

APPENDIX C

**REVISIONS TO APPENDIX 1, HGB REASONABLE FURTHER PROGRESS
DEMONSTRATION CALCULATIONS SPREADSHEET, ADOPTED MARCH 10, 2010**

Project Number 2012-002-SIP-NR

Adoption
April 23, 2013

Appendix C - Sheet 1

Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
 Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller
 Reasonable Further Progress (RFP) Demonstration Calculation Spreadsheet
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Appendix C - Sheet 2

2008 RFP Demonstration Analysis
Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area

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

2008 RFP Demonstration Analysis - To determine if the 2008 RFP requirements are met, the 2008 target level of emissions is compared to 2008 controlled forecast inventory. For the HGB nonattainment area, an average 3% reduction of volatile organic compounds (VOC) and/or nitrogen oxides (NO_x) per year out to an area's attainment year are required for the 1997 eight-hour ozone standard to meet an RFP demonstration. For details of the requirements, please refer to Section 7.3: *Target Emissions Levels and RFP Demonstration* of this SIP revision. The 2008 forecast inventory includes growth between the 2002 base year and the 2008 milestone year. The controlled forecast inventory has been reduced by subtracting the RFP control reductions from 2002 to 2008. If the 2008 controlled forecasted RFP emissions inventory (EI) is less than the 2008 RFP target level of emissions, the 2008 RFP requirement is satisfied.

Line #	Description	NO _x (tpd)	VOC (tpd)
Line 1	Uncontrolled Emissions Forecast With Growth	1321.24	1052.58
Line 2	Creditable RFP Control Reductions for 2008	678.70	169.44
Line 3	Controlled RFP Emissions Forecast (Line 1 minus Line 2)	642.54	883.14
Line 4	RFP Target Level of Emissions	816.10	923.82
Line 5	Excess (+) / Shortfall (-) (Line 4 minus Line 3)	173.56	40.68
Line 6	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 2002 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" sheet.
- 3) Excess emissions reductions (Line 5) 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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2009 to 2018 Contingency Demonstration for Reasonable Further Progress

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

Contingency Element Description	NO _x	VOC
2008 Adjusted Base Year (ABY) Emissions Inventory (EI)	983.26	933.15
Percent for 2008 Contingency Calculation (total of 3%)	2.50	0.50
2008 to 2009 Required Contingency Reductions (ABY EI x (Contingency Percent))	24.58	4.67
Control Reductions to meet contingency requirements		
Excess Reductions from 2008 RFP Demonstration	173.56	40.68
Subtract 2008 Motor Vehicle Emissions Budgets (MVEB) Safety Margin From Excess Reductions from 2018 RFP Demonstration	-23.81	-9.32
This row not used for current RFP	0.00	0.00
Total Contingency Reductions	149.75	31.36
Contingency Excess (+) or Shortfall (-)	125.17	26.69
Are contingency reductions greater than required contingency reduction?	Yes	Yes

Note: The 2008 to 2009 contingency reductions are held in reserve for all RFP milestone years in this RFP demonstration.

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2011 RFP Demonstration Analysis

Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area

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

2011 RFP Demonstration Analysis - To determine if the 2011 RFP requirements are met, the 2011 target level of emissions is compared to 2011 controlled forecast inventory. For the HGB nonattainment area, an average 3% reduction of volatile organic compounds (VOC) and/or nitrogen oxides (NO_x) per year out to an area's attainment year are required for the 1997 eight-hour ozone standard to meet an RFP demonstration. For details of the requirements, please refer to Section 7.3: *Target Emissions Levels and RFP Demonstration* of this SIP revision. The 2011 forecast inventory includes growth between the 2002 base year and the 2011 milestone year. The controlled forecast inventory has been reduced by subtracting the RFP control reductions from 2002 to 2011. If the 2011 controlled forecasted RFP emissions inventory (EI) is less than the 2011 RFP target level of emissions, the 2011 RFP requirement is satisfied.

