of the dilution air as measured, in ppm.

(C) M_{CO₂ mode}=Carbon dioxide emissions, in grams per hour by mode, are calculated using the following equations:

$$M_{CO_2 mode} = (V_{mix})(Density_{CO_2})(CO_{2conc}/10^2)/V_f$$

$$CO_{2conc} = CO_{2e} - CO_{2d}(1 - (1/DF))$$

Where:

Density CO₂=Density of carbon dioxide is 51.81 g/ft³ (1.830 kg/m³), at standard conditions.

CO_{2conc}=Carbon dioxide concentration of the dilute exhaust sample corrected for background, in percent.

CO_{2e}=Carbon dioxide concentration of the dilute exhaust bag sample, in percent.

CO_{2d}=Carbon dioxide concentration of the dilution air as measured, in percent.

(D)(1) M_{CO mode}=Carbon monoxide emissions, in grams per hour by mode, are calculated using the following equations:

$$M_{CO mode} = (V_{mix})(Density_{CO})(CO_{conc}/10^6)/V_f$$

$$CO_{conc} = CO_e - CO_d(1 - (1/DF))$$

$$CO_d = (1 - 0.000323R)CO_{dm}$$

Where:

Density_{CO}=Density of carbon monoxide is 32.97 g/ft³ (1.164 kg/m³), at standard conditions.

CO_{conc}=Carbon monoxide concentration of the dilute exhaust sample corrected for background, water vapor, and CO₂ extraction, ppm.

CO_e=Carbon monoxide concentration of the dilute exhaust sample volume corrected for water vapor and carbon dioxide extraction, in ppm.

CO_e=(1 - (0.01 + 0.005/α)CO_{2e} - 0.000323RH)CO_{em}, where α is the hydrogen to carbon ratio as measured for the fuel used.

CO_{em}=Carbon monoxide concentration of the dilute exhaust sample as measured, in ppm.

RH = Relative humidity of the dilution air, percent.

CO_d=Carbon monoxide concentration of the dilution air corrected for water vapor extraction, in ppm.

CO_{dm}=Carbon monoxide concentration of the dilution air sample as measured, in ppm.

(2) If a CO instrument which meets the criteria specified in § 86.1311 of this chapter is used and the conditioning column has been deleted, CO_{em} must be substituted directly for CO_e, and CO_{dm} must be substituted directly for CO_d.

(E) M_{CH₄ mode}=Methane emissions corrected for background, in gram per hour by mode, are calculated using the following equations:

$$M_{CH_4 mode} = (V_{mix})(Density_{CH_4})(CH_{4conc}/10^6)/V_f$$

$$CH_{4conc} = C_{CH_4e} - C_{CH_4d}(1 - (1/DF))$$

Where:

Density_{CH₄}=Density of methane is 18.89 g/ft³ at 68 °F (20 °C) and 760 mm Hg (101.3kPa) pressure.

CH_{4conc}=Methane concentration of the dilute exhaust corrected for background, in ppm.

C_{CH_{4e}}=Methane concentration in the dilute exhaust, in ppm.

C_{CH_{4d}}=Methane concentration in the dilution air, in ppm.

(F) M_{CH₃OH mode}=Methanol emissions corrected for background, in gram per hour by mode, are calculated using the following equations:

$$M_{CH_3OH mode} = (V_{mix})(Density_{CH_3OH})(CH_3OH_{conc}/10^6)/V_f$$

$$CH_3OH_{conc} = C_{CH_3OHe} - C_{CH_3OHd}(1 - (1/DF))$$

$$C_{CH_3OHe} = ((3.817)(10^{-2})(T_{EM})(((C_{S1})(AV_{S1})) + (C_{S2})(AV_{S2}))) / ((P_B)(V_{EM}))$$

$$C_{CH_3OHd} = ((3.817)(10^{-2})(T_{DM})(((C_{D1})(AV_{D1})) + (C_{D2})(AV_{D2}))) / ((P_B)(V_{DM}))$$

Where:

Density_{CH₃OH}=Density of methanol is 37.71 g/ft³ (1.332 kg/m³), at 68 °F (20 °C) and 760 mm Hg (101.3kPa) pressure.

CH₃OH_{conc}=Methanol concentration of the dilute exhaust corrected for background, in ppm.

C_{CH₃OHe}=Methanol concentration in the dilute exhaust, in ppm.

