

APPENDIX 2

HOUSTON-GALVESTON-BRAZORIA (HGB) REASONABLE FURTHER PROGRESS (RFP) DEMONSTRATION SPREADSHEET

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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Appendix 2 - Sheet 1

Houston-Galveston-Brazoria Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Reasonable Further Progress Demonstration Calculation Spreadsheet

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2023 RFP Demonstration Analysis
HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

2023 RFP Demonstration Analysis: To determine if the 2023 RFP requirements are met, the 2023 target level of emissions is compared to the 2023 controlled forecast inventory. The 2023 forecast inventory includes growth between the 2011 base year and the 2023 milestone year. The controlled forecast inventory has been reduced by subtracting the RFP control reductions between 2011 and 2023. If the 2023 controlled forecasted RFP emissions inventory (EI) is less than the 2023 RFP target level of emissions, then the 2023 RFP requirement is satisfied.

Line	Description	NO _x (tpd)	VOC (tpd)
Line 1	Uncontrolled or existing controlled eight-county HGB 2023 emissions forecast with growth	520.94	644.99
Line 2	Creditable eight-county HGB RFP control reductions, between 2011 and 2023	202.93	175.30
Line 3	Controlled eight-county HGB 2023 RFP emissions forecast (Line 1 minus Line 2)	318.01	469.69
Line 4	Amount of NO _x reduction substitution (see Sheet 3)	0.00	0.00
Line 5	Controlled eight-county HGB 2023 RFP emission forecast accounting for NO _x substitution (Line 3 plus Line 4)	318.01	469.69
Line 6	Eight-county HGB 2023 RFP target level of emissions	358.43	500.13
Line 7	Excess (+) / Shortfall (-) (Line 6 minus Line 5)	40.42	30.44
Line 8	Is controlled RFP EI less than target level of emissions?	Yes	Yes

Notes:

- 1) To calculate the RFP controlled forecast for each milestone/attainment year, the total RFP creditable control strategy reductions to date (total RFP reductions from 2011 to the current RFP milestone year) are subtracted from the total uncontrolled RFP EI.
- 2) To calculate the final excess or shortfall of for each milestone/attainment year, the controlled RFP emissions forecast is subtracted from the RFP target level of emissions. The RFP target level of emissions for all milestone years is calculated on the "Calc Targets" page.
- 3) Excess emissions reductions (Line 7) may be used to provide a transportation conformity safety margin. The safety margin must be less than or equal to the excess emissions reductions.

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2023 RFP NO_x Substitution Analysis

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

The NO_x substitution calculation includes six steps. First, calculate the percent target reduction for both VOC and NO_x by comparing the base year and target inventories. Second, calculate the percent actual reduction by comparing the base year and the actual inventory. Third, compare the percent required reduction to the percent actual reduction. If the percent actual reduction is greater than the percent required, then there are surplus reductions. If the percent actual reduction is less than the percent target, then there is a shortfall of reductions. The difference between the percent actual and the percent target reduction (when there are surplus reductions) is the amount that is available for substitution. For the fourth step, determine the percent NO_x needed for substitution. The minimum base year VOC percentage needed is equal to the percent base year shortfall in VOC plus the smallest increment possible, or 0.01. The respective NO_x percent is calculated using the NO_x base year inventory. The percent base year NO_x transfer should not exceed the percent base year NO_x surplus. The percent NO_x available to transfer is based upon the base year because the base year is the basis for the required reduction calculations. Fifth, convert the percent base year NO_x to a percent target NO_x using the percent base year NO_x from step 5 and the relative values of the base year and target NO_x inventory. The percent NO_x transfer is derived from milestone year target values because those are the values modified by NO_x transfer. The percent NO_x transfer is a percentage of the milestone year target NO_x value that is added back into the NO_x inventory and a percentage of the milestone year target VOC that is subtracted from the VOC inventory. For the sixth step, calculate the resulting tons per day (tpd) associated with the percent NO_x transfer. For NO_x, multiply the NO_x percent transfer and the NO_x milestone year target value. For VOC, multiply the percent NO_x transfer (which is the same as the percentage of the milestone year target VOC that is subtracted from the VOC inventory) and the VOC milestone year target value. The NO_x transfer amount (in tpd) is added to the NO_x actual (in tpd) inventory in the RFP demonstration calculation, and the VOC transfer amount (in tpd) is subtracted from the VOC actual (in tpd) inventory.

Line #	Description	NO _x	VOC
Line 1	2011 base year emissions (tpd)	471.62	549.59
Line 2	2023 controlled RFP EI (tpd)	318.01	469.69
Line 3	Total actual reductions for 2011 to 2023 (Line 1 minus Line 2) (tpd)	153.61	79.90
Line 4	Percent actual reductions for 2011 to 2023 (percent Line 3 is of Line 1) (%)	32.57	14.54
Line 5	2023 target RFP EI (tpd)	358.43	500.13
Line 6	2023 total target reductions for 2011 to 2023 (Line 1 minus Line 5) (tpd)	113.19	49.46
Line 7	Percent target reductions for 2011 to 2023 (percent Line 6 is of Line 1) (%)	24.00	9.00
Line 8	Percent surplus or shortfall (percent actual minus percent target, Line 4 - Line 7) (%)	8.57	5.54
Line 9	Percent surplus to transfer (NO _x percentage should be less than Line 8) (%)	0.00	0.00
Line 10	Convert the percent surplus to transfer to tons per day (tpd)	0.00	Only NO _x Value Needed
Line 11	Calculate what percentage Line 10 is of target (this is the percentage to transfer) (%)	0.00	0.00
Line 12	Tons equivalent to percent for transfer [Line 5 times (Line 10 divided by 100)] (tpd)	0.00	0.00
Line 13	NO _x substitution amount okay? (Check to assure NO _x substitution does not exceed maximum available: Sheet 02, Line 9 must be greater than zero.)	Okay to Substitute	Okay to Substitute

Notes:

Line 7: The percent target reduction includes the 15% required reductions from 2011 through 2017, the 3% required reductions for each year after 2017 until the milestone year, and may account for noncreditable reductions between 2011 and the RFP milestone year; therefore, the total percent reduction may not be exactly 15 plus 18 (3% for each year from 2017 through 2023).

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Contingency Demonstration for RFP Milestone

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Summary Contingency for RFP Milestone Year

Contingency Plan Description	NO_x	VOC
Eight-county HGB 2011 controlled base year EI	471.62	549.59
Percent for contingency calculation (total of 3%)	0.00	3.00
Eight-county HGB milestone required contingency reductions (Line 1 x Line 2 expressed as a percent)	0.00	16.49
Total eight-county HGB milestone contingency reductions	0.00	17.30
Contingency Excess (+) or Shortfall (-)	0.00	0.81
Are contingency reductions greater than or equal to required contingency reductions?	Yes	Yes

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2026 RFP Demonstration Analysis

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

2026 RFP Demonstration Analysis: To determine if the 2026 RFP requirements are met, the 2026 target level of emissions is compared to the 2026 controlled forecast inventory. The 2026 forecast inventory includes growth between the 2011 base year and the 2026 milestone year. The controlled forecast inventory has been reduced by subtracting the RFP control reductions from 2011 to 2026. If the 2026 controlled forecasted RFP EI is less than the 2026 RFP target level of emissions the 2026 RFP requirement is satisfied.

Line	Description	NO _x (tpd)	VOC (tpd)
Line 1	Uncontrolled or existing controlled eight-county HGB 2026 emissions forecast with growth	518.76	656.61
Line 2	Creditable eight-county HGB RFP control reductions between 2011 and 2023	202.93	175.30
Line 3	Creditable eight-county RFP control reductions between 2023 and 2026	18.48	8.61
Line 4	Controlled eight-county HGB 2026 RFP emissions forecast (Line 1 minus Line 2 minus Line 3)	297.35	472.70
Line 5	Amount of NO _x reduction substitution (see Sheet 6)	0.00	0.00
Line 6	Controlled eight-county HGB 2026 RFP emission forecast accounting for NO _x substitution (Line 4 plus Line 5)	297.35	472.70
Line 7	Eight-county HGB 2026 RFP target level of emissions	332.49	480.89
Line 8	Excess (+) / Shortfall (-) (Line 7 minus Line 6)	35.14	8.19
Line 9	Is controlled RFP EI less than target level of emissions?	Yes	Yes

Notes:

1) To calculate the RFP controlled forecast for each milestone/attainment year, the total RFP creditable control strategy reductions to date (total RFP reductions from 2011 to the current RFP milestone year) are subtracted from the total uncontrolled RFP EI.

2) To calculate the final excess or shortfall for each milestone/attainment year, the controlled RFP emissions forecast is subtracted from the RFP target level of emissions. The RFP target level of emissions for all milestone years is calculated on the "Calc Targets" page.

3) Excess emissions reductions (Line 8) may be used to provide a transportation conformity safety margin. The safety margin must be less than or equal to the excess emissions reductions.

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2026 RFP NO_x Substitution Analysis

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

The NO_x substitution calculation includes six steps. First, calculate the percent target reduction for both VOC and NO_x by comparing the base year and target inventories. Second, calculate the percent actual reduction by comparing the base year and the actual inventory. Third, compare the percent required reduction to the percent actual reduction. If the percent actual reduction is greater than the percent required, then there are surplus reductions. If the percent actual reduction is less than the percent target, then there is a shortfall of reductions. The difference between the percent actual and the percent target reduction (when there are surplus reductions) is the amount that is available for substitution. For the fourth step, determine the percent NO_x needed for substitution. The minimum base year VOC percentage needed is equal to the percent base year shortfall in VOC plus the smallest increment possible, or 0.01. The respective NO_x percent is calculated using the NO_x base year inventory. The percent base year NO_x transfer should not exceed the percent base year NO_x surplus. The percent NO_x available to transfer is based upon the base year because the base year is the basis for the required reduction calculations. Fifth, convert the percent base year NO_x to a percent target NO_x using the percent base year NO_x from step 5 and the relative values of the base year and target NO_x inventory. The percent NO_x transfer is derived from milestone year target values because those are the values modified by NO_x transfer. The percent NO_x transfer is a percentage of the milestone year target NO_x value that is added back into the NO_x inventory and a percentage of the milestone year target VOC that is subtracted from the VOC inventory. For the sixth step, calculate the resulting tons per day (tpd) associated with the percent NO_x transfer. For NO_x, multiply the NO_x percent transfer and the NO_x milestone year target value. For VOC, multiply the percent NO_x transfer (which is the same as the percentage of the milestone year target VOC that is subtracted from the VOC inventory) and the VOC milestone year target value. The NO_x transfer amount (in tpd) is added to the NO_x actual (in tpd) inventory in the RFP demonstration calculation, and the VOC transfer amount (in tpd) is subtracted from the VOC actual (in tpd) inventory.