Line #	Description	NO _x (tpd)	VOC (tpd)
Line 1	Uncontrolled Emissions Forecast With Growth	1432.28	1108.01
Line 2	Creditable RFP Control Reductions for 2008	678.70	169.44
Line 3	Creditable RFP Control Reductions 2008 to 2011	142.48	67.52
Line 4	Controlled RFP Emissions Forecast (Line 1 minus Line 2 minus Line 3)	611.10	871.05
Line 5	Amount of Creditable Reductions Reserved for 2009 to 2018 Contingency	24.58	4.67
Line 6	Controlled RFP Forecast Without Reductions Reserved for Contingency (Line 4 plus Line 5)	635.68	875.72
Line 7	RFP Target Level of Emissions	754.15	927.98
Line 8	Excess (+) / Shortfall (-) (Line 7 minus Line 6)	118.47	52.26
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 2002 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" sheet.
- 3) Excess emissions reductions (Line 5) 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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2014 RFP Demonstration Analysis

Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area

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

2014 RFP Demonstration Analysis - To determine if the 2014 RFP requirements are met, the 2014 target level of emissions is compared to 2014 controlled forecast inventory. For the HGB nonattainment area, an average 3% reduction of volatile organic compounds (VOC) and/or nitrogen oxides (NO_x) per year out to an area's attainment year are required for the 1997 eight-hour ozone standard to meet an RFP demonstration. For details of the requirements, please refer to Section 7.3: *Target Emissions Levels and RFP Demonstration* of this SIP revision. The 2014 forecast inventory includes growth between the 2002 base year and the 2014 milestone year. The controlled forecast inventory has been reduced by subtracting the RFP control reductions from 2002 to 2014. If the 2014 controlled forecasted RFP emissions inventory (EI) is less than the 2014 RFP target level of emissions, the 2014 RFP requirement is satisfied.

Line #	Description	NO _x (tpd)	VOC (tpd)
Line 1	Uncontrolled Emissions Forecast With Growth	1511.38	1146.34
Line 2	Creditable RFP Control Reductions for 2008, 2011	821.18	217.14
Line 3	Creditable RFP Control Reductions 2011 to 2014	142.91	47.70
Line 4	Controlled RFP Emissions Forecast (Line 1 minus Line 2 minus Line 3)	547.29	881.50
Line 5	Amount of Creditable Reductions Reserved for 2009 to 2018 Contingency	24.58	4.67
Line 6	Controlled RFP Forecast Without Reductions Reserved for Contingency (Line 4 plus Line 5)	571.87	886.17
Line 7	RFP Target Level of Emissions	667.70	919.19
Line 8	Excess (+) / Shortfall (-) (Line 7 minus Line 6)	95.83	33.02
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 2002 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" sheet.
- 3) Excess emissions reductions (Line 5) 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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2017 RFP Demonstration Analysis

Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area

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

2017 RFP Demonstration Analysis - To determine if the 2017 RFP requirements are met the, 2017 target level of emissions is compared to 2017 controlled forecast inventory. For the HGB nonattainment area, an average 3% reduction of volatile organic compounds (VOC) and/or nitrogen oxides (NO_x) per year out to an area's attainment year are required for the 1997 eight-hour ozone standard to meet an RFP demonstration. For details of the requirements, please refer to Section 7.3: *Target Emissions Levels and RFP Demonstration* of this SIP revision. The 2017 forecast inventory includes growth between the 2002 base year and the 2017 milestone year. The controlled forecast inventory has been reduced by subtracting the RFP control reductions from 2002 to 2017. If the 2017 controlled forecasted RFP emissions inventory (EI) is less than the 2017 RFP target level of emissions, the 2017 RFP requirement is satisfied.

Line #	Description	NO _x (tpd)	VOC (tpd)
Line 1	Uncontrolled Emissions Forecast With Growth	1601.38	1194.21
Line 2	Creditable RFP Control Reductions for 2008, 2011, 2014	964.09	264.84
Line 3	Creditable RFP Control Reductions 2014 to 2017	133.49	37.63
Line 4	Controlled RFP Emissions Forecast (Line 1 minus Line 2 minus Line 3)	503.80	891.74
Line 5	Amount of Creditable Reductions Reserved for 2009 to 2018 Contingency	24.58	4.67
Line 6	Controlled RFP Forecast Without Reductions Reserved for Contingency (Line 4 plus Line 5)	528.38	896.40
Line 7	RFP Target Level of Emissions	580.60	912.54
Line 8	Excess (+) / Shortfall (-) (Line 7 minus Line 6)	52.22	16.14
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 2002 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" sheet.