C_{CH₃OHd}=Methanol concentration in the dilution air, in ppm.

T_{EM}=Temperature of methanol sample withdrawn from dilute exhaust, °R.

T_{DM}=Temperature of methanol sample withdrawn from dilution air, °R.

P_B=Barometric pressure during test, mm Hg.

V_{EM}=Volume of methanol sample withdrawn from dilute exhaust, ft³.

V_{DM}=Volume of methanol sample withdrawn from dilution air, ft³.

C_S=GC concentration of aqueous sample drawn from dilute exhaust, µg/ml.

C_D=GC concentration of aqueous sample drawn from dilution air, µg/ml.

AV_S=Volume of absorbing reagent (deionized water) in impinger through which methanol sample from dilute exhaust is drawn, ml.

AV_D=Volume of absorbing reagent (deionized water) in impinger through which methanol sample from dilution air is drawn, ml.

i=first impinger.

2=second impinger.

(G) $M_{C_2H_5OH\ mode}$ =Ethanol emissions corrected for background, in gram per hour by mode, are calculated using the following equations:

$$M_{CH_3CH_2OH\ mode} = (V_{mix})(Density_{CH_3CH_2OH}) \left(\frac{(CH_3CH_2OH)_{conc}}{10^6} \right) / V_f$$

$$CH_3CH_2OH_{conc} = C_{CH_3CH_2OH_e} - \frac{C_{CH_3CH_2OH_d}(1 - (1/DF))}{(P_B)(V_{DM})}$$

$$C_{CH_3CH_2OH_d} = ((2.654)(10^{-2})(T_{DM})(((C_{D1})(AV_{D1})) + (C_{D2})(AV_{D2}))) / ((P_B)(V_{DM}))$$

$$C_{CH_3CH_2OH_e} = ((2.654)(10^{-2})(T_{EM})(((C_{S1})(AV_{S1})) + (C_{S2})(AV_{S2}))) / ((P_B)(V_{EM}))$$

Where:

Density $_{C_2H_5OH}$ =Density of ethanol is 54.23 g/ft³ (1.915 kg/m³), at 68 °F (20 °C) and 760 mm Hg (101.3kPa) pressure.
 $CH_3CH_2OH_{conc}$ =Ethanol concentration of the dilute exhaust corrected for background, in ppm.
 $C_{CH_3CH_2OH_e}$ =Ethanol concentration in the dilute exhaust, in ppm.
 $C_{CH_3CH_2OH_d}$ =Ethanol concentration in the dilution air, in ppm.
 T_{EM} = Temperature of ethanol sample withdrawn from dilute exhaust, °R.
 T_{DM} =Temperature of ethanol sample withdrawn from dilution air, °R.
 P_B =Barometric pressure during test, mm Hg.
 V_{EM} =Volume of ethanol sample withdrawn from dilute exhaust, ft³.
 V_{DM} =Volume of ethanol sample withdrawn from dilution air, ft³.
 C_S =GC concentration of aqueous sample drawn from dilute exhaust, µg/ml.
 C_D =GC concentration of aqueous sample drawn from dilution air, µg/ml.
 AV_S = Volume of absorbing reagent (deionized water) in impinger through which ethanol sample from dilute exhaust is drawn, ml.
 AV_D =Volume of absorbing reagent (deionized water) in impinger through which ethanol sample from dilution air is drawn, ml.
 1=first impinger.
 2=second impinger.

(H) $M_{CH_2O\ mode}$ =Formaldehyde emissions corrected for background, in gram per hour by mode, are calculated using the following equations:

$$M_{CH_2O\ mode} = (V_{mix})(Density_{CH_2O}) \left(\frac{(CH_2O)_{conc}}{10^6} \right) / V_f$$

$$CH_2O_{conc} = C_{CH_2O_e} - \frac{C_{CH_2O_d}(1 - (1/DF))}{(Q)(T_{EF}) / ((V_{SE})(P_B))}$$

$$C_{CH_2O_d} = ((4.069)(10^{-2})(C_{FDA})(V_{AA})(Q)(T_{DF}) / (V_{SA})(P_B))$$

Where:

Density $_{CH_2O}$ =Density of formaldehyde is 35.36 g/ft³ (1.249 kg/m³), at 68 °F (20 °C) and 760 mmHg (101.3 kPa) pressure.
 CH_2O_{conc} =Formaldehyde concentration of the dilute exhaust corrected for background, ppm.
 $C_{CH_2O_e}$ =Formaldehyde concentration in dilute exhaust, ppm.
 $C_{CH_2O_d}$ =Formaldehyde concentration in dilution air, ppm.
 C_{FDE} =Concentration of DNPH derivative of formaldehyde from dilute exhaust sample in sampling solution, µg/ml.