Line #	Description	NO _x	VOC
Line 1	2011 base year emissions (tpd)	471.62	549.59
Line 2	2026 controlled RFP EI (tpd)	297.35	472.70
Line 3	Total actual reductions for 2011 to 2026 (Line 1 minus Line 2) (tpd)	174.27	76.89
Line 4	Percent actual reductions for 2011 to 2026 (percent Line 3 is of Line 1) (%)	36.95	13.99
Line 5	2026 target RFP EI (tpd)	332.49	480.89
Line 6	2026 total target reductions for 2011 to 2026 (Line 1 minus Line 5) (tpd)	139.13	68.70
Line 7	Percent target reductions for 2011 to 2026 (percent Line 6 is of Line 1) (%)	29.50	12.50
Line 8	Percent surplus or shortfall (percent actual minus percent target, Line 4 minus Line 7) (%)	7.45	1.49
Line 9	Percent surplus to transfer (NO _x percentage should be less than Line 8) (%)	0.00	0.00
Line 10	Convert the percent surplus to transfer to tons per day (tpd)	0.00	Only NO _x Value Needed
Line 11	Calculate what percentage Line 10 is of target (this is the percentage to transfer) (%)	0.00	0.00
Line 12	Tons equivalent to percent for transfer [Line 5 times (Line 10 divided by 100)] (tpd)	0.00	0.00
Line 13	NO _x substitution amount okay? (Check to assure NO _x substitution does not exceed maximum available: Sheet 05, Line 10 must be greater than zero)	Okay to Substitute	Okay to Substitute

Notes:

Line 7: The percent target reduction includes the 15% required reductions from 2011 through 2017, the 18% from 2017 through 2023, the 3% required reductions for each year after 2023 until the attainment year, and may account for noncreditable reductions between 2011 and the RFP milestone year; therefore, the total percent reduction may not be exactly 15 plus 18 plus 9 (3% for each year from 2023 through 2026).

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Appendix 2 - Sheet 7

Contingency Demonstration for RFP and Attainment Demonstration (AD)

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Summary Contingency for Attainment Year for RFP and AD

Contingency Element Description	NO_x	VOC
Eight-county HGB 2011 controlled base year EI	471.62	549.59
Percent for contingency calculation (total of 3%)	0.00	3.00
Eight-county HGB required contingency reductions (Line 1 x Line 2 expressed as a percent)	0.00	16.49
Total eight-county HGB contingency reductions	0.00	17.30
Contingency Excess (+) or Shortfall (-)	0.00	0.81
Are contingency reductions greater than or equal to required contingency reductions?	Yes	Yes

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Appendix 2 - Sheet 8

Calculations: 2023 RFP MVEBs with MOVES3

HGB Nonattainment Area Eight-Hour Ozone Season VOC and NO_x (tons per day)

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Summary 2023 MVEB

Description	NO _x	VOC
2023 uncontrolled on-road emissions projection	82.87	45.03
2023 on-road mobile source RFP control reductions	21.32	11.17
2023 On-road mobile controlled inventory	61.55	33.86
Transportation conformity safety margin	6.22	3.41
Excess emissions reduction for 2023	40.42	30.44
Is excess emissions enough for safety margin?	yes	yes
2023 MVEB with safety margin	67.77	37.27

Note: If safety margin is > than excess emission reductions modify percent safety margin input on the "Enter % for RFP Cont & Conf SM" page.

Note:

1) If there are excess RFP control reductions, a transportation conformity safety margin is allowed. The transportation conformity safety margin for this SIP revision is calculated based upon a percentage of excess emissions. Control of the safety margin options and calculation of the NO_x and VOC values is done on Sheet "Enter % RFP Cont & Conf SM". If changes are needed for the Safety Margin, go to Sheet "Enter % RFP Cont & Conf SM".

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Appendix 2 - Sheet 9

Calculations: 2026 RFP MVEBs with MOVES3

HGB Nonattainment Area Eight-Hour Ozone Season VOC and NO_x (tons per day)

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Summary 2026 MVEB

Description	NO_x	VOC
2026 uncontrolled on-road emissions projection	66.47	38.70
2026 on-road mobile source RFP control reductions	15.54	9.73
2026 On-road mobile controlled inventory	50.93	28.97
Transportation conformity safety margin	5.34	2.91
Excess emissions reduction for 2026	35.14	8.19
Is excess emissions enough for safety margin?	yes	yes
2026 MVEB with safety margin	56.27	31.88

Note: If safety margin is > than excess emission reductions modify percent safety margin input on the "Enter % for RFP Cont & Conf SM" page.

Note:

1) If there are excess RFP control reductions, a transportation conformity safety margin is allowed. The transportation conformity safety margin for this SIP revision is calculated based upon a percentage of excess emissions. Control of the safety margin options and calculation of the NO_x and VOC values is done on Sheet "Enter % RFP Cont & Conf SM". If changes are needed for the Safety Margin, go to Sheet "Enter % RFP Cont & Conf SM".

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Appendix 2 - Sheet 11

Quantify the Reductions to Meet the Initial 15%, the 3% per Year and Contingency Requirements

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

The Initial 15%, the 3% per Year and Contingency Requirements: The FCAA mandates that an initial 15%, plus a 3% per year starting in year seven, VOC reduction, net of growth, occur from the baseline year 2011 through the attainment year. The reductions must be demonstrated for the six-year period from baseline 2011 through 2017, and every three years after 2017 through the attainment year, 2026. NO_x may be substituted for VOC for the counties designated nonattainment under both the one-hour and 1997 eight-hour standards from the baseline 2011 through 2026. According to FCAA, §172(c)(9), the RFP contingency plan includes required emissions reductions, calculated as a 3% emissions reduction of the base year inventory, in case of failure to demonstrate progress for a milestone or attainment year. The division of the percent reductions between VOC and NO_x are entered in the data entry sheet with tab name "Enter % for RFP Cont & Conf SM."

Calculation of Required 15% VOC Reductions and 3% per Year NO_x and VOC Reductions

RFP Analysis Year	Total Percent Reduction Requirement	Percent NO _x	Percent VOC	RFP BY EI NO _x (tpd)	RFP BY EI VOC (tpd)	Required Reductions NO _x (tpd)	Required Reductions VOC (tpd)
2011	N/A	N/A	N/A	471.62	549.59	N/A	N/A
2017	15.0	11.0	4.0	471.62	549.59	51.88	21.98
2020	9.0	7.0	2.0	471.62	549.59	33.01	10.99
2023	9.0	6.0	3.0	471.62	549.59	28.30	16.49
2026	9.0	5.5	3.5	471.62	549.59	25.94	19.24

Notes:

- 1) Column headings changed from adjusted base year (ABY) to base year (BY) to account for the current regulatory process that does not require accounting for non-creditable pre-1990 on-road mobile controls.
- 2) 2008 eight-hour ozone NAAQS severe classification on-road inventories were calculated using MOVES3. For EIs calculated using pre MOVES3 models, the on-road mobile ABY inventories: The on-road mobile ABY inventories for each milestone/attainment year are calculated using 2011 VMT and MOVES emission factors for each RFP analysis year with only the effects of pre-1990 FCAA controls turned on. The pre-1990 FCAA controls include the 1992 Reid Vapor Pressure control and the pre-1990 on-road mobile source FMVCP controls. The on-road mobile ABY EI is equal to the on-road mobile BY EI minus the non-creditable FMVCP reductions.
- 3) In the legacy regulatory process, the ABY EI is the base year (BY) emissions minus the non-creditable on-road mobile reductions. It is calculated by adding the BY EI for point, area and non-road to the ABY for on-road. When the ABY EI is multiplied by the required percent reduction, the result is the reductions required.

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Appendix 2 - Sheet 12

Target Calculations: 2023 and 2026 RFP Target Level of NO_x and VOC Emissions

HGB 2008 Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Post-2011 target level of NO_x emissions: The NO_x target level is calculated by subtracting the reductions necessary to meet: the initial 15% from the baseline 2011 through 2017; the post-2017 3% per year; and may include the non-creditable fleet (FMVCP/RVP) reductions from the previous milestone/attainment year target level.

RFP Post-2011 Target Level of NO _x Emissions				
RFP Milestone Year	Previous Target	FMVCP Non-creditable Reduction	Post-2011 Percent Reduction Requirement NO _x (tpd)	NO _x Target (tpd)
2011 Base Year	N/A	N/A	N/A	471.62
2017	471.62	0.00	51.88	419.74
2020	419.74	0.00	33.01	386.73
2023	386.73	0.00	28.30	358.43
2026	358.43	0.00	25.94	332.49

Post-2011 target level of VOC emissions: The VOC target level is calculated by subtracting the reductions necessary to meet: the initial 15% from the baseline 2011 through 2017; the post-2017 3% per year; and may include the non-creditable fleet (FMVCP/RVP) reductions from the previous milestone/attainment year target level.