3) Excess emissions reductions (Line 5) 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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2018 RFP Demonstration Analysis
Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area

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

2018 RFP Demonstration Analysis - To determine if the 2018 RFP requirements are met, the 2018 target level of emissions is compared to 2018 controlled forecast inventory. For the HGB nonattainment area, an average 3% reduction of volatile organic compounds (VOC) and/or nitrogen oxides (NO_x) per year out to an area's attainment year are required for the 1997 eight-hour ozone standard to meet an RFP demonstration. For details of the requirements, please refer to Section 7.3: *Target Emissions Levels and RFP Demonstration* of this SIP revision. The 2018 forecast inventory includes growth between the 2002 base year and the 2018 milestone year. The controlled forecast inventory has been reduced by subtracting the RFP control reductions from 2002 to 2018. If the 2018 controlled forecasted RFP emissions inventory (EI) is less than the 2018 RFP target level of emissions, the 2018 RFP requirement is satisfied.

Line #	Description	NO _x (tpd)	VOC (tpd)
Line 1	Uncontrolled Emissions Forecast With Growth	1636.21	1210.28
Line 2	Creditable RFP Control Reductions for 2008, 2011, 2014, 2017	1097.58	302.47
Line 3	Creditable RFP Control Reductions 2017 to 2018	41.05	10.86
Line 4	Controlled RFP Emissions Forecast (Line 1 minus Line 2 minus Line 3)	497.58	896.95
Line 5	Amount of Creditable Reductions Reserved for 2009 to 2018 Contingency	24.58	4.67
Line 6	Controlled RFP Forecast Without Reductions Reserved for Contingency (Line 4 plus Line 5)	522.17	901.62
Line 7	RFP Target Level of Emissions	555.22	907.50
Line 8	Excess (+) / Shortfall (-) (Line 7 minus Line 6)	33.05	5.89
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 2002 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" sheet.
- 3) Excess emissions reductions (Line 5) 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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Appendix C - Sheet 8

2019 Contingency Demonstration for Reasonable Further Progress

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

Contingency Element Description	NO _x	VOC
2018 Adjusted Base Year (ABY) Emissions Inventory (EI)	1003.92	935.59
Percent for Contingency Calculation (total of 3%)	2.50	0.50
2018 to 2019 Required Contingency Reductions (ABY EI x (Contingency Percent))	25.10	4.68
Control Reductions to meet contingency requirements		
Excess Reductions from 2018 RFP Demonstration	33.05	5.89
Subtract 2018 Motor Vehicle Emissions Budget (MVEB) Safety Margin From Excess Reductions from 2018 RFP Demonstration	-11.00	-5.18
Federal Reformulated Gasoline (RFG)	6.80	-0.25
Federal Motor Vehicle Control Program (FMVCP)	22.28	9.50
Inspection and Maintenance Program (I/M)	-0.67	-0.26
Texas Low Emission Diesel (TxLED)	-0.20	0.00
Tier I and II Locomotive NOX Standards	0.68	0.01
Small Non-Road Spark Ignition (SI) Phase I	-0.03	0.24
Heavy Duty Non-road Engines	0.30	0.32
Tier 2, and 3 Non-road Diesel Engines	0.72	0.11
Small Non-road SI Engines (Phase II)	0.04	0.43
Large Non-road SI & Recreational Marine	0.95	0.62
Non-road Texas Low Emission Diesel	0.00	0.00
Non-road Reformulated Gasoline	0.00	0.03
Tier 4 Diesel Rule	1.58	0.06
Federal Marine Diesel Tier 2	0.55	0.02
This row not used for current RFP	0.00	0.00
This row not used for current RFP	0.00	0.00
This row not used for current RFP	0.00	0.00
This row not used for current RFP	0.00	0.00
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This row not used for current RFP	0.00	0.00
This row not used for current RFP	0.00	0.00
This row not used for current RFP	0.00	0.00
Total Contingency Reductions	55.05	11.53
Contingency Excess (+) or Shortfall (-)	29.95	6.85
Are contingency reductions greater than required contingency reduction?	Yes	Yes

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2019 Contingency Demonstration for 2018 Attainment