V_{AE} =Volume of sampling solution for dilute exhaust formaldehyde sample, ml.
 Q = Ratio of molecular weights of formaldehyde to its DNPH derivative = 0.1429.

T_{EF} =Temperature of formaldehyde sample withdrawn from dilute exhaust, °R.
 V_{SE} =Volume of formaldehyde sample withdrawn from dilute exhaust, ft³.
 P_B =Barometric pressure during test, mm Hg.
 C_{FDA} =Concentration of DNPH derivative of formaldehyde from dilution air sample in sampling solution, µg/ml.

V_{AA} =Volume of sampling solution for dilution air formaldehyde sample, ml.
 T_{DF} =Temperature of formaldehyde sample withdrawn from dilution air, °R.
 V_{SA} =Volume of formaldehyde sample withdrawn from dilution air, ft³.

(I) $M_{CH_3CHO\ mode}$ =Acetaldehyde emissions corrected for background, in grams per hour by mode, are calculated using the following equations:

$$M_{CH_3CHO\ mode} = (V_{mix})(Density_{CH_3CHO}) \left(\frac{(CH_3CHO)_{conc}}{10^6} \right) / V_f$$

$$CH_3CHO_{conc} = C_{CH_3CHO_e} - \frac{C_{CH_3CHO_d}(1 - (1/DF))}{(C_{ADE})(V_{AE})(Q)(T_{EF}) / ((V_{SE})(P_B))}$$

$$C_{CH_3CHO_e} = ((2.774)(10^{-2})(C_{ADE})(V_{AE})(Q)(T_{EF}) / ((V_{SE})(P_B))$$

$$C_{CH_3CHO_d} = ((2.774)(10^{-2})(C_{ADA})(V_{AA})(Q)(T_{DF}) / (V_{SA})(P_B))$$

Where:

Density $_{CH_3CHO}$ =Density of acetaldehyde is 51.88 g/ft³ (1.833 kg/m³), at 68 °F (20 °C) and 760 mmHg (101.3 kPa) pressure.
 CH_3CHO_{conc} =Acetaldehyde concentration of the dilute exhaust corrected for background, ppm.
 $C_{CH_3CHO_e}$ =Acetaldehyde concentration in dilute exhaust, ppm.
 $C_{CH_3CHO_d}$ =Acetaldehyde concentration in dilution air, ppm.
 C_{ADE} =Concentration of DNPH derivative of acetaldehyde from dilute exhaust sample in sampling solution, µg/ml.
 V_{AE} =Volume of sampling solution for dilute exhaust acetaldehyde sample, ml.
 Q =Ratio of molecular weights of acetaldehyde to its DNPH derivative = 0.182

T_{EF} =Temperature of acetaldehyde sample withdrawn from dilute exhaust, °R.
 V_{SE} =Volume of acetaldehyde sample withdrawn from dilute exhaust, ft³.
 P_B =Barometric pressure during test, mm Hg.
 C_{ADA} Concentration of DNPH derivative of acetaldehyde from dilution air sample in sampling solution, µg/ml.
 V_{AA} =Volume of sampling solution for dilution air acetaldehyde sample, ml.
 T_{DF} =Temperature of acetaldehyde sample withdrawn from dilution air, °R.
 V_{SA} =Volume of acetaldehyde sample withdrawn from dilution air, ft³.

(J) $M_{NMHC\ mode}$ =Nonmethane hydrocarbon emissions, in grams per hour by mode.

$$M_{NMHC\ mode} = (V_{mix})(Density_{NMHC}) \left(\frac{(NMHC)_{conc}}{10^6} \right) / V_f$$

$$NMHC_{conc} = NMHC_e - (NMHC_d)(1 - (1/DF))$$

$NMHC_e$ =FID $HC_e - (r_m)(C_{CH_4e})$
 $NMHC_d$ =FID $HC_d - (r_m)(C_{CH_4d})$

Where:

Density $_{NMHC}$ =Density of nonmethane hydrocarbons=16.42 g/ft³ (0.5800 kg/m³) for # 1 petroleum diesel fuel, 16.27 g/ft³ (0.5746 kg/m³) for #2 diesel, and 16.33 for other fuels, assuming an average carbon to hydrogen ratio of 1:1.93 for #1 petroleum diesel fuel, 1:1.80 for #2 petroleum diesel fuel, and 1:1.85 for nonmethane hydrocarbons in other fuels at standard conditions.