RFP Post-2011 Target Level of VOC Emissions				
RFP Milestone Year	Previous Target	FMVCP Non-creditable Reduction	Post-2011 Percent Reduction Requirement VOC (tpd)	VOC Target (tpd)
2011 Base Year	N/A	N/A	N/A	549.59
2017	549.59	0.00	21.98	527.61
2020	527.61	0.00	10.99	516.62
2023	516.62	0.00	16.49	500.13
2026	500.13	0.00	19.24	480.89

1) The EPA published the final implementation rule for the 2008 ozone NAAQS (SIP requirements rule) in the Federal Register (FR) on March 6, 2015 (80 FR 12263). The final rule removed the requirement for states to account for non-creditable reductions when determining compliance with Reasonable Further Progress (RFP) emission reduction requirements. There is a toggle on Sheet "Enter % RFP Cont & Conf SM" of this spreadsheet to turn the effects of non-creditable reduction either off or on. The default toggle is "No," which turns off the calculated effects of pre-1990 control measures. The non-creditable reductions are calculated on Sheet "Calc NonCred Red" for use in the calculation of RFP Targets above. If the effects of non-creditable reductions are turned off on Sheet "Enter % RFP Cont & Conf SM", the values for the non-creditable reductions will still be calculated on Sheet "Calc NonCred Red", however, zeros will automatically be substituted in the target calculations above. Should there be a need to perform the RFP calculations accounting for the effects of pre-1990 control reductions, the toggle on Sheet "Enter % RFP Cont & Conf SM" can be set to "Yes" and the values above will automatically be used in the calculation of the RFP targets.

2) A result of removing the non-creditable reductions from the RFP calculations is the RFP adjusted base year inventory (ABY) becomes equal to the RFP base year inventory. The ABY inventory is used to calculate the Post-2011 Percent Reductions used above. There is a toggle on Sheet "Enter % RFP Cont & Conf SM" The EPA published the final implementation rule for the 2008 ozone NAAQS (SIP requirements rule) in the Federal Register (FR) on March 6, 2015 (80 FR 12263). The final rule removed the requirement for states to account for non-creditable reductions when determining compliance with Reasonable Further Progress (RFP) emission reduction requirements. There is a toggle on Sheet "Enter % RFP Cont & Conf SM" of this spreadsheet to turn the effects of non-creditable reductions either off or on. The default toggle is "No," which turns off the calculated effects of pre-1990 control measures. The non-creditable reductions are calculated on Sheet "Calc NonCred Red" for use in the calculation of RFP Targets above. If the effects of non-creditable reductions are turned off on Sheet "Enter % RFP Cont & Conf SM", the values for the non-creditable reductions will still be calculated on Sheet "Calc NonCred Red", however, zeros will automatically be substituted in the target calculations above. Should there be a need to perform the RFP calculations accounting for the effects of pre-1990 control reductions, the toggle on Sheet "Enter % RFP Cont & Conf SM" can be set to "Yes" and the values above will automatically be used in the calculation of the RFP targets. of this spreadsheet to turn the effects of non-creditable reductions either off or on. The default toggle is "No," which turns off the calculated effects of pre-1990 control measures. Should there be a need to perform the RFP calculations accounting for the effects of pre-1990 control reductions, the toggle on Sheet "Enter % RFP Cont & Conf SM" can be set to "Yes."

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Appendix 2 - Sheet 13

Enter RFP NO_x and VOC Percentage Reductions, Contingency Percents and Safety Margin

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

The total reduction for 2023 is 33% which includes, the initial 15% reduction from the baseline year 2011 through 2017 (NO_x may be substituted for VOC); the 9% reduction between 2017 and 2020 (3% times 3 years); and the 9% reduction between 2020 and 2023 (3% times 3 years). The total reduction for 2026 is 42% which includes the 33% reduction from base year 2011 through milestone year 2023, and the 9% (3% times 3 years) incremental reduction from milestone year 2023 to attainment year 2026. Input percentage of NO_x and VOC reductions to be used to demonstrate RFP for 2023 and 2026. Only a NO_x value needs to input. The VOC percent will be calculated automatically based upon the total required and the percent NO_x to be used.

RFP NO _x and VOC Percent Reductions for Milestone and Attainment Years			
RFP Milestone Year	NO _x %	VOC %	Total Percent
2017	11	4	15
2020	7	2	9
2023	6	3	9
2026	5.5	3.5	9

A total of 3% reductions from contingency measures are required for milestone year contingency. A 3% reduction from contingency measures is also required for attainment year contingency. The contingency reductions can be from NO_x or VOC. Input only the percent of the contingency reductions that will be from NO_x. The VOC value will be calculated automatically as 3 minus the NO_x percent.

RFP and Attainment Demonstration NO _x and VOC Percent Reductions for Milestone and Attainment Contingency			
Contingency Year	NO _x %	VOC %	Total Percent
Milestone Contingency	0	3	3
Attainment Year Contingency	0	3	3

If there are excess RFP control reductions, a transportation conformity safety margin is allowed. The safety margin for this SIP revision is calculated based upon a percentage of excess emissions. If a safety margin will be used, enter the percentage of excess VOC and NO_x emissions to be used below. The safety margin amount must be less than or equal to the excess reductions after demonstrating RFP. The percentage entered must be between 0 and 100. An error message will appear if a value over 100 is entered. Adjusting the safety margin below will automatically update the MVEB calculation to include the percent of excess emissions entered. For reference, the corresponding percent of the MVEB and tons per day are provided.

RFP Milestone Year	Pollutant	Conformity Safety Margin % of Excess RFP Reductions	Percent of On-road EI (For Reference)	Tons Per Day Change to On-road EI (For Reference)
2023	NO _x	15.4	10.11	6.22
	VOC	11.2	10.07	3.41
2026	NO _x	15.2	10.49	5.34
	VOC	35.5	10.04	2.91

The EPA published the final implementation rule for the 2008 ozone NAAQS (SIP requirements rule) in the *Federal Register* (FR) on March 6, 2015 (80 FR 12263). The final rule removed the requirement for states to account for non-creditable reductions when determining compliance with Reasonable Further Progress (RFP) emission reduction requirements. The Federal Clean Air Act (FCAA) §182(b)(1)(D) specifies four categories of control measures that are not creditable toward the 15% RFP requirement under FCAA §182(b)(1)(A). The EPA stated that for three of the categories, reductions from the measures were achieved many years ago, so the question of creditability is moot for RFP credits for the 2008 eight-hour ozone standard. For the one remaining category, measures related to motor vehicle exhaust or evaporative emissions promulgated by January 1, 1990, citing an assessment that at this point in history the ongoing emission reductions from pre-1990 control measures in this category are *de minimis*, the EPA finalized an approach that eliminates any obligation for states to continue to perform emission reduction calculations for the pre-1990 control measures listed under FCAA §182(b)(1)(D)(i). The "Yes/No" drop-down list in the table below allows non-creditable emission reductions to be turned on or off for this SIP revision. The default toggle is "No," which turns off the calculated effects of pre-1990 control measures. Should there be a need to perform the RFP calculations accounting for the effects of pre-1990 control reductions, the toggle can be set to "Yes."

Non-creditable Calculation	Include Non-creditable Reductions in RFP Target Calculations
Applies to NO _x and VOC for all years	No

Enter the percent of the NO_x milestone year target that will be transferred to VOC. Only the NO_x percent is entered. The VOC percent is automatically equal to the NO_x percent transfer. These values are used on Sheets "Calc NO_x Sub 2023" and "Calc NO_x Sub 2026" in the NO_x transfer calculations.

NO _x Substitution	Percent of NO _x Reductions to Transfer to Percent VOC Reductions	Percent of VOC Reductions Transferred from Percent NO _x Reductions
2023	0.00	0.00
2026	0.00	0.00

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Appendix 2 - Sheet 14

Enter Airport Emissions Inventory
HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

'RFP Analysis Year	Uncontrolled NO _x (tpd)	Controlled NO _x (tpd)	Total Reduction NO _x (tpd)	Percent Reduction	Uncontrolled VOC (tpd)	Controlled VOC (tpd)	Total Reduction VOC (tpd)	Percent Reduction
2011	10.13	10.13	0.00	0.00	3.19	3.19	0.00	0.00
2023	7.85	7.80	0.06	0.71	2.67	2.67	0.00	0.14
2026	9.55	9.48	0.06	0.67	2.98	2.98	0.00	0.14

Notes:

- 1) The airport emissions inventory includes emissions from: aircraft; aircraft auxiliary power units (APU); and, airport ground support equipment (GSE).

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Appendix 2 - Sheet 15

Enter Area Source Emissions Inventory
HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

'RFP Analysis Year	Existing Controlled Emissions (as of 2011) NOX (tpd)	Post-2011 Controlled NOX (tpd)	Total Reduction NO _x (tpd)	Percent Reduction	Existing Controlled Emissions (as of 2011) VOC (tpd)	Post-2011 Controlled VOC (tpd)	Total Reduction VOC (tpd)	Percent Reduction
2011	21.14	21.14	0.00	0.00	308.52	308.52	0.00	0.00
2023	33.87	33.87	0.00	0.00	311.04	311.04	0.00	0.00
2026	34.40	34.40	0.00	0.00	317.47	317.47	0.00	0.00

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Appendix 2 - Sheet 16

Enter Biogenic Emissions Inventory
HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

'RFP Analysis Year	Uncontrolled NO _x (tpd)	Controlled NO _x (tpd)	Total Reduction NO _x (tpd)	Percent Reduction	Uncontrolled VOC (tpd)	Controlled VOC (tpd)	Total Reduction VOC (tpd)	Percent Reduction
2011	See Note 1	N/A	N/A	N/A	See Note 1	N/A	N/A	N/A

Notes:

1) Beginning with the Air Emissions Reporting Requirements (December 2008), the emissions required to be reported no longer include emissions from biogenic sources. Therefore, as of the 2011 reporting year, the comprehensive triennial emissions inventory no longer includes emissions from biogenic sources. The RFP demonstrations are based upon the emissions from anthropogenic sources. The guidance for RFP calculations shows the first step is to subtract the emissions from biogenic sources from the total base year emissions to obtain the total anthropogenic emission inventory. As of 2011, under the AERR, the base year emissions do not include biogenic sources and already represent the total anthropogenic emissions. In this case, step one of the RFP process is not needed, and the emissions from biogenic sources is unnecessary. This RFP SIP revision: uses a base year of 2011; does not require subtraction of the biogenic emissions in Step One of the RFP calculation process; and does not include quantification of emissions from biogenic sources.

2) 8 HGB means the eight nonattainment counties and indicates values are for the eight counties that had an existing designation under the one-hour ozone standard and under the 1997 eight-hour ozone standard. Includes: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller counties.