Summary 2019 Contingency for 2018 Attainment Demonstration

Contingency Element Description	NO _x	VOC
2018 Adjusted Base Year (ABY) Emissions Inventory (EI)	1003.92	935.59
Percent for Contingency Calculation (total of 3%)	2.00	1.00
2018 to 2019 Required Contingency Reductions (ABY EI x (Contingency Percent))	20.08	9.36
Control Reductions to meet contingency requirements		
Excess Reductions from 2018 Attainment Demonstration (AD)	0.00	0.00
Subtract 2018 AD Motor Vehicle Emissions Budget (MVEB) Safety Margin From Excess Reductions from 2018 AD	0.00	0.00
Federal On-road Mobile New Vehicle Certification Standards	6.87	0.31
Federal Reformulated Gasoline (RFG) On-road	22.28	9.50
State Inspection and Maintenance (I/M) and Anti Tampering Programs (ATP) (Brazoria, Fort Bend, Galveston, Harris & Montgomery Counties)	0.01	-0.25
On-road Texas Low Emission Diesel	0.72	0.11
Texas Emissions Reduction Plan (TERP)	0.04	0.43
Local Control Measures (Transportation Control Measure (TCM), Voluntary Mobile Emissions Reductions Program (VMEP))	0.95	0.62
Federal Non-road Mobile New Vehicle Certification Standards	2.13	0.08
Non-road RFG	0.00	0.00
Non-road Texas Low Emission Diesel	0.00	0.00
Federal Locomotive Standards	0.00	0.03
Federal Marine Standards	0.00	0.00
Total AD Contingency Reductions	33.00	10.83
Contingency Excess (+) or Shortfall (-)	12.92	1.47

If changes are made to the enter reductions page, please ensure the control reduction summary values above are consistent with the table below. The enter reductions page allows for the control reduction for a row to change. The table above adds particular rows from below.

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

Contingency Element Description	NOx	VOC
2018 ABY EI	1003.92	935.59
Percent for Contingency Calculation (total of 3%)	2.00	1.00
2018 to 2019 Required Contingency Reductions (ABY EI x (Contingency Percent))	20.08	9.36
Control Reductions to meet contingency requirements		
Excess Reductions from 2018 AD	0.00	0.00
Subtract 2018 AD MVEB Safety Margin From Excess Reductions from 2018 AD	0.00	0.00
Federal Reformulated Gasoline (RFG)	6.80	-0.25
Federal Motor Vehicle Control Program (FMVCP)	22.28	9.50
Inspection and Maintenance Program (I/M)	-0.67	-0.26
Texas Low Emission Diesel (TxLED)	-0.20	0.00
Tier I and II Locomotive NOX Standards	0.68	0.01
Small Non-Road Spark Ignition (SI) Phase I	-0.03	0.24
Heavy Duty Non-road Engines	0.30	0.32
Tier 2, and 3 Non-road Diesel Engines	0.72	0.11
Small Non-road SI Engines (Phase II)	0.04	0.43
Large Non-road SI & Recreational Marine	0.95	0.62
Non-road Texas Low Emission Diesel	0.00	0.00
Non-road Reformulated Gasoline	0.00	0.03
Tier 4 Diesel Rule	1.58	0.06
Federal Marine Diesel Tier 2	0.55	0.02
This row not used for current RFP	0.00	0.00
This row not used for current RFP	0.00	0.00
This row not used for current RFP	0.00	0.00
This row not used for current RFP	0.00	0.00
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This row not used for current RFP	0.00	0.00
This row not used for current RFP	0.00	0.00
This row not used for current RFP	0.00	0.00
This row not used for current RFP	0.00	0.00
Total AD Contingency Reductions	33.00	10.83
Contingency Excess (+) or Shortfall (-)	12.92	1.47

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Appendix C - Sheet 10

Calculations: 2008 Motor Vehicle Emissions Budget (MVEB)

Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x

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

Summary 2008 MVEB

Description	NO _x (tpd)	VOC (tpd)
Uncontrolled On-road Mobile Source Emission Inventory	653.33	233.94
Total On-road Mobile Source RFP Control Reductions	415.19	140.76
On-road Mobile Controlled Inventory	238.14	93.18
Transportation Conformity Safety Margin	23.81	9.32
Excess emissions reduction for 2008	173.56	40.68
Is excess emissions enough for safety margin?	yes	yes
MVEB with Safety Margin	261.95	102.50

