

APPENDIX 13

FINAL REPORT - DEVELOPMENT OF ON-ROAD MOBILE SOURCE RFP EMISSIONS INVENTORIES AND INDIVIDUAL CONTROL REDUCTION ESTIMATES FOR THE TEN-COUNTY DFW 2008 OZONE NAAQS NONATTAINMENT AREA

Dallas-Fort Worth and Houston-Galveston-Brazoria Severe
Areas Reasonable Further Progress State Implementation Plan
Revision for the 2008 Eight-Hour Ozone National Ambient Air
Quality Standard

Project Number 2023-108-SIP-NR

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DEVELOPMENT OF ON-ROAD MOBILE SOURCE RFP EMISSIONS INVENTORIES AND INDIVIDUAL CONTROL REDUCTION ESTIMATES FOR THE TEN-COUNTY DFW 2008 OZONE NAAQS NONATTAINMENT AREA

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1 PURPOSE

This task updates Dallas-Fort Worth (DFW) Reasonable Further Progress (RFP) analysis MOVES emission rates by changing the conventional gasoline (CG) inputs to reformulated gasoline (RFG) inputs for six DFW perimeter counties, for 2026 and 2027, since for those analysis years, all 10 counties require RFG fuel with no CG fuel sales. MOVES will be re-run and the affected RFP EIs and individual control reductions for those counties and years will be recalculated. This update will require 24 MOVES runs comprising two analysis years (2026 and 2027), two individual control scenarios (fuels controls and I/M program), and six counties (Ellis, Johnson, Kaufman, Parker, Rockwall, and Wise). The task is to be accomplished by replacing the CG inputs with RFG inputs in the 24 MOVES county input databases (CDBs) and re-running the MOVES emission rates and the subsequent RFP_{emissions} inventory (EI) and control reduction analyses for each of the 24 scenarios.

2 BACKGROUND

The DFW fiscal year 2021 (FY2021) 2008 standard ozone nonattainment county EIs (for 2011, 2017, 2018, 2020, 2023, 2026, and 2027) were developed by NCTCOG before the 10-county area's reclassification from serious to severe (November 17, 2022). Up until

one year after the effective date (November 7, 2023), only the four “core” counties require RFG (see the middle column of Table 1); one year after the effective date of reclassification to severe, all 10 of the DFW nonattainment counties will require RFG (last column of Table 1 Error! Reference source not found.), which includes 2026 and 2027 analysis years for this project.

The FY2021 DFW RFP EIs developed by the North Central Texas Council of Governments (NCTCOG) included RFG only in the four core counties as required for the serious classification). Therefore, to fulfill the severe nonattainment requirement, the purpose of this task is the redevelopment of the FY2021 RFP EI and individual control reduction estimates incorporating RFG effects for all 10 counties for the analysis years after 2023 (i.e., 2026 and 2027).

Table 1. DFW RFG nonattainment counties by 2008 ozone NAAQS serious and severe classifications

RFG Requirements	DFW <i>Serious</i> Area Counties¹	DFW <i>Severe</i> Area Counties²
Federal RFG required with no sale of CG	Core counties: Collin, Dallas, Denton, Tarrant	Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, Wise
Federal RFG Not required	Perimeter counties: Ellis, Johnson, Kaufman, Parker, Rockwall, Wise	None

¹Prior to effective date for expanded RFG requirement.

²RFG expanded to all counties effective one year after classification (effective November 7, 2023)

3 METHODOLOGY

TTI will use the methodology consistent with the FY2021 RFP EI and individual control strategy reduction estimates development work by NCTCOG as documented in “*Dallas-Fort Worth Motor Vehicle Emissions Simulator 3 (MOVES3)-Based Reasonable Further Progress On-Road Emissions Inventories and Control Strategies Reductions for Analysis Years 2011, 2017, 2018, 2020, 2023, 2026, and 2027*” (NCTCOG, August 2021).