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Appendix 2 - Sheet 17

Enter Commercial Marine Emissions Inventory
HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

'RFP Analysis Year	Uncontrolled NO _x (tpd)	Controlled NO _x (tpd)	Total Reduction NO _x (tpd)	Percent Reduction	Uncontrolled VOC (tpd)	Controlled VOC (tpd)	Total Reduction VOC (tpd)	Percent Reduction
2011	95.37	80.23	15.14	15.87	2.24	2.24	0.00	0.00
2023	120.69	66.36	54.33	45.02	2.92	2.59	0.33	11.30
2026	127.03	58.57	68.46	53.89	3.16	2.74	0.42	13.44

Note: The CMV NO_x tons per day emissions for calendar year 2026 were updated to account for the projected improvements in ocean-going vessel traffic efficiency due to the widening of the Houston Ship Channel scheduled to be completed by 2026. To account for improved vessel traffic, the total 2026 NO_x emissions for all Category 3 vessels (ocean-going vessels) were reduced by 3% based on the projections provided from project studies.

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Appendix 2 - Sheet 18

Enter Oil and Gas Production, Drilling Rigs, Diesel Engines Emissions Inventory
HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

'RFP Analysis Year	Uncontrolled NO _x (tpd)	Controlled NO _x (tpd)	Total Reduction NO _x (tpd)	Percent Reduction	Uncontrolled VOC (tpd)	Controlled VOC (tpd)	Total Reduction VOC (tpd)	Percent Reduction
2011	0.95	0.48	0.47	49.47	0.15	0.04	0.11	73.33
2023	0.99	0.27	0.72	72.73	0.16	0.01	0.15	93.75
2026	0.99	0.25	0.74	74.75	0.16	0.01	0.15	93.75

Notes:

1) The 2011 Controlled NO_x emissions include TxLED Reductions. The 2023 and 2026 Controlled NO_x emissions do not include TxLED Reductions.

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Appendix 2 - Sheet 19

Enter Locomotive Emissions Inventory
HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

'RFP Analysis Year	Uncontrolled NO _x (tpd)	Controlled NO _x (tpd)	Total Reduction NO _x (tpd)	Percent Reduction	Uncontrolled VOC (tpd)	Controlled VOC (tpd)	Total Reduction VOC (tpd)	Percent Reduction
2011	16.08	14.65	1.43	8.88	0.89	0.89	0.00	0.00
2023	10.20	9.98	0.22	2.17	0.46	0.46	0.00	0.00
2026	8.48	8.26	0.22	2.59	0.38	0.38	0.00	0.00

Notes:

1) 2011 Controlled NO_x emissions include TxLED Reductions. 2023 and 2026 Controlled NO_x emissions do not include TxLED Reductions.

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Appendix 2 - Sheet 20

Enter NONROAD Categories Emissions Inventory
HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

'RFP Analysis Year	Uncontrolled NO _x (tpd)	Controlled NO _x (tpd)	Total Reduction NO _x (tpd)	Percent Reduction	Uncontrolled VOC (tpd)	Controlled VOC (tpd)	Total Reduction VOC (tpd)	Percent Reduction
2011	105.39	57.32	48.07	45.61	155.18	54.62	100.55	64.80
2023	158.94	32.60	126.34	79.49	203.54	39.89	163.65	80.40
2026	166.31	29.86	136.45	82.05	214.59	40.98	173.62	80.90

1) 2011 Controlled NO_x emissions include TxLED Reductions. 2023 and 2026 Controlled NO_x emissions do not include TxLED Reductions.

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Appendix 2 - Sheet 21

Enter On-road Mobile Emissions Inventory
HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

'RFP Analysis Year	Uncontrolled NO _x (tpd)	Controlled NO _x (tpd)	Total Reduction NO _x (tpd)	Percent Reduction	Uncontrolled VOC (tpd)	Controlled VOC (tpd)	Total Reduction VOC (tpd)	Percent Reduction
2011	179.34	179.34	0.00	0.00	84.12	84.12	0.00	0.00
2023	82.87	61.55	21.32	25.73	45.03	33.85	11.18	24.83
2026	66.47	50.93	15.54	23.38	38.70	28.98	9.72	25.12

Notes:

- 1) Uncontrolled and Controlled 2011 base year on-road EI are equal because the on-road EI values for 2011 reflect controls in place to 2011, not post-2011 controls included.
- 2) On-road emissions inventories developed using MOVES3 include FMVCP emissions reductions; however, MOVES3 does not include an option for quantifying FMVCP reductions separately from the overall emissions inventory. For continuity with previous SIP revisions, FMVCP is still included as a control strategy, but the reductions are set to zero. The uncontrolled emissions inventory values include FMVCP.
- 3) 2011 Controlled NO_x emissions include TxLED Reductions. 2023 and 2026 Controlled NO_x emissions do not include TxLED Reductions.

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Appendix 2 - Sheet 23

Enter Point Source Emissions Inventory
HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

'RFP Analysis Year	Existing Controlled Emissions (as of 2011) NOX (tpd)	Post-2011 Controlled NOX (tpd)	Total Reduction NO _x (tpd)	Percent Reduction	Existing Controlled Emissions (as of 2011) VOC (tpd)	Post-2011 Controlled VOC (tpd)	Total Reduction VOC (tpd)	Percent Reduction
2011	108.33	108.33	0.00	0.00	95.97	95.97	0.00	0.00
2023	105.53	105.53	0.00	0.00	79.17	79.17	0.00	0.00
2026	105.53	105.53	0.00	0.00	79.17	79.17	0.00	0.00

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Appendix 2 - Sheet 24

Enter 2023 Control Measure Reductions
HGB Nonattainment Area Eight-hour Ozone Season VOC and NO_x
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

RFP Control Strategy Description	Source Category	Total 2011 to 2023 NO _x Emissions Reductions (tpd)	Total 2011 to 2023 VOC Emissions Reductions (tpd)	Use this control for RFP calculations? (Yes or No)	Is this an on-road mobile control that will change the MVEB? (Yes or No)
Chapter 117 NO _x controls	Point	0.00	0.00	Yes	No
Chapter 115 Storage Tank Rule	Point	0.00	0.00	Yes	No
Coating / printing rules	Point	0.00	0.00	Yes	No
Portable fuel containers	Area	0.00	0.00	Yes	No
Federal Motor Vehicle Control Program (FMVCP)	OR	0.00	0.00	Yes	Yes
Reformulated Gasoline (RFG)/Low Sulfur Gasoline/Ultra Low Sulfur Diesel	OR	19.48	7.04	Yes	Yes
Inspection and Maintenance (I/M)	OR	1.84	4.13	Yes	Yes
On-road TxLED	OR	0.00	0.00	Yes	Yes
Tier I and II locomotive NO _x standards	NR	0.22	0.00	Yes	No
Small non-road spark ignition (SI) engines (Phase I)	NR	-6.67	53.24	Yes	No
Heavy duty non-road engines	NR	0.37	5.43	Yes	No
Tiers 2 and 3 non-road diesel engines	NR	2.81	0.57	Yes	No
Small non-road SI engines (Phase II)	NR	4.78	49.95	Yes	No
Large non-road SI & recreational marine	NR	51.41	17.68	Yes	No
Non-road TxLED	NR	0.00	0.00	Yes	No
Non-road RFG	NR	0.00	0.30	Yes	No
Tier 4 non-road diesel engines	NR	68.82	14.61	Yes	No
Diesel recreational marine	NR	0.03	0.00	Yes	No
Small SI (Phase III)	NR	4.79	21.87	Yes	No
Chapter 117 NO _x area source engine controls	Area	0.00	0.00	Yes	No
Drilling Rigs: Federal Engine Standards	NR	0.72	0.15	Yes	No
Commercial marine vessel engine certification standards and fuel programs	NR	54.33	0.33	Yes	No
Drilling Rigs: Texas Low Emission Diesel	NR	0.00	0.00	Yes	No
Locomotive: Texas Low Emission Diesel	NR	0.00	0.00	Yes	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
Total		202.92	175.29		

Notes:

- 1) Point source Chapter 117 NO_x controls in the HGB area had compliance deadlines before 2011. The 2011 EI includes the effects of the control. No additional control beyond 2011 are claimed.
- 2) Area source Chapter 117 NO_x controls in the HGB area had compliance deadlines before 2011. The 2011 EI includes the effects of the control. No additional control beyond 2011 are claimed.
- 3) Area source Portable fuel containers controls in the HGB area had compliance deadlines before 2011. The 2011 EI includes the effects of the control. No additional control beyond 2011 are claimed.
- 4) All eight counties in the HGB area are covered by the federal RFG requirement.
- 5) Inspection and Maintenance Program is only modeled for the five counties covered by the program: The five I/M counties include: Brazoria, Fort Bend, Galveston, Harris, and Montgomery.
- 6) "This row not used for current RFP" control rows were created only to allow for planners to easily add controls for alternative scenario analyses.
- 7) In Feb 2023, the EPA released a new method to determine emissions reductions from TxLED. The new method reduces TxLED emissions reductions by approximately 90%. To be conservative the TxLED reductions were set to zero.
- 8) On-road emissions inventories developed using MOVES3 include FMVCP emissions reductions; however, MOVES3 does not include an option for quantifying FMVCP reductions separately from the overall emissions inventory. For continuity with previous SIP revisions, FMVCP is still included as a control strategy, but the reductions are set to zero. The uncontrolled emissions inventory values include FMVCP.
- 9) The small SI Phase 1 rule is shown to provide a substantial reduction in VOC emissions. A slight increase in NO_x emissions (small negative NO_x emissions delta) is due to the engine modifications required to meet the VOC and CO standards of the Small SI Phase 1. There can also be small negative NO_x emissions deltas associated with the non-road RFG control strategy due to the MOVES model's fuel effects on NO_x for the RFG versus conventional gasoline formulations.