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

Creditable Reductions Control Strategy	Control Used for RFP Demonstration?	On-road Mobile Source Control?	Total 2002 - 2008 On-road Mobile NO _x Emissions Reductions (tpd)	Total 2002 - 2008 On-road Mobile VOC Emissions Reductions (tpd)
Mass Emissions Cap and Trade Program (MECT)	Yes	No	0	0
Tank Landing Loss Rule	Yes	No	0	0
Portable Fuel Containers	Yes	No	0	0
Federal Reformulated Gasoline (RFG)	Yes	Yes	150.64	22.03
Federal Motor Vehicle Control Program (FMVCP)	Yes	Yes	241.17	109.17
Inspection and Maintenance Program (I/M)	Yes	Yes	17.35	9.56
Texas Low Emission Diesel (TxLED)	Yes	Yes	6.03	0
Tier I and II Locomotive NOX Standards	Yes	No	0	0
Small Non-Road Spark Ignition (SI) Phase I	Yes	No	0	0
Heavy Duty Non-road Engines	Yes	No	0	0
Tier 2, and 3 Non-road Diesel Engines	Yes	No	0	0
Small Non-road SI Engines (Phase II)	Yes	No	0	0
Large Non-road SI & Recreational Marine	Yes	No	0	0
Non-road Texas Low Emission Diesel	Yes	No	0	0
Non-road Reformulated Gasoline	Yes	No	0	0
Tier 4 Diesel Rule	Yes	No	0	0
Federal Marine Diesel Tier 2	Yes	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
Total On-road Mobile Source RFP Control Reductions			415.19	140.76

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Appendix C - Sheet 11

Calculations: 2011 Motor Vehicle Emissions Budget (MVEB)
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NOx
Eight Non-attainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Summary 2011 MVEB

Description	NO _x (tpd)	VOC (tpd)
Uncontrolled On-road Mobile Source Emission Inventory	744.52	266.44
Total On-road Mobile Source RFP Control Reductions	530.96	181.39
On-road Mobile Controlled Inventory	213.56	85.05
Transportation Conformity Safety Margin	21.36	8.51
Excess emissions reduction for 2011	118.47	52.26
Is excess emissions enough for safety margin?	yes	yes
MVEB with Safety Margin	234.92	93.56

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

Creditable Reductions Control Strategy	Control Used for RFP Demonstration?	On-road Mobile Source Control?	Total 2002 - 2011 On-road Mobile NO _x Emissions Reductions (tpd)	Total 2002 - 2011 On-road Mobile VOC Emissions Reductions (tpd)
Mass Emissions Cap and Trade Program (MECT)	Yes	No	0	0
Tank Landing Loss Rule	Yes	No	0	0
Portable Fuel Containers	Yes	No	0	0
Federal Reformulated Gasoline (RFG)	Yes	Yes	189.54	22.79
Federal Motor Vehicle Control Program (FMVCP)	Yes	Yes	319.72	148.83
Inspection and Maintenance Program (I/M)	Yes	Yes	16.62	9.77
Texas Low Emission Diesel (TxLED)	Yes	Yes	5.08	0
Tier I and II Locomotive NOX Standards	Yes	No	0	0
Small Non-Road Spark Ignition (SI) Phase I	Yes	No	0	0
Heavy Duty Non-road Engines	Yes	No	0	0
Tier 2, and 3 Non-road Diesel Engines	Yes	No	0	0
Small Non-road SI Engines (Phase II)	Yes	No	0	0
Large Non-road SI & Recreational Marine	Yes	No	0	0
Non-road Texas Low Emission Diesel	Yes	No	0	0
Non-road Reformulated Gasoline	Yes	No	0	0
Tier 4 Diesel Rule	Yes	No	0	0
Federal Marine Diesel Tier 2	Yes	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
Total On-road Mobile Source RFP Control Reductions			530.96	181.39

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Appendix C - Sheet 12

Calculations: 2014 Motor Vehicle Emissions Budget (MVEB)
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x

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

Summary 2014 MVEB

Description	NO _x (tpd)	VOC (tpd)
Uncontrolled On-road Mobile Source Emission Inventory	793.84	279.29
Total On-road Mobile Source RFP Control Reductions	637.81	214.24
On-road Mobile Controlled Inventory	156.03	65.05
Transportation Conformity Safety Margin	15.60	6.51
Excess emissions reduction for 2014	95.83	33.02
Is excess emissions enough for safety margin?	yes	yes
MVEB with Safety Margin	171.63	71.56