To update the RFP emissions analysis by incorporating 2026 and 2027 RFG effects in the perimeter counties, TTI will update their 2026 and 2027 MOVES3 inputs by replacing the perimeter county CG inputs with the core county RFG inputs of the pertinent individual control scenarios. Table 2 provides the DFW RFP future year RFG fuel formulation inputs TTI will use (from NCTCOG’s FY2021 RFP EIs input data provided by TCEQ). NCTCOG originally used these Table 2 RFG inputs for the four core counties and the depicted CG inputs for the six perimeter counties. TTI will use these core county future year RFG

inputs to MOVES for the perimeter county 2026 and 2027 analyses as well. The perimeter county 2026 and 2027 MOVES emission rates with updated fuels (RFG) inputs will be re-run followed by recalculation of the EIs and individual control reduction estimates using the updated emission rates in combination with the other original NCTCOG analysis input components provided by TCEQ (i.e., link VMT and speeds, off-network activity inputs, VMT mix).

Table 2. DFW RFG and CG Fuel Formulations for Future Years

MOVES Fuel Formulation Column	RFG	CG
fuelformulationID	14714	14702
fuelsubtypeID	12	12
RVP	7.09	7.80
sulfurLevel	10.00	10.00
ETOHVolume	9.56	9.56
MTBEVolume	0	0
ETBEVolume	0	0
TAMEVolume	0	0
aromaticContent	16.96	22.22
olefinContent	10.13	8.69
benzeneContent	0.37	0.99
e200	47.00	49.64
e300	84.95	84.60
VolToWtPercentOxy	0.3653	0.3653
BioDieselEsterVolume	\N	\N
CetaneIndex	\N	\N
PAHContent	\N	\N
T50	210.35	202.53
T90	325.30	319.75

*Note: in the perimeter county fuelsupply tables the fuelregionID for CG (178010000) will be replaced with the RFG fuelregionID (1370011000).

Source: "2021 and Future Years (2023, 2026, and 2027)" data from Exhibit 4.5 Fuel Formulations, presented in "Dallas-Fort Worth Motor Vehicle Emissions Simulator 3 (MOVES3)-Based Reasonable Further Progress On-Road Emissions Inventories and Control Strategies Reductions for Analysis Years 2011, 2017, 2018, 2020, 2023, 2026, and 2027" (NCTCOG, August 2021).

Except for the updated 2026 and 2027 individual control emission rates for the perimeter RFG counties, all other EI analysis inputs (e.g., other MOVES inputs aside from updated fuelformulation and fuelsupply inputs, EI activity inputs, VMT mix, TxLED post-processing factors) will be taken from the original NCTCOG analysis files package provided by TCEQ. For consistency throughout the analysis, the same version of MOVES

will be used as in the original NCTCOG analysis, namely MOVES3.0.1 (with MOVESdb20210209 default database). Only the MOVES scenarios requiring updated fuels (RFG) inputs will be re-run.

Table 3 shows the NCTCOG's RFP control scenarios sequence with the information provided on which scenarios TTI will update in this task. The first three RFP control scenarios in the table will not be updated or re-run. The last three RFP control scenarios in the table will be updated for the perimeter counties for 2026 and 2027 analysis years, with "FC" and "IM" scenarios requiring updated MOVES runs, and "TxLED" scenario requiring emission rates post-processing.

Table 3. RFP Scenarios with TTI Re-runs Identified for 2026 and 2027 for the DFW Perimeter Counties (Ellis, Johnson, Kaufman, Parker, Rockwall, and Wise)

Reasonable Further Progress Scenarios ¹	Input Files ¹	Re-run (Yes / No)	Notes
Adjusted Base Year	ABY	No	Pre-1990 fuels
Pre-1990 Federal Motor Vehicle Control Program (FMVCP)	PR90	No	Pre-1990 fuels
FMVCP Tier 1 FMVCP Tier 2 FMVCP – Heavy-Duty 2007	FMVCP	No	Pre-1990 fuels
Fuel Controls (FC)	FC	Yes	MOVES 2026 and 2027 RFG update runs for perimeter counties
Expanded Inspection & Maintenance (I/M)	IM	Yes	MOVES 2026 and 2027 RFG update runs for perimeter counties
Texas Low-Emission Diesel	TxLED	Yes	Apply TxLED effects via emission rates post-processing

¹ Source: Exhibit 1.3: Emissions Inventory Scenarios Modeled (NCTCOG, August 2021).