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Appendix 2 - Sheet 25

Enter 2026 Control Measure Reductions

HGB Nonattainment Area Eight-hour Ozone Season VOC and NO_x

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

RFP Control Strategy Description	Source Category	Total 2011 to 2026 NO _x Emissions Reductions (tpd)	Total 2011 to 2026 VOC Emissions Reductions (tpd)	Use this control for RFP demonstration? (Yes or No)	Is this an on-road mobile control that will change the MVEB? (Yes or No)
Chapter 117 NOX controls	Point	0.00	0.00	Yes	No
Chapter 115 Storage Tank Rule	Point	0.00	0.00	Yes	No
Coating / printing rules	Point	0.00	0.00	Yes	No
Portable fuel containers	Area	0.00	0.00	Yes	No
Federal Motor Vehicle Control Program (FMVCP)	OR	0.00	0.00	Yes	Yes
Reformulated Gasoline (RFG)/Low Sulfur Gasoline/Ultra Low Sulfur Diesel	OR	14.18	5.65	Yes	Yes
Inspection and Maintenance (I/M)	OR	1.36	4.08	Yes	Yes
On-road TxLED	OR	0.00	0.00	Yes	Yes
Tier I and II locomotive NOX standards	NR	0.22	0.00	Yes	No
Small non-road spark ignition (SI) engines (Phase I)	NR	-7.07	56.33	Yes	No
Heavy duty non-road engines	NR	0.04	5.48	Yes	No
Tiers 2 and 3 non-road diesel engines	NR	2.08	0.41	Yes	No
Small non-road SI engines (Phase II)	NR	5.06	52.62	Yes	No
Large non-road SI & recreational marine	NR	58.38	19.89	Yes	No
Non-road TxLED	NR	0.00	0.00	Yes	No
Non-road RFG	NR	0.00	0.32	Yes	No
Tier 4 non-road diesel engines	NR	72.80	15.26	Yes	No
Diesel recreational marine	NR	0.03	0.00	Yes	No
Small SI (Phase III)	NR	5.13	23.30	Yes	No
Chapter 117 NOX area source engine controls	Area	0.00	0.00	Yes	No
Drilling Rigs: Federal Engine Standards	NR	0.74	0.15	Yes	No
Commercial marine vessel engine certification standards and fuel programs	NR	68.46	0.42	Yes	No
Drilling Rigs: Texas Low Emission Diesel	NR	0.00	0.00	Yes	No
Locomotive: Texas Low Emission Diesel	NR	0.00	0.00	Yes	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
Total		221.42	183.93		

Notes

Please see notes for the control reductions on:

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Appendix 2 - Sheet 28

Calculate 2011 RFP Base Year Emissions Inventory
HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

The 2011 Base Year Inventory	NO_x (tons/day)	VOC (tons/day)
Point Source 2011 EI	108.33	95.97
Area Source 2011 EI	21.14	308.52
On-road mobile 2011 EI	179.34	84.12
Non-road mobile 2011 EI	162.81	60.98
Biogenic 2011 EI (see Note 1)	See Note 1	See Note 1
Total 2011 Base Year Inventory	471.62	549.59

Notes:

1) Beginning with the Air Emissions Reporting Requirements (December 2008), the emissions required to be reported no longer include emissions from biogenic sources. Therefore, as of the 2011 reporting year, the comprehensive triennial emissions inventory no longer includes emissions from biogenic sources. The RFP demonstrations are based upon the emissions from anthropogenic sources. The guidance for RFP calculations shows the first step is to subtract the emissions from biogenic sources from the total base year emissions to obtain the total anthropogenic emission inventory. As of 2011, under the AERR, the base year emissions do not include biogenic sources and already represent the total anthropogenic emissions. In this case, step one of the RFP process is not needed, and the emissions from biogenic sources is unnecessary. This RFP SIP revision: uses a base year of 2011; does not require subtraction of the biogenic emissions in Step One of the RFP calculation process; and does not include quantification of emissions from biogenic sources.

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Appendix 2 - Sheet 29

2023 Forecasted Uncontrolled or Existing Control Emissions Inventory with pre-2011 Controls

HGB Nonattainment Area Eight-Hour Ozone Season VOC and NO_x

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Uncontrolled or Existing Control EI with pre-2011 controls: These calculations sum the total Uncontrolled or Existing Control NO_x and VOC emissions (tpd) for the 2023 RFP milestone year. The totals for each source category used in these calculations were entered on enter EI sheets.

Forecasted 2023 Uncontrolled or Existing Control Emissions Inventory with pre-2011 Controls		
Emissions Description	NO _x (tpd)	VOC (tpd)
Point Source	105.53	79.17
Area Source	33.87	311.04
On-Road Mobile Source	82.87	45.03
Non-Road Mobile Source	298.67	209.75
Total	520.94	644.99

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Appendix 2 - Sheet 30

2026 Forecasted Uncontrolled or Existing Control Emissions Inventory with pre-2011 Controls
HGB Nonattainment Area Eight-Hour Ozone Season VOC and NO_x

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery,
Waller

Uncontrolled or Existing Control EI with pre-2011 controls: These calculations add up to the total Uncontrolled or Existing Control NO_x and VOC emissions (tpd) for the 2026 RFP milestone year. The totals for each source category used in these calculations were entered on enter EI sheets.

Forecasted 2020 Uncontrolled or Existing Control Emissions Inventory with pre-2011 Controls		
Emissions Description	NO _x (tpd)	VOC (tpd)
Point Source	105.53	79.17
Area Source	34.40	317.47
On-Road Mobile Source	66.47	38.70
Non-Road Mobile Source	312.36	221.27
Total	518.76	656.61

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Appendix 2 - Sheet 36

Calculations: 2011 to 2023 Control Measures Reductions

HGB Nonattainment Area Eight-Hour Ozone Season VOC and NO_x

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Explanation: The control strategy name, control reduction amount, status of inclusion of the control in the RFP calculations, and whether or not the control is for on-road mobile sources were all input in sheet "Enter Reductions 2023." The reduction is the reduction that is creditable from each control between 2011 and 2023. If the control has been turned off by inputting a "No" in the "Use this control for RFP demonstration?" column, the spreadsheet will put a zero in for the reduction for that control on this sheet, even if a positive value for the control was input into sheet "Enter Reductions 2023". If it was intended to have a positive reduction for the control but there is a zero, go back to the "Enter Reductions 2023" Sheet and change the No to a Yes indicating that the control will be used for RFP demonstration.

RFP Control Strategy Description	Source Category	Total 2011 to 2023 NOX Emissions Reductions (tpd)	Total 2011 to 2023 VOC Emissions Reductions (tpd)	Use this control for RFP demonstration? (Yes or No)	Is this an on-road mobile control that will change the MVEB? (Yes or No)
Chapter 117 NOX controls	Point	0.00	0.00	Yes	No
Chapter 115 Storage Tank Rule	Point	0.00	0.00	Yes	No
Coating / printing rules	Point	0.00	0.00	Yes	No
Portable fuel containers	Area	0.00	0.00	Yes	No
Federal Motor Vehicle Control Program (FMVCP)	OR	0.00	0.00	Yes	Yes
Reformulated Gasoline (RFG)/Low Sulfur Gasoline/Ultra Low Sulfur Diesel	OR	19.48	7.04	Yes	Yes
Inspection and Maintenance (I/M)	OR	1.84	4.13	Yes	Yes
On-road TxLED	OR	0.00	0.00	Yes	Yes
Tier I and II locomotive NOX standards	NR	0.22	0.00	Yes	No
Small non-road spark ignition (SI) engines (Phase I)	NR	-6.67	53.24	Yes	No
Heavy duty non-road engines	NR	0.37	5.43	Yes	No
Tiers 2 and 3 non-road diesel engines	NR	2.81	0.57	Yes	No
Small non-road SI engines (Phase II)	NR	4.78	49.95	Yes	No
Large non-road SI & recreational marine	NR	51.41	17.68	Yes	No
Non-road TxLED	NR	0.00	0.00	Yes	No
Non-road RFG	NR	0.00	0.30	Yes	No
Tier 4 non-road diesel engines	NR	68.82	14.61	Yes	No
Diesel recreational marine	NR	0.03	0.00	Yes	No
Small SI (Phase III)	NR	4.79	21.87	Yes	No
Chapter 117 NOX area source engine controls	Area	0.00	0.00	Yes	No
Drilling Rigs: Federal Engine Standards	NR	0.72	0.15	Yes	No
Commercial marine vessel engine certification standards and fuel programs	NR	54.33	0.33	Yes	No
Drilling Rigs: Texas Low Emission Diesel	NR	0.00	0.00	Yes	No
Locomotive: Texas Low Emission Diesel	NR	0.00	0.00	Yes	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
Total 2023 RFP Control Reductions		202.93	175.30		

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Appendix 2 - Sheet 37

Calculations: 2023 to 2026 Control Measures Reductions

HGB Nonattainment Area Eight-Hour Ozone Season VOC and NO_x

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Explanation: The control strategy name, control reduction amount, status of inclusion of the control in the RFP calculations, and whether or not the control is for on-road mobile sources were all input in sheet "Enter Reductions 2026." The reduction is the reduction that is creditable from each control between 2023 and 2026. If the control has been turned off by inputting a "No" in the "Use this control for 2026 RFP demonstration?" column, the spreadsheet will put a zero in for the reduction for that control on this sheet, even if a positive value for the control was input into the "Enter Reductions 2026" sheet. If it was intended to have a positive reduction for the control but there is a zero, go back to the "Enter Reductions 2026" Sheet and change the No to a Yes indicating that the control will be used for RFP demonstration.