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

Creditable Reductions Control Strategy	Control Used for RFP Demonstration?	On-road Mobile Source Control?	Total 2002 - 2008 On-road Mobile NO _x Emissions Reductions (tpd)	Total 2002 - 2008 On-road Mobile VOC Emissions Reductions (tpd)
Mass Emissions Cap and Trade Program (MECT)	Yes	No	0	0
Tank Landing Loss Rule	Yes	No	0	0
Portable Fuel Containers	Yes	No	0	0
Federal Reformulated Gasoline (RFG)	Yes	Yes	213.44	17.27
Federal Motor Vehicle Control Program (FMVCP)	Yes	Yes	409.05	188.98
Inspection and Maintenance Program (I/M)	Yes	Yes	11.8	7.99
Texas Low Emission Diesel (TxLED)	Yes	Yes	3.52	0
Tier I and II Locomotive NO _x Standards	Yes	No	0	0
Small Non-Road Spark Ignition (SI) Phase I	Yes	No	0	0
Heavy Duty Non-road Engines	Yes	No	0	0
Tier 2, and 3 Non-road Diesel Engines	Yes	No	0	0
Small Non-road SI Engines (Phase II)	Yes	No	0	0
Large Non-road SI & Recreational Marine	Yes	No	0	0
Non-road Texas Low Emission Diesel	Yes	No	0	0
Non-road Reformulated Gasoline	Yes	No	0	0
Tier 4 Diesel Rule	Yes	No	0	0
Federal Marine Diesel Tier 2	Yes	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
Total On-road Mobile Source RFP Control Reductions			637.81	214.24

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Appendix C - Sheet 13

Calculations: 2017 Motor Vehicle Emissions Budget (MVEB)
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x

Eight Non-attainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Summary 2017 MVEB

Description	NO _x (tpd)	VOC (tpd)
Uncontrolled On-road Mobile Source Emission Inventory	850.60	298.20
Total On-road Mobile Source RFP Control Reductions	732.42	243.87
On-road Mobile Controlled Inventory	118.18	54.33
Transportation Conformity Safety Margin	11.82	5.43
Excess emissions reduction for 2017	52.22	16.14
Is excess emissions enough for safety margin?	yes	yes
MVEB with Safety Margin	130.00	59.76

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

Creditable Reductions Control Strategy	Control Used for RFP Demonstration?	On-road Mobile Source Control?	Total 2002 - 2008 On-road Mobile NO _x Emissions Reductions (tpd)	Total 2002 - 2008 On-road Mobile VOC Emissions Reductions (tpd)
Mass Emissions Cap and Trade Program (MECT)	Yes	No	0	0
Tank Landing Loss Rule	Yes	No	0	0
Portable Fuel Containers	Yes	No	0	0
Federal Reformulated Gasoline (RFG)	Yes	Yes	235.00	14.12
Federal Motor Vehicle Control Program (FMVCP)	Yes	Yes	486.84	222.89
Inspection and Maintenance Program (I/M)	Yes	Yes	8.03	6.86
Texas Low Emission Diesel (TxLED)	Yes	Yes	2.55	0.00
Tier I and II Locomotive NOX Standards	Yes	No	0.00	0.00
Small Non-Road Spark Ignition (SI) Phase I	Yes	No	0.00	0.00
Heavy Duty Non-road Engines	Yes	No	0.00	0.00
Tier 2, and 3 Non-road Diesel Engines	Yes	No	0.00	0.00
Small Non-road SI Engines (Phase II)	Yes	No	0	0
Large Non-road SI & Recreational Marine	Yes	No	0	0
Non-road Texas Low Emission Diesel	Yes	No	0	0
Non-road Reformulated Gasoline	Yes	No	0	0
Tier 4 Diesel Rule	Yes	No	0	0
Federal Marine Diesel Tier 2	Yes	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
Total On-road Mobile Source RFP Control Reductions			732.42	243.87

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[Go To Sheet 18: Enter % RFP Cont & Conf](#)

[Go To Sheet 30: Enter Reductions 2017](#)

Appendix C - Sheet 14

Calculations: 2018 Motor Vehicle Emissions Budget (MVEB)
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x
Eight Non-attainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Summary 2018 MVEB

Description	NO _x (tpd)	VOC (tpd)
Uncontrolled On-road Mobile Source Emission Inventory	870.89	304.27
Total On-road Mobile Source RFP Control Reductions	760.90	252.43
On-road Mobile Controlled Inventory	109.99	51.84
Transportation Conformity Safety Margin	11.00	5.18
Excess emissions reduction for 2018	33.05	5.89
Is excess emissions enough for safety margin?	yes	yes
MVEB with Safety Margin	120.99	57.02