The basic steps to complete the task are as follows:

1. Use MOVES3.0.1 with MOVESdb20210209 consistent with NCTCOG FY2021 analysis.
2. Identify the MOVES CDBs (24) that need CG fuelformulation/fuelsupply inputs replaced with RFG inputs. These include:
 - a. Two years: 2026 and 2027.
 - b. Six perimeter counties: Ellis, Johnson, Kaufman, Parker, Rockwall, and Wise.

- c. Two individual control scenarios: sequential individual control CDBs with "FC" (current fuel controls) and "IM" (inspection and maintenance program) in the CDB names (per second column of Table 3).
3. Copy, rename, and update the 24 MOVES CDBs by replacing CG inputs with RFG in the fuelformulation and fuelsupply tables.
 - a. Write and execute CDB scripts and check to ensure updated CDBs are as expected.
 - b. Rename CDBs, for example, from "26ellis_2008naaqs_rfp_fc_in" to "26ellis_2008naaqs_rfp_fc_fy23rfg_in."
 - c. Use original core county RFG inputs to replace perimeter county CG inputs as shown in Table 3 (from "2021 and Future Years" column, Exhibit 4.5, NCTCOG, August 2021).
4. Set up and re-run MOVES to produce the updated 2026 and 2027 perimeter county emission rates for the "FC" and "IM" control scenarios.
 - a. Create the 24 MOVES run specification files (e.g., with "fy23rfg" in in/out file names) and check. (These run specification files may be updates of the NCTCOG files.)
 - b. Create and execute batch run files and check MOVES output for errors.
5. Complete the RFP EI and individual control reductions analysis by redoing the rest of the 2026 and 2027 perimeter county analysis steps, e.g., TxLED post-processing for emission rates, EI and individual control reduction computations, checks, and summaries.
 - a. Use the EI estimation utilities consistent with the NCTCOG FY2021 RFP EIs analysis.
 - b. Produce the standard required inputs, outputs, and summaries, complete to include all the required results as a combination of the updated county scenarios (i.e., perimeter counties) and original county scenarios (i.e., core counties). Include: MOVES run specification files and CDBs, county and scenario input and output files, EI summary files (Tab Files), EI SCC and XML files.

- c. Update pertinent RFP EI and control reduction summaries and compare them to NCTCOG August 2021 report summaries as a reasonability check.

4 SUMMARIES

Final updated RFP on-road emission estimates by pollutant for summer weekday for each analysis year are shown in Table 4 through Table 6. Table 7 through Table 9 show the updated emissions reductions resulting from the application of each control scenario (updated values are **bold and underlined**).

Table 4. On-Road Emissions for the DFW 10-County Nonattainment Area¹

Summer Season, Midweek, On-Road Emissions (tons/day)							
Nitrogen Oxides							
	2011	2017	2018	2020	2023	2026	2027
ABY	N/A	1211.88	1211.67	1212.52	1212.91	1212.91	1212.91
PR90	1224.00	1399.30	1424.38	1444.28	1526.32	1608.94	1636.10
FMVCP	345.78	191.98	172.90	139.50	107.08	86.10	82.06
FC	277.07	150.09	134.56	103.75	81.89	<u>68.48</u>	<u>66.09</u>
IM	258.88	142.36	128.39	99.98	79.55	<u>66.72</u>	<u>64.46</u>
TxLED	252.23	138.22	124.54	96.72	76.85	<u>64.30</u>	<u>62.09</u>
Volatile Organic Compounds							
	2011	2017	2018	2020	2023	2026	2027
ABY	N/A	649.80	649.18	648.53	648.01	648.01	648.01
PR90	582.42	739.19	753.95	764.25	809.60	857.25	873.77
FMVCP	139.29	79.98	74.13	63.17	54.10	46.47	44.79
FC	116.76	68.49	63.80	53.52	46.64	<u>40.40</u>	<u>39.21</u>
IM	106.98	62.13	57.92	48.25	41.62	<u>35.39</u>	<u>34.19</u>
TxLED	106.98	62.13	57.92	48.25	41.62	<u>35.39</u>	<u>34.19</u>

¹ Each scenario contains the control strategies of all previous scenarios.