Creditable Reductions Control Strategy	Source Category	Total 2023 to 2026 NOX Emissions Reductions (tpd)	Total 2023 to 2026 VOC Emissions Reductions (tpd)	Use this control for RFP demonstration? (Yes or No)	Is this an on-road mobile control that will change the MVEB? (Yes or No)
Chapter 117 NOX controls	Point	0.00	0.00	Yes	No
Chapter 115 Storage Tank Rule	Point	0.00	0.00	Yes	No
Coating / printing rules	Point	0.00	0.00	Yes	No
Portable fuel containers	Area	0.00	0.00	Yes	No
Federal Motor Vehicle Control Program (FMVCP)	OR	0.00	0.00	Yes	Yes
Reformulated Gasoline (RFG)/Low Sulfur Gasoline/Ultra Low Sulfur Diesel	OR	-5.30	-1.39	Yes	Yes
Inspection and Maintenance (I/M)	OR	-0.48	-0.05	Yes	Yes
On-road TxLED	OR	0.00	0.00	Yes	Yes
Tier I and II locomotive NOX standards	NR	0.00	0.00	Yes	No
Small non-road spark ignition (SI) engines (Phase I)	NR	-0.40	3.09	Yes	No
Heavy duty non-road engines	NR	-0.33	0.05	Yes	No
Tiers 2 and 3 non-road diesel engines	NR	-0.73	-0.16	Yes	No
Small non-road SI engines (Phase II)	NR	0.28	2.67	Yes	No
Large non-road SI & recreational marine	NR	6.97	2.21	Yes	No
Non-road TxLED	NR	0.00	0.00	Yes	No
Non-road RFG	NR	0.00	0.02	Yes	No
Tier 4 non-road diesel engines	NR	3.98	0.65	Yes	No
Diesel recreational marine	NR	0.00	0.00	Yes	No
Small SI (Phase III)	NR	0.34	1.43	Yes	No
Chapter 117 NOX area source engine controls	Area	0.00	0.00	Yes	No
Drilling Rigs: Federal Engine Standards	NR	0.02	0.00	Yes	No
Commercial marine vessel engine certification standards and fuel programs	NR	14.13	0.09	Yes	No
Drilling Rigs: Texas Low Emission Diesel	NR	0.00	0.00	Yes	No
Locomotive: Texas Low Emission Diesel	NR	0.00	0.00	Yes	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
This row not used for current RFP	N/A	0.00	0.00	No	No
Total 2026 RFP Control Reductions		18.48	8.61		

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Appendix 2 - Sheet 38

Calculations: 2011 to 2023 On-road Control Measures Reductions

HGB Nonattainment Area Eight-Hour Ozone Season VOC and NOX

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Creditable Reductions Control Strategy	Control Used for RFP Demonstration?	On-road Mobile Source Control?	Total 2011 - 2023 'On-road Mobile NO _x Emissions Reductions (tpd)	Total 2011 - 2023 'On-road Mobile VOC Emissions Reductions (tpd)
Chapter 117 NOX controls	Yes	No	0.00	0.00
Chapter 115 Storage Tank Rule	Yes	No	0.00	0.00
Coating / printing rules	Yes	No	0.00	0.00
Portable fuel containers	Yes	No	0.00	0.00
Federal Motor Vehicle Control Program (FMVCP)	Yes	Yes	0.00	0.00
Reformulated Gasoline (RFG)/Low Sulfur Gasoline/Ultra Low Sulfur Diesel	Yes	Yes	19.48	7.04
Inspection and Maintenance (I/M)	Yes	Yes	1.84	4.13
On-road TxLED	Yes	Yes	0.00	0.00
Tier I and II locomotive NOX standards	Yes	No	0.00	0.00
Small non-road spark ignition (SI) engines (Phase I)	Yes	No	0.00	0.00
Heavy duty non-road engines	Yes	No	0.00	0.00
Tiers 2 and 3 non-road diesel engines	Yes	No	0.00	0.00
Small non-road SI engines (Phase II)	Yes	No	0.00	0.00
Large non-road SI & recreational marine	Yes	No	0.00	0.00
Non-road TxLED	Yes	No	0.00	0.00
Non-road RFG	Yes	No	0.00	0.00
Tier 4 non-road diesel engines	Yes	No	0.00	0.00
Diesel recreational marine	Yes	No	0.00	0.00
Small SI (Phase III)	Yes	No	0.00	0.00
Chapter 117 NOX area source engine controls	Yes	No	0.00	0.00
Drilling Rigs: Federal Engine Standards	Yes	No	0.00	0.00
Commercial marine vessel engine certification standards and fuel programs	Yes	No	0.00	0.00
Drilling Rigs: Texas Low Emission Diesel	Yes	No	0.00	0.00
Locomotive: Texas Low Emission Diesel	Yes	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
Total On-road Mobile Source RFP Control Reductions			21.32	11.17

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Calculations: 2011 to 2026 On-road Control Measures Reductions

HGB Nonattainment Area Eight-Hour Ozone Season VOC and NOX

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Creditable Reductions Control Strategy	Control Used for RFP Demonstration?	On-road Mobile Source Control?	Total 2011 - 2026 'On-road Mobile NO _x Emissions Reductions (tpd)	Total 2011 - 2026 'On-road Mobile VOC Emissions Reductions (tpd)
Chapter 117 NOX controls	Yes	No	0.00	0.00
Chapter 115 Storage Tank Rule	Yes	No	0.00	0.00
Coating / printing rules	Yes	No	0.00	0.00
Portable fuel containers	Yes	No	0.00	0.00
Federal Motor Vehicle Control Program (FMVCP)	Yes	Yes	0.00	0.00
Reformulated Gasoline (RFG)/Low Sulfur Gasoline/Ultra Low Sulfur Diesel	Yes	Yes	14.18	5.65
Inspection and Maintenance (I/M)	Yes	Yes	1.36	4.08
On-road TxLED	Yes	Yes	0.00	0.00
Tier I and II locomotive NOX standards	Yes	No	0.00	0.00
Small non-road spark ignition (SI) engines (Phase I)	Yes	No	0.00	0.00
Heavy duty non-road engines	Yes	No	0.00	0.00
Tiers 2 and 3 non-road diesel engines	Yes	No	0.00	0.00
Small non-road SI engines (Phase II)	Yes	No	0.00	0.00
Large non-road SI & recreational marine	Yes	No	0.00	0.00
Non-road TxLED	Yes	No	0.00	0.00
Non-road RFG	Yes	No	0.00	0.00
Tier 4 non-road diesel engines	Yes	No	0.00	0.00
Diesel recreational marine	Yes	No	0.00	0.00
Small SI (Phase III)	Yes	No	0.00	0.00
Chapter 117 NOX area source engine controls	Yes	No	0.00	0.00
Drilling Rigs: Federal Engine Standards	Yes	No	0.00	0.00
Commercial marine vessel engine certification standards and fuel programs	Yes	No	0.00	0.00
Drilling Rigs: Texas Low Emission Diesel	Yes	No	0.00	0.00
Locomotive: Texas Low Emission Diesel	Yes	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
This row not used for current RFP	No	No	0.00	0.00
Total On-road Mobile Source RFP Control Reductions			15.54	9.73

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Summary Sheet: Uncontrolled or Existing Control NOx Emissions Inventory

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty,
Montgomery, Waller

2011 Uncontrolled or Existing Control NOx (tons per day)	
Emissions Inventory Source	HGB
Area Sources	21.14
Non-Road Mobile Sources	227.92
On-Road Mobile Sources	179.34
Point Sources	108.33
Total	536.73

2023 Uncontrolled or Existing Control NOx (tons per day)	
Emissions Inventory Source	HGB
Area Sources	33.87
Non-Road Mobile Sources	298.67
On-Road Mobile Sources	82.87
Point Sources	105.53
Total	520.94

2026 Uncontrolled or Existing Control NOx (tons per day)	
Emissions Inventory Source	HGB
Area Sources	34.40
Non-Road Mobile Sources	312.36
On-Road Mobile Sources	66.47
Point Sources	105.53
Total	518.76

Note: HGB 2008 ozone NAAQS nonattainment area uncontrolled on-road EI values for 2011 reflect controls in place up to 2011, no post-2011 controls included.

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Summary Sheet: Controlled or Post-2011 Controlled NOx Emissions Inventory
HGB Eight-Hour Ozone Nonattainment Area
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris,
Liberty, Montgomery, Waller

Controlled or Post-2011 Controlled NOx for 2011 (tons per day)	
Emissions Inventory Source	HGB
Area Sources	21.14
Non-Road Mobile Sources	162.81
On-Road Mobile Sources	179.34
Point Sources	108.33
Total	471.62

Controlled or Post-2011 Controlled NOx for 2023 (tons per day)	
Emissions Inventory Source	HGB
Area Sources	33.87
Non-Road Mobile Sources	117.01
On-Road Mobile Sources	61.55
Point Sources	105.53
Total	317.96

Controlled or Post-2011 Controlled NOx for 2026 (tons per day)	
Emissions Inventory Source	HGB
Area Sources	34.40
Non-Road Mobile Sources	106.42
On-Road Mobile Sources	50.93
Point Sources	105.53
Total	297.28

Note: The controlled inventory shown here includes all controls. The controlled RFP inventory may not include all controls and may therefore be a higher value than shown here.

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Appendix 2 - Sheet 42

Summary Sheet: Uncontrolled or Existing Control VOC Emissions Inventory

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris,
Liberty, Montgomery, Waller

2011 Uncontrolled or Existing Control VOC (tons per day)	
Emissions Inventory Source	HGB
Area Sources	308.52
Non-Road Mobile Sources	161.65
On-Road Mobile Sources	84.12
Point Sources	95.97
Total	650.26

2023 Uncontrolled or Existing Control VOC (tons per day)	
Emissions Inventory Source	HGB
Area Sources	311.04
Non-Road Mobile Sources	209.75
On-Road Mobile Sources	45.03
Point Sources	79.17
Total	644.99

2026 Uncontrolled or Existing Control VOC (tons per day)	
Emissions Inventory Source	HGB
Area Sources	317.47
Non-Road Mobile Sources	221.27
On-Road Mobile Sources	38.70
Point Sources	79.17
Total	656.61

Note: HGB 2008 ozone NAAQS nonattainment area uncontrolled on-road EI values for 2011 reflect controls in place up to 2011, no post-2011 controls included

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Appendix 2 - Sheet 43

Summary Sheet: Controlled or Post-2011 Controlled VOC Emissions Inventory

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty,
Montgomery, Waller

Controlled or Post-2011 Controlled VOC for 2011 (tons per day)	
Emissions Inventory Source	HGB
Area Sources	308.52
Non-Road Mobile Sources	60.98
On-Road Mobile Sources	84.12
Point Sources	95.97
Total	549.59

Controlled or Post-2011 Controlled VOC for 2023 (tons per day)	
Emissions Inventory Source	HGB
Area Sources	311.04
Non-Road Mobile Sources	45.62
On-Road Mobile Sources	33.85
Point Sources	79.17
Total	469.68

Controlled or Post-2011 Controlled VOC for 2026 (tons per day)	
Emissions Inventory Source	HGB
Area Sources	317.47
Non-Road Mobile Sources	47.09
On-Road Mobile Sources	28.98
Point Sources	79.17
Total	472.71

Note: The controlled inventory shown here includes all controls. The controlled RFP inventory may not include all controls and may therefore be a higher value than shown here.