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

Creditable Reductions Control Strategy	Control Used for RFP Demonstration?	On-road Mobile Source Control?	Total 2002 - 2018 On-road Mobile NOx Emissions Reductions (tpd)	Total 2002 - 2018 On-road Mobile VOC Emissions Reductions (tpd)
Mass Emissions Cap and Trade Program (MECT)	Yes	No	0	0
Tank Landing Loss Rule	Yes	No	0	0
Portable Fuel Containers	Yes	No	0	0
Federal Reformulated Gasoline (RFG)	Yes	Yes	241.29	13.48
Federal Motor Vehicle Control Program (FMVCP)	Yes	Yes	510.15	232.44
Inspection and Maintenance Program (I/M)	Yes	Yes	7.10	6.51
Texas Low Emission Diesel (TxLED)	Yes	Yes	2.36	0.00
Tier I and II Locomotive NOx Standards	Yes	No	0.00	0.00
Small Non-Road Spark Ignition (SI) Phase I	Yes	No	0.00	0.00
Heavy Duty Non-road Engines	Yes	No	0.00	0.00
Tier 2, and 3 Non-road Diesel Engines	Yes	No	0.00	0.00
Small Non-road SI Engines (Phase II)	Yes	No	0	0
Large Non-road SI & Recreational Marine	Yes	No	0	0
Non-road Texas Low Emission Diesel	Yes	No	0	0
Non-road Reformulated Gasoline	Yes	No	0	0
Tier 4 Diesel Rule	Yes	No	0	0
Federal Marine Diesel Tier 2	Yes	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
This row not used for current RFP	No	No	0	0
Total On-road Mobile Source RFP Control Reductions			760.9	252.43

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RFP Non-Creditable Reductions Calculations
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Calculation of Non-creditable NO_x and VOC Reductions

RFP Analysis Year	On-road Mobile ABY EI		Non-creditable Fleet Turn Over Reductions		Non-Creditable Reduction Description
	NO _x	VOC	NO _x	VOC	
2002	552.30	205.76	N/A	N/A	
2008	578.29	205.89	-25.99	-0.13	Pre-1990 CAA Fleet Turn Over Reduction 2002-2008
2011	601.92	214.76	-23.63	-8.87	Pre-1990 CAA Fleet Turn Over Reduction 2008-2011
2014	600.98	210.66	0.94	4.10	Pre-1990 CAA Fleet Turn Over Reduction 2011-2014
2017	599.24	208.69	1.74	1.97	Pre-1990 CAA Fleet Turn Over Reduction 2014-2017
2018	598.95	208.33	0.29	0.36	Pre-1990 CAA Fleet Turn Over Reduction 2017-2018

Notes:

1) Non-Creditable Fleet Turn Over Corrections - The reductions due to the pre-1990 Federal Motor Vehicle Control Program (FMVCP) for on-road mobile sources are not creditable toward the reasonable further progress (RFP) requirements. The non-creditable reductions for each RFP milestone year are the difference between the on-road mobile adjusted base year (ABY) emissions inventory (EI) for each RFP milestone year and the on-road mobile 2002 RFP ABY EI. Since the pre-1990 FMVCP fleet turnover corrections are cumulative in the MOBILE6 model, the non-creditable reductions from previous milestone years must be subtracted from the current milestone year to obtain the non-creditable reductions between milestone years. The FMVCP non-creditable reductions are used to calculate the target value for each RFP milestone year.

2) ABY Inventories - The on-road mobile adjusted base year inventories for each milestone/attainment year are calculated using 2002 vehicle miles travelled (VMT) and MOBILE6 emission factors for each RFP analysis year with only the effects of pre-1990 Federal Clean Air Act (FCAA) controls turned on. The pre-1990 FCAA controls include the 1992 Low Reid Vapor Pressure (RVP) Gasoline control and the pre-1990 on-road mobile source FMVCP controls.

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Appendix C - Sheet 16

Quantify the Reductions to Meet the 3% Per Year And Contingency Requirements

Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area

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

3% per year Reductions - The Federal Clean Air Act (FCAA) mandates that a 3% per year volatile organic compounds (VOC) reduction, net of growth, occur between 2002 and the attainment year. The reductions must be demonstrated for the six-year period from 2002 to 2008, and every three years after 2008 until the attainment year, 2011, 2014, 2017 and 2018. Nitrogen oxides (NO_x) reductions may be substituted for VOC reductions. An additional 3% reduction must be demonstrated as contingency measures for the one-year period following the attainment year, 2019. The division of the percent reductions between VOC and NO_x are entered in the "Enter % for RFP Cont & Conf SM" sheet.