Table 5. On-Road Emissions for the Wise County²

Summer Season, Midweek, On-Road Emissions (tons/day)							
Nitrogen Oxides							
	2011	2017	2018	2020	2023	2026	2027
ABY	N/A	24.91	24.88	24.95	25.13	25.13	25.13
PR90	25.70	28.23	28.76	29.49	31.53	33.45	34.21
FMVCP	8.31	4.60	4.19	3.51	2.81	2.36	2.30
FC	7.29	3.96	3.63	2.94	2.41	<u>2.16</u>	<u>2.11</u>
IM	7.29	3.96	3.63	2.94	2.41	<u>2.16</u>	<u>2.11</u>
TxLED	7.04	3.82	3.50	2.82	2.32	<u>2.07</u>	<u>2.03</u>
Volatile Organic Compounds							
	2011	2017	2018	2020	2023	2026	2027
ABY	N/A	8.66	8.64	8.65	8.67	8.67	8.67
PR90	7.91	10.00	10.19	10.44	11.19	11.93	12.22
FMVCP	2.08	1.18	1.09	0.91	0.77	0.66	0.63
FC	1.82	1.04	0.96	0.78	0.67	<u>0.56</u>	<u>0.54</u>
IM	1.82	1.04	0.96	0.78	0.67	<u>0.56</u>	<u>0.54</u>
TxLED	1.82	1.04	0.96	0.78	0.67	<u>0.56</u>	<u>0.54</u>

² Each scenario contains the control strategies of all previous scenarios.

Table 6. On-Road Emissions for the DFW 9-County Nonattainment Area³

Summer Season, Midweek, On-Road Emissions (tons/day)							
Nitrogen Oxides							
	2011	2017	2018	2020	2023	2026	2027
ABY	N/A	1186.96	1186.79	1187.57	1187.78	1187.78	1187.78
PR90	1198.29	1371.07	1395.62	1414.79	1494.80	1575.49	1601.89
FMVCP	337.47	187.38	168.71	135.99	104.27	83.73	79.76
FC	269.78	146.12	130.93	100.81	79.48	66.32	63.98
IM	251.59	138.39	124.76	97.04	77.14	64.56	62.35
TxLED	245.19	134.40	121.04	93.90	74.53	62.23	60.06
Volatile Organic Compounds							
	2011	2017	2018	2020	2023	2026	2027
ABY	N/A	641.13	640.54	639.88	639.34	639.34	639.34
PR90	574.51	729.19	743.76	753.81	798.41	845.31	861.55
FMVCP	137.22	78.81	73.04	62.26	53.33	45.81	44.16
FC	114.94	67.45	62.84	52.75	45.97	39.84	38.67
IM	105.17	61.09	56.96	47.48	40.95	34.83	33.65
TxLED	105.17	61.09	56.96	47.48	40.95	34.83	33.65

³ Each scenario contains the control strategies of all previous scenarios.

Table 7. Control Strategy Emission Reductions for the DFW 10-County Nonattainment Area⁴

Summer Season, Midweek, On-Road Emissions (tons/day)								
Nitrogen Oxides								
		2011	2017	2018	2020	2023	2026	2027
Inventory	PR90	1224.00	1399.30	1424.38	1444.28	1526.32	1608.94	1636.10
	Control Strategies	252.23	138.22	124.54	96.72	76.85	64.30	62.09
Reductions	FMVCP	878.22	1207.32	1251.48	1304.79	1419.24	1522.84	1554.04
	FC	68.70	41.89	38.34	35.75	25.19	17.62	15.97
	IM	18.19	7.73	6.17	3.76	2.34	1.77	1.64
	TxLED	6.65	4.14	3.85	3.26	2.70	2.42	2.37
	Total	971.76	1261.08	1299.85	1347.56	1449.47	1544.64	1574.01
Volatile Organic Compounds								
		2011	2017	2018	2020	2023	2026	2027
Inventory	PR90	582.42	739.19	753.95	764.25	809.60	857.25	873.77
	Control Strategies	106.98	62.13	57.92	48.25	41.62	35.39	34.19
Reductions	FMVCP	443.13	659.21	679.82	701.09	755.50	810.78	828.98
	FC	22.54	11.50	10.33	9.64	7.46	6.07	5.58
	IM	9.78	6.35	5.88	5.27	5.02	5.01	5.02
	TxLED	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	475.44	677.06	696.03	716.00	767.98	821.86	839.58

⁴ Each scenario contains the control strategies of all previous scenarios.