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Summary Sheet: 2011 Emissions Inventory By Category

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

2011 (tons per day)

Emissions Inventory Source	Uncontrolled or Existing Control NOx	Controlled NOx	Uncontrolled or Existing Control VOC	Controlled VOC
Area Sources	21.14	21.14	308.52	308.52
Non-Road Mobile Sources	227.92	162.81	161.65	60.98
On-Road Mobile Sources	179.34	179.34	84.12	84.12
Point Sources	108.33	108.33	95.97	95.97
Total	536.73	471.62	650.26	549.59

Note: The controlled inventory shown here includes all controls. The controlled RFP inventory may not include all controls and may therefore be lower than the controlled inventory shown here.

Eight-County HGB 2008 Ozone NAAQS Nonattainment Area RFP Summary of the 2011 Base Year Average Su

Emissions Inventory Source	Uncontrolled or Existing Control NOx	Controlled NOx	Uncontrolled or Existing Control VOC	Controlled VOC
Non-Road Mobile Sources	227.92	162.81	161.65	60.98
On-Road Mobile Sources	179.34	179.34	84.12	84.12
Area Sources	21.14	21.14	308.52	308.52
Point Sources	108.33	108.33	95.97	95.97
Total	536.73	471.62	650.26	549.59

Note: HGB 2008 ozone NAAQS nonattainment area uncontrolled on-road EI values for 2011 reflect controls in place up to 2011, no post-2011 controls.

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Summary Sheet: 2023 Emissions Inventory By Category

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

2023 (tons per day)

Emissions Inventory Source	Uncontrolled or Existing Control NOx	Controlled or Post-2011 Controlled NOx	Uncontrolled or Existing Control VOC	Controlled or Post-2011 Controlled VOC
Area Sources	33.87	33.87	311.04	311.04
Non-Road Mobile Sources	298.67	117.01	209.75	45.62
On-Road Mobile Sources	82.87	61.55	45.03	33.85
Point Sources	105.53	105.53	79.17	79.17
Total	520.94	317.96	644.99	469.68

Note: The controlled inventory shown here includes all controls. The controlled RFP inventory may not include all controls and may therefore be a higher value than shown here.

Eight-County HGB 2008 Ozone NAAQS Nonattainment Area RFP Summary of the 2023 Base Year Average Summer

Emissions Inventory Source	Uncontrolled or Existing Control NOx	Controlled NOx	Uncontrolled or Existing Control VOC	Controlled VOC
Non-Road Mobile Sources	298.67	117.01	209.75	45.62
On-Road Mobile Sources	82.87	61.55	45.03	33.85
Area Sources	33.87	33.87	311.04	311.04
Point Sources	105.53	105.53	79.17	79.17
Total	520.94	317.96	644.99	469.68

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Summary Sheet: 2026 Emissions Inventory By Category

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

2026 (tons per day)

Emissions Inventory Source	Uncontrolled or Existing Control NOx	Controlled or Post-2011 Controlled NOx	Uncontrolled or Existing Control VOC	Controlled or Post-2011 Controlled VOC
Area Sources	34.40	34.40	317.47	317.47
Non-Road Mobile Sources	312.36	106.42	221.27	47.09
On-Road Mobile Sources	66.47	50.93	38.70	28.98
Point Sources	105.53	105.53	79.17	79.17
Total	518.76	297.28	656.61	472.71

Note: The controlled inventory shown here includes all controls. The controlled RFP inventory may not include all controls and may therefore be a higher value than shown here.

Eight-County HGB 2008 Ozone NAAQS Nonattainment Area RFP Summary of the 2026 Base Year Average Su

Emissions Inventory Source	Uncontrolled or Existing Control NOx	Controlled NOx	Uncontrolled or Existing Control VOC	Controlled VOC
Non-Road Mobile Sources	312.36	106.42	221.27	47.09
On-Road Mobile Sources	66.47	50.93	38.70	28.98
Area Sources	34.40	34.40	317.47	317.47
Point Sources	105.53	105.53	79.17	79.17
Total	518.76	297.28	656.61	472.71

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Summary Total Non-Road Emissions Inventory
HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

RFP Analysis Year	Uncontrolled NO _x (tpd)	Controlled NO _x (tpd)	Total Reduction NO _x (tpd)	Percent Reduction	Uncontrolled VOC (tpd)	Controlled VOC (tpd)	Total Reduction VOC (tpd)	Percent Reduction
2011	227.92	162.81	65.11	28.57	161.65	60.98	100.67	62.28
2023	298.67	117.01	181.66	60.82	209.75	45.62	164.13	78.25
2026	312.36	106.42	205.94	65.93	221.27	47.09	174.18	78.72

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Summary Sheet: 2011 Non-Road Summary by Category

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

2011 (tons per day)

Emissions Inventory Source	Uncontrolled NOx	Controlled NOx	Uncontrolled VOC	Controlled VOC
Airport	10.13	10.13	3.19	3.19
Locomotive	16.08	14.65	0.89	0.89
Marine	95.37	80.23	2.24	2.24
NONROAD Model	105.39	57.32	155.18	54.62
Drilling Rigs	0.95	0.48	0.15	0.04
Total All	227.92	162.81	161.65	60.98
Total ALM	121.58	105.01	6.32	6.32
ALM Plus Drilling Rigs (Off-road)	122.53	105.49	6.47	6.36

Note: The controlled inventory shown here includes all controls. The controlled RFP inventory may not include all controls and may therefore be a higher value than shown here.

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Summary Sheet: 2023 Non-Road Summary by Category

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

2023 (tons per day)

Emissions Inventory Source	Uncontrolled NOx	Controlled NOx	Uncontrolled VOC	Controlled VOC
Airport	7.85	7.80	2.67	2.67
Locomotive	10.20	9.98	0.46	0.46
Marine	120.69	66.36	2.92	2.59
NONROAD Model	158.94	32.60	203.54	39.89
Drilling Rigs	0.99	0.27	0.16	0.01
Total All	298.67	117.01	209.75	45.62
Total ALM	138.74	84.14	6.05	5.72
ALM Plus Drilling Rigs (Off-road)	139.73	84.41	6.21	5.73

Note: The controlled inventory shown here includes all controls. The controlled RFP inventory may not include all controls and may therefore be a higher value than shown here.

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Summary Sheet: 2026 Non-Road Summary by Category

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

2026 (tons per day)

Emissions Inventory Source	Uncontrolled NOx	Controlled NOx	Uncontrolled VOC	Controlled VOC
Airport	9.55	9.48	2.98	2.98
Locomotive	8.48	8.26	0.38	0.38
Marine	127.03	58.57	3.16	2.74
NONROAD Model	166.31	29.86	214.59	40.98
Drilling Rigs	0.99	0.25	0.16	0.01
Total All	312.36	106.42	221.27	47.09
Total ALM	145.06	76.31	6.52	6.10
ALM Plus Drilling Rigs (Off-road)	146.05	76.56	6.68	6.11

Note: The controlled inventory shown here includes all controls. The controlled RFP inventory may not include all controls and may therefore be a higher value than shown here.

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Appendix 2 - Sheet 51

Summary Sheet: 2011, 2023 and 2026 On-Road Summaries

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

HGB Eight County RFP Ozone Season Weekday On-Road Mobile Source NOX Emissions

RFP Analysis Year Inventory	Uncontrolled NOX (tons per day)	Controlled NOX (tons per day)
2011 Base Year	179.34	179.34
2023 Milestone Year	82.87	61.55
2026 Attainment Year	66.47	50.93

Note: HGB 2008 ozone NAAQS nonattainment area uncontrolled on-road EI values for 2011 reflect controls in place up to 2011, no post-2011 controls included.

HGB EightCounty RFP Ozone Season Weekday On-Road Mobile Source VOC Emissions

RFP Analysis Year Inventory	Uncontrolled VOC (tons per day)	Controlled VOC (tons per day)
2011 Base Year	84.12	84.12
2023 Milestone Year	45.03	33.85
2026 Attainment Year	38.70	28.98

Note: HGB 2008 ozone NAAQS nonattainment area uncontrolled on-road EI values for 2011 reflect controls in place up to 2011, no post-2011 controls included.

2023 HGB Eight County RFP Ozone Season Weekday On-Road Mobile Source NOX and VOC Emissions and Control Strategy Reductions

RFP Analysis Year and Inventory of On-Road Mobile Emissions Inventory Strategies	NOX (tons per day)	VOC (tons per day)
2023 Uncontrolled Inventory	82.87	45.03
Federal Motor Vehicle Control Program (FMVCP)	0.00	0.00
Reformulated Gasoline (RFG)/East Texas Regional Low RVP/Low Sulfur	19.48	7.04
Inspection and Maintenance (I/M)	1.84	4.13
On-road TxLED	0.00	0.00
2023 Controlled Inventory	61.55	33.85

2026 HGB Eight County RFP Ozone Season Weekday On-Road Mobile Source NOX and VOC Emissions and Control Strategy Reductions

RFP Analysis Year and Inventory of On-Road Mobile Emissions Inventory Strategies	NOX (tons per day)	VOC (tons per day)
2026 Uncontrolled Inventory	66.47	38.70
Federal Motor Vehicle Control Program (FMVCP)	0.00	0.00
Reformulated Gasoline (RFG)/East Texas Regional Low RVP/Low Sulfur	14.18	5.65
Inspection and Maintenance (I/M)	1.36	4.08
On-road TxLED	0.00	0.00
2026 Controlled Inventory	50.93	28.98

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Appendix 2 - Sheet 52

Summary Sheet: Calculation Process for 2023 Target Levels of Emissions
 HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Summary of the Calculation Process for 2023 HGB RFP Target Levels