$NMHC_{conc}$ =Nonmethane hydrocarbon concentration of the dilute exhaust sample corrected for background, in ppm carbon equivalent (i.e., equivalent propane × 3).

$NMHC_e$ =Nonmethane hydrocarbon concentration of the dilute exhaust bag sample:

FID HC_e =Concentration of hydrocarbons in dilute exhaust as measured by the FID, ppm carbon equivalent.

r_m =FID response to methane.

C_{CH_4e} =Concentration of methane in dilute exhaust as determined from the dilute exhaust sample.

$NMHC_d$ =Nonmethane hydrocarbon concentration of the dilution air:

FID HC_d =Concentration of hydrocarbons in dilute exhaust as measured by the FID, ppm carbon equivalent.

r_m =FID response to methane.

C_{CH_4d} =Concentration of methane in dilute exhaust as determined from the dilute exhaust sample, ppm.

(4) *Particulate exhaust emissions.* The mass of particulate for a test mode determined from the following equations when a heat exchanger is used (i.e., no flow compensation), and when background filters are used to correct for background particulate levels:

$M_{PM\ mode}$ =Particulate emissions, grams per hour by mode.

$$M_{PM\ mode} = (WVol)(PM_{conc})(1 + DF) = (V_{mix})(PM_{conc}) / V_f$$

$PM_{conc} = PM_e - PM_d(1 - (1/DF))$

$PM_e = M_{PM_e} / V_{sample} / 10^3$

$PM_d = M_{PM_d} / V_{sample} / 10^3$

Where:

PM_{conc} =Particulate concentration of the diluted exhaust sample corrected for background, in g/ft³

M_{PM_e} =Measured mass of particulate for the exhaust sample, in mg, which is the difference in filter mass before and after the test.

M_{PM_d} =Measured mass of particulate for the dilution air sample, in mg, which is the difference in filter mass before and after the test.

V_{sample} =Total wet volume of sample removed from the dilution tunnel for the exhaust particulate measurement, cubic feet at standard conditions.

V_{sample} =Total wet volume of sample removed from the dilution tunnel for the dilution air particulate measurement, cubic feet at standard conditions.

DF=Dilution factor, which is the volumetric ratio of the dilution air to the raw exhaust sample, calculated as:

$$DF = \frac{WCO_2 - WCO_{2d}}{WCO_{2e} - WCO_{2d}} - 1$$

(c) *Humidity calculations.* (1) The following abbreviations (and units) apply to paragraph (b) of this section:

- BARO=barometric pressure (Pa).
- H=specific humidity, (g H₂O/g of dry air).
- K_H=conversion factor=0.6220 g H₂O/g dry air.
- M_{air}=Molecular weight of air=28.9645.
- M_{H₂O}=Molecular weight of water=18.01534.
- P_{DB}=Saturation vapor pressure of water at the dry bulb temperature (Pa).
- P_{DP}=Saturation vapor pressure of water at the dewpoint temperature (Pa).
- P_v=Partial pressure of water vapor (Pa).
- P_{WB}=Saturation vapor pressure of water at the wet bulb temperature (Pa).
- T_{DB}=Dry bulb temperature (Kelvin).
- T_{WB}=Wet bulb temperature (Kelvin).
- Y=Water-vapor volume concentration.