Table 8. Control Strategy Emission Reductions for Wise County⁵

Summer Season, Midweek, On-Road Emissions (tons/day)								
Nitrogen Oxides								
		2011	2017	2018	2020	2023	2026	2027
Inventory	PR90	25.70	28.23	28.76	29.49	31.53	33.45	34.21
	Control Strategies	7.04	3.82	3.50	2.82	2.32	<u>2.07</u>	<u>2.03</u>
Reductions	FMVCP	17.40	23.63	24.57	25.98	28.72	31.09	31.91
	FC	1.02	0.64	0.56	0.57	0.40	<u>0.20</u>	<u>0.19</u>
	IM	0.00	0.00	0.00	0.00	0.00	<u>0.00</u>	<u>0.00</u>
	TxLED	0.25	0.14	0.13	0.11	0.10	<u>0.09</u>	<u>0.08</u>
	Total	18.66	24.41	25.26	26.67	29.21	<u>31.38</u>	<u>32.18</u>
	Volatile Organic Compounds							
		2011	2017	2018	2020	2023	2026	2027
Inventory	PR90	7.91	10.00	10.19	10.44	11.19	11.93	12.22
	Control Strategies	1.82	1.04	0.96	0.78	0.67	<u>0.56</u>	<u>0.54</u>
Reductions	FMVCP	5.84	8.83	9.11	9.53	10.42	11.28	11.58
	FC	0.26	0.14	0.12	0.13	0.10	<u>0.10</u>	<u>0.09</u>
	IM	0.00	0.00	0.00	0.00	0.00	<u>0.00</u>	<u>0.00</u>
	TxLED	0.00	0.00	0.00	0.00	0.00	<u>0.00</u>	<u>0.00</u>
	Total	6.10	8.96	9.23	9.67	10.53	<u>11.38</u>	<u>11.67</u>

⁵ Each scenario contains the control strategies of all previous scenarios.

Table 9. Control Strategy Emission Reductions for the Nine-County Nonattainment Area⁶

Summer Season, Midweek, On-Road Emissions (tons/day)								
Nitrogen Oxides								
		2011	2017	2018	2020	2023	2026	2027
Inventory	PR90	1198.29	1371.07	1395.62	1414.79	1494.80	1575.49	1601.89
	Control Strategies	245.19	134.40	121.04	93.90	74.53	62.23	60.06
Reductions	FMVCP	860.82	1183.69	1226.91	1278.81	1390.53	1491.76	1522.13
	FC	67.69	41.25	37.78	35.18	24.79	17.41	15.78
	IM	18.19	7.73	6.17	3.76	2.34	1.77	1.64
	TxLED	6.40	4.00	3.72	3.15	2.61	2.33	2.29
	Total	953.10	1236.67	1274.58	1320.90	1420.26	1513.26	1541.83
Volatile Organic Compounds								
		2011	2017	2018	2020	2023	2026	2027
Inventory	PR90	574.51	729.19	743.76	753.81	798.41	845.31	861.55
	Control Strategies	105.17	61.09	56.96	47.48	40.95	34.83	33.65
Reductions	FMVCP	437.29	650.38	670.71	691.56	745.08	799.50	817.39
	FC	22.28	11.36	10.20	9.51	7.36	5.97	5.49
	IM	9.78	6.35	5.88	5.27	5.02	5.01	5.02
	TxLED	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	469.34	668.10	686.80	706.34	757.46	810.48	827.90

⁶ Each scenario contains the control strategies of all previous scenarios.

5 COMPARISONS

Table 10 to Table 12 show the comparison between updated emissions reductions and previously submitted emission reductions.