Line	Description	NO _x	VOC
Line 1	2011 base year emissions inventory	471.62	549.59
Line 2	Percent of NO _x (PN) and VOC (PV) to meet 15% reduction requirement from 2012 through 2017 (PN plus PV = 15)	11.00	4.00
Line 3	Percent of NO _x (PN) and VOC (PV) to meet 9% reduction requirement from 2018 through 2020 (PN plus PV = 9)	7.00	2.00
Line 4	Percent of NO _x (PN) and VOC (PV) to meet 9% reduction requirement from 2021 through 2023 (PN plus PV = 9)	6.00	3.00
Line 5	Total percent of NO _x (PN) and VOC (PV) to meet 2023 reduction requirement (Line 2 + Line 3 + Line 4)	24.00	9.00
Line 6	Calculate the 33% NO _x and VOC reduction requirement between 2011 and 2023 (Line 1 multiplied by Line 5)	113.19	49.46
Line 7	Calculate the 2023 target level of emissions (Line 1 minus Line 6)	358.43	500.13

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Appendix 2 - Sheet 53

Summary Sheet: Calculation Process for 2026 Target Levels of Emissions

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Summary of the Calculation Process for 2026 HGB RFP Target Levels

Line	Description	NO _x	VOC
Line 1	2011 base year emissions inventory (see Table 2-13)	471.62	549.59
Line 2	Percent of NO _x (PN) and VOC (PV) to meet 15% reduction requirement from 2012 through 2017 (PN plus PV = 15)	11.00	4.00
Line 3	Percent of NO _x (PN) and VOC (PV) to meet 9% reduction requirement from 2018 through 2020 (PN plus PV = 9)	7.00	2.00
Line 4	Percent of NO _x (PN) and VOC (PV) to meet 9% reduction requirement from 2021 through 2023 (PN plus PV = 9)	6.00	3.00
Line 5	Percent of NO _x (PN) and VOC (PV) to meet 9% reduction requirement from 2024 through 2026 (PN plus PV = 9)	5.50	3.50
Line 6	Total percent of NO _x (PN) and VOC (PV) to meet 2026 reduction requirement (Line 2 + Line 3 + Line 4 + Line 5)	29.50	12.50
Line 7	Calculate the 42% NO _x and VOC reduction requirement between 2011 and 2026 (Line 1 multiplied by Line 6)	139.13	68.70
Line 8	Calculate the 2026 target level of emissions (Line 1 minus Line 7)	332.49	480.89

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Appendix 2 - Sheet 54

Summary Sheet: 2011 to 2023 Total RFP Emissions Reductions (Chapter 4 table)

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Control Strategy Description	Source Category	NO _x Reductions	VOC Reductions
Chapter 117 NOX controls	Point	0.00	0.00
Chapter 115 Storage Tank Rule	Point	0.00	0.00
Coating / printing rules	Point	0.00	0.00
Portable fuel containers	Area	0.00	0.00
Federal Motor Vehicle Control Program (FMVCP)	OR	0.00	0.00
Reformulated Gasoline (RFG)/Low Sulfur Gasoline/Ultra Low Sulfur Diesel	OR	19.48	7.04
Inspection and Maintenance (I/M)	OR	1.84	4.13
On-road TxLED	OR	0.00	0.00
Tier I and II locomotive NOX standards	NR	0.22	0.00
Small non-road spark ignition (SI) engines (Phase I)	NR	-6.67	53.24
Heavy duty non-road engines	NR	0.37	5.43
Tiers 2 and 3 non-road diesel engines	NR	2.81	0.57
Small non-road SI engines (Phase II)	NR	4.78	49.95
Large non-road SI & recreational marine	NR	51.41	17.68
Non-road TxLED	NR	0.00	0.00
Non-road RFG	NR	0.00	0.30
Tier 4 non-road diesel engines	NR	68.82	14.61
Diesel recreational marine	NR	0.03	0.00
Small SI (Phase III)	NR	4.79	21.87
Chapter 117 NOX area source engine controls	Area	0.00	0.00
Drilling Rigs: Federal Engine Standards	NR	0.72	0.15
Commercial marine vessel engine certification standards and fuel programs	NR	54.33	0.33
Drilling Rigs: Texas Low Emission Diesel	NR	0.00	0.00
Locomotive: Texas Low Emission Diesel	NR	0.00	0.00
Total:		202.93	175.30

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Appendix 2 - Sheet 55

Summary Sheet: Cumulative 2011 to 2026 Total RFP Emissions Reductions (Chapter 4 table)

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Control Strategy Description	Source Category	NO _x Reductions	VOC Reductions
Chapter 117 NOX controls	Point	0.00	0.00
Chapter 115 Storage Tank Rule	Point	0.00	0.00
Coating / printing rules	Point	0.00	0.00
Portable fuel containers	Area	0.00	0.00
Federal Motor Vehicle Control Program (FMVCP)	OR	0.00	0.00
Reformulated Gasoline (RFG)/Low Sulfur Gasoline/Ultra Low Sulfur Diesel	OR	14.18	5.65
Inspection and Maintenance (I/M)	OR	1.36	4.08
On-road TxLED	OR	0.00	0.00
Tier I and II locomotive NOX standards	NR	0.22	0.00
Small non-road spark ignition (SI) engines (Phase I)	NR	-7.07	56.33
Heavy duty non-road engines	NR	0.04	5.48
Tiers 2 and 3 non-road diesel engines	NR	2.08	0.41
Small non-road SI engines (Phase II)	NR	5.06	52.62
Large non-road SI & recreational marine	NR	58.38	19.89
Non-road TxLED	NR	0.00	0.00
Non-road RFG	NR	0.00	0.32
Tier 4 non-road diesel engines	NR	72.80	15.26
Diesel recreational marine	NR	0.03	0.00
Small SI (Phase III)	NR	5.13	23.30
Chapter 117 NOX area source engine controls	Area	0.00	0.00
Drilling Rigs: Federal Engine Standards	NR	0.74	0.15
Commercial marine vessel engine certification standards and fuel programs	NR	68.46	0.42
Drilling Rigs: Texas Low Emission Diesel	NR	0.00	0.00
Locomotive: Texas Low Emission Diesel	NR	0.00	0.00
Total:		221.41	183.91

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Appendix 2 - Sheet 56

Summary Sheet: 2023 Point Source RFP Emissions Reductions

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty,

Emissions	NO _x	VOC
Existing Controlled Emissions (as of 2011)	105.53	79.17
RFP Point Source Reductions	0.00	0.00
RFP Post-2011 Controlled Emissions	105.53	79.17

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Summary Sheet: 2026 Point Source RFP Emissions Reductions

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery,
Waller

Emissions	NO _x	VOC
Existing Controlled Emissions (as of 2011)	105.53	79.17
RFP Point Source Reductions	0.00	0.00
RFP Post-2011 Controlled Emissions	105.53	79.17

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Appendix 2 - Sheet 58

Summary Sheet: 2023 Area Source RFP Emissions Reductions

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty,
Montgomery, Waller

Emissions	NO _x	VOC
Existing Controlled Emissions (as of 2011)	33.87	311.04
RFP Area Source Reductions	0.00	0.00
RFP Post-2011 Controlled Emissions	33.87	311.04

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Appendix 2 - Sheet 59

Summary Sheet: 2026 Area Source RFP Emissions Reductions

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty,
Montgomery, Waller

Emissions	NO _x	VOC
Existing Controlled Emissions (as of 2011)	34.40	317.47
RFP Area Source Reductions	0.00	0.00
RFP Post-2011 Controlled Emissions	34.40	317.47

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Appendix 2 - Sheet 60

Summary Sheet: 2023 Non-Road Source RFP Emissions Reductions

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty,
Montgomery, Waller

Emissions	NO _x	VOC
Uncontrolled	298.67	209.75
RFP Non-Road Source Reductions	181.61	164.13
RFP Post-2011 Controlled Emissions	117.06	45.62

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Appendix 2 - Sheet 61

Summary Sheet: 2026 Non-Road Source RFP Emissions Reductions

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Emissions	NO _x	VOC
Uncontrolled	312.36	221.27
RFP Non-Road Source Reductions	205.87	174.18
RFP Post-2011 Controlled Emissions	106.49	47.09

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Appendix 2 - Sheet 62

Summary Sheet: 2023 On-Road Source RFP Emissions Reductions

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Emissions	NO _x	VOC
Uncontrolled	82.87	45.03
RFP On-Road Source Reductions	21.32	11.17
RFP Post-2011 Controlled Emissions	61.55	33.86

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Appendix 2 - Sheet 63

Summary Sheet: 2026 On-Road Source RFP Emissions Reductions

HGB Eight-Hour Ozone Nonattainment Area

Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty,
Montgomery, Waller

Emissions	NO _x	VOC
Uncontrolled	66.47	38.70
RFP On-Road Source Reductions	15.54	9.73
RFP Post-2011 Controlled Emissions	50.93	28.97

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Appendix 2 - Sheet 64
Adjusted Base Year (ABY) Note
HGB Eight-Hour Ozone Nonattainment Area
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

For on-road EIs, ABY inventories can no longer be calculated with the release of the MOVES3 model in 2020 year.

To maintain the flow of the RFP demonstration, the following sheets used to calculate the ABY inventories remain but are hidden since the ABY can no longer be calculated with MOVES3.

<u>Sheet Number</u>	<u>Sheet Name</u>	<u>Sheet Description</u>
10	10 Calc NonCred Red	Calculation of RFP Non-Creditable Reductions from Pre-1990 FMVCP with MOVES3
22	22 Enter ABY On-road EI	Enter Adjusted Base Year (ABY) On-road EI, All Years
31	31 Calc ABY 2011	Calculation of 2011 ABY RFP Emission Inventory for the 8 Non-attainment Counties
32	32 Calc ABY 2017	Calculation of 2017 ABY RFP Emission Inventory for the 8 Non-attainment Counties
33	33 Calc ABY 2020	Calculation of 2020 ABY RFP Emission Inventory for the 8 Non-attainment Counties
34	34 Calc ABY 2023	Calculation of 2023 ABY RFP Emission Inventory for the 8 Non-attainment Counties
35	35 Calc ABY 2026	Calculation of 2026 ABY RFP Emission Inventory for the 8 Non-attainment Counties