(2) The specific humidity on a dry basis of the intake air (H) is defined as:
 $H = \frac{(K_H)(P_v)}{(BARO - P_v)}$

(3) The partial pressure of water vapor may be determined using a dew point device. In that case:

$$P_v = P_{DP}$$

(4) The percent of relative humidity (RH) is defined as:

$$RH = \frac{P_v}{P_{DB}} 100$$

(5) The water-vapor volume concentration on a dry basis of the engine intake air (Y) is defined as:

$$Y = \frac{(H)(M_{air})}{(M_{H_2O})} = \frac{P_v}{(BARO - P_v)}$$

(d) *NO_x correction factor.* (1) NO_x emission rates (M_{NO_x mode}) shall be adjusted to account for the effects of humidity and temperature by multiplying each emission rate by K_{NO_x}, which is calculated from the following equations:

$$K_{NO_x} = (K)(1 + (0.25(\log K)^2)^{1/2})$$

$$K = (K_H)(K_T)$$

$$K_H = \frac{[C_1 + C_2(\exp(-0.0143)(10.714))] / [C_1 + C_2(\exp(-0.0143)(1000H))]}{C_1 = -8.7 + 164.5 \exp(-0.0218(A/F)_{wet})}$$

$$C_2 = 130.7 + 3941 \exp(-0.0248(A/F)_{wet})$$

Where:

(A/F)_{wet}=Mass of moist air intake divided by mass of fuel intake.

K_T=1/[1-0.017(T₃₀-T_A)] for tests conducted at ambient temperatures below 30 °C.

K_T=1.00 for tests conducted at ambient temperatures at or above 30 °C.

T₃₀=The measured intake manifold air temperature in the locomotive when operated at 30 °C (or 100 °C, where intake manifold air temperature is not available).

T_A=The measured intake manifold air temperature in the locomotive as tested (or

the ambient temperature (°C), where intake manifold air temperature is not available).

(e) *Other calculations.* Calculations other than those specified in this section may be used with the advance approval of the Administrator.

[FR Doc. 01-55530 Filed 11-23-01; 8:45 am]

Editorial Note: On Monday, November 26, 2001, this rule document FR Doc. 01-55530 appeared on 66 FR 58953-58964. Due to additional text being inadvertently added, it is being reprinted in its entirety.

[FR Doc. R1-55530 Filed 11-28-01; 8:45 am]

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FEDERAL RESERVE SYSTEM

[Docket No. R-1115]

Federal Reserve Bank Services

Correction

In notice document 01-27779 beginning on page 56310 in the issue of Wednesday, November 7, 2001, make the following corrections:

1. On page 56310, in Table 1, the title should have appeared as follows:

TABLE 1.—PRO FORMA COST AND REVENUE PERFORMANCE ^a

2. On page 56315, in Table 5, in the fourth column, the column title, “Estimated growth 2001 (percent)”

should read, “Estimated 2001 growth (percent)”.

3. On the same page, Table 7 should have appeared as follows:

TABLE 7.—SELECTED CHECK FEES

	2001 Current price ranges (per item)	2002 price ranges (per item)
Items:		
Forward-processed		
City	\$0.001 to 0.079	\$0.001 to 0.079
RCPC	\$0.003 to 0.200	\$0.003 to 0.300
Forward fine-sort		
City	\$0.003 to 0.021	\$0.003 to 0.021
RCPC	\$0.003 to 0.036	\$0.004 to 0.036
Qualified returned checks		
City	\$0.08 to 0.85	\$0.08 to 0.85
RCPC	\$0.10 to 1.15	\$0.10 to 1.15
Raw returned checks		
City	\$1.05 to 5.00	\$1.05 to 5.00
RCPC	\$1.05 to 5.00	\$1.05 to 5.00
Cash letters:	(per cash letter)	(per cash letter)
Forward-processed ^a	\$2.00 to 32.00	\$2.25 to 36.00
Forward fine-sort	\$3.00 to 14.00	\$3.50 to 14.00
Returned checks: raw/qualified	\$2.00 to 14.00	\$2.00 to 14.50
Payor bank services:	(Fixed) (per item)	(Fixed) (per item)
MICR information	\$2-15 \$0.0020-0.0070	\$2-15 \$0.0030-0.0110
Electronic presentment	\$1-11 \$0.0005-0.0100	\$1-12 \$0.0005-0.0100
Truncation	\$2-7 \$0.0020-0.0180	\$2-7 \$0.0040-0.0180
Image capture	\$2-15 \$0.0020-0.02	\$2-15 \$0.002-0.02
Image delivery	Varies ^b \$0.001-0.008	Varies ^b \$0.002-0.008
Image archive	N/A \$0.001-0.01	N/A \$0.001-0.01
Image retrieval	N/A \$0.3-5	N/A \$0.3-5

Note: Bold indicates change from 2001 prices.

^aCash letter fees for forward-processed items transported on Check Relay for 2001 and 2002 include a fifty-cent surcharge due to higher fuel costs.