Table 10. Control Strategy Emission Reductions Comparisons for the DFW 10-County Nonattainment Area

Summer Season, Midweek, On-Road Emissions (tons/day)							
Nitrogen Oxides							
		2026			2027		
		Old	New	Difference ¹	Old	New	Difference ¹
Inventory	PR90	1608.94	1608.94	0.00	1636.10	1636.10	0.00
	Control Strategies	63.68	64.30	-0.62	61.52	62.09	-0.57
Reductions	FMVCP	1522.84	1522.84	0.00	1554.04	1554.04	0.00
	FC	18.30	17.62	-0.68	16.60	15.97	-0.63
	IM	1.70	1.77	0.07	1.57	1.63	0.07
	TxLED	2.42	2.42	0.00	2.37	2.37	0.00
	Total	1545.26	1544.64	-0.62	1574.57	1574.01	-0.56
Volatile Organic Compounds							
		Old	New	Difference ¹	Old	New	Difference ¹
Inventory	PR90	857.25	857.25	0.00	873.77	873.77	0.00
	Control Strategies	35.61	35.39	0.22	34.40	34.19	0.21
Reductions	FMVCP	810.78	810.78	0.00	828.98	828.98	0.00
	FC	5.87	6.07	0.20	5.39	5.58	0.19
	IM	4.99	5.01	0.02	5.00	5.02	0.02
	TxLED	0.00	0.00	0.00	0.00	0.00	0.00
	Total	821.64	821.86	0.22	839.37	839.58	0.21

¹ Difference in Reductions = New Reduction – Old Reduction, calculated before rounding. The difference in Inventory = Old Total – New Total, calculated before rounding.

Table 11. Control Strategy Emission Reductions Comparisons for Wise County

Summer Season, Midweek, On-Road Emissions (tons/day)							
Nitrogen Oxides							
		2026			2027		
		Old	New	Difference ¹	Old	New	Difference ¹
Inventory	PR90	33.45	33.45	0.00	34.21	34.21	0.00
	Control Strategies	1.99	2.07	-0.08	1.95	2.03	-0.08
Reductions	FMVCP	31.09	31.09	0.00	31.91	31.91	0.00
	FC	0.29	0.20	-0.09	0.26	0.19	-0.07
	IM	0.00	0.00	0.00	0.00	0.00	0.00
	TxLED	0.09	0.09	0.00	0.08	0.08	0.00
	Total	31.46	31.38	-0.08	32.25	32.18	-0.07
Volatile Organic Compounds							
		Old	New	Difference ¹	Old	New	Difference ¹
Inventory	PR90	11.93	11.93	0.00	12.22	12.22	0.00
	Control Strategies	0.57	0.56	0.01	0.55	0.54	0.01
Reductions	FMVCP	11.28	11.28	0.00	11.58	11.58	0.00
	FC	0.08	0.10	0.02	0.08	0.09	0.01
	IM	0.00	0.00	0.00	0.00	0.00	0.00
	TxLED	0.00	0.00	0.00	0.00	0.00	0.00
	Total	11.36	11.38	0.02	11.66	11.67	0.01

¹ Difference in Reductions = New Reduction – Old Reduction, calculated before rounding. The difference in Inventory = Old Total – New Total, calculated before rounding.

Table 12. Control Strategy Emission Reductions Comparisons for the Nine-County Nonattainment Area

Summer Season, Midweek, On-Road Emissions (tons/day)							
Nitrogen Oxides							
		2026			2027		
		Old	New	Difference ¹	Old	New	Difference ₁
Inventory	PR90	1575.49	1575.49	0.00	1601.89	1601.89	0.00
	Control Strategies	61.69	62.23	-0.54	59.57	60.06	-0.49
Reductions	FMVCP	1491.76	1491.76	0.00	1522.13	1522.13	0.00
	FC	18.01	17.41	-0.60	16.34	15.78	-0.56
	IM	1.70	1.77	0.07	1.57	1.64	0.07
	TxLED	2.33	2.33	0.00	2.29	2.29	0.00
	Total	1513.80	1513.26	-0.54	1542.32	1541.83	-0.49
Volatile Organic Compounds							
		Old	New	Difference ¹	Old	New	Difference ₁
Inventory	PR90	845.31	845.31	0	861.55	861.55	0
	Control Strategies	35.04	34.83	0.21	33.84	33.65	0.19
Reductions	FMVCP	799.50	799.50	0	817.39	817.39	0
	FC	5.79	5.97	0.18	5.31	5.49	0.18
	IM	4.99	5.01	0.02	5.00	5.02	0.02
	TxLED	0.00	0.00	0.00	0.00	0.00	0.00
	Total	810.28	810.48	0.20	827.71	827.90	0.19

¹ Difference in Reductions = New Reduction – Old Reduction, calculated before rounding. The difference in Inventory = Old Total – New Total, calculated before rounding.