Calculation of Required 3% Per Year NO_x and VOC Reductions

RFP Analysis Year	Total Percent Reduction Requirement	Percent NO _x	Percent VOC	RFP ABY EI NO _x (tpd)	RFP ABY EI VOC (tpd)	Required Reductions NO _x (tpd)	Required Reductions VOC (tpd)
2002	N/A	N/A	N/A	957.27	933.02	N/A	N/A
2008	18.0	17.0	1.0	983.26	933.15	167.15	9.33
2011	9.0	8.5	0.5	1006.89	942.02	85.59	4.71
2014	9.0	8.5	0.5	1005.95	937.92	85.51	4.69
2017	9.0	8.5	0.5	1004.21	935.95	85.36	4.68
2018	3.0	2.5	0.5	1003.92	935.59	25.10	4.68
2019	3.0	2.5	0.5	1003.92	935.59	25.10	4.68

Notes:

1) The adjusted base year (ABY) emissions inventory (EI) is the Base Year Emissions minus the non-creditable on-road mobile reductions. It is calculated by adding the ABY 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.

2) On-road Mobile ABY Inventories - The on-road mobile ABY EI for each milestone/attainment year are calculated using 2002 vehicle miles travelled (VMT) and MOBILE6 emission factors for each reasonable further progress (RFP) analysis year with only the effects of pre-1990 FCAA controls turned on. The pre-1990 FCAA controls include the 1992 Low Reid Vapor Pressure (RVP) Gasoline control and the pre-1990 on-road mobile source Federal Motor Vehicle Control Program (FMVCP) controls. The on-road mobile ABY EI is equal to the on-road mobile ABY EI minus the non-creditable FMVCP reductions.

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Appendix C - Sheet 17

**Target Calculations: 2008 RFP Target Level of NO_x and VOC Emissions
Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris,
Liberty, Montgomery, Waller**

Post-2002 target level of nitrogen oxides (NO_x) emissions - The NO_x target level is calculated by subtracting the reductions necessary to meet the combined 3% per year combined NO_x and volatile organic compounds (VOC) reduction requirement and the non-creditable fleet (Federal Motor Vehicle Control Program (FMVCP)/Low Reid Vapor Recovery (RVP) Gasoline) reductions from the previous milestone/attainment year target level.

RFP Post-2002 Target Level of NO_x Emissions				
RFP Milestone Year	Previous Target	FMVCP Non-Creditable Reduction	Post-2002 Percent Reduction Requirement NO_x (tpd)	NO_x Target (tpd)
2002 Base Year	N/A	N/A	N/A	957.27
2008	957.27	-25.99	167.15	816.10
2011	816.10	-23.63	85.59	754.15
2014	754.15	0.94	85.51	667.70
2017	667.70	1.74	85.36	580.60
2018	580.60	0.29	25.10	555.22

Post-2002 target level of VOC emissions - The VOC target level is calculated by subtracting the reductions necessary to meet the combined 3% per year combined NO_x and VOC reduction requirement and the non-creditable fleet (FMVCP/RVP) reductions from the previous milestone/attainment year target level.

RFP Post-2002 Target Level of VOC Emissions				
RFP Milestone Year	Previous Target	FMVCP Non-Creditable Reduction	Post-2002 Percent Reduction Requirement VOC (tpd)	VOC Target (tpd)
2002 Base Year	N/A	N/A	N/A	933.02
2008	933.02	-0.13	9.33	923.82
2011	923.82	-8.87	4.71	927.98
2014	927.98	4.10	4.69	919.19
2017	919.19	1.97	4.68	912.54
2018	912.54	0.36	4.68	907.50

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Appendix C - Sheet 18

**Enter RFP NO_x and VOC Percentage Reductions, Contingency Percents and Safety Margin
Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery,**

A 3% per year reduction is required for HGB for every year from the 2002 base year until the attainment year. The reduction is required to be demonstrated six years after the base year, 2008, every three years after that year, 2011, 2014, and 2017, and the attainment year 2018. The total reduction for 2008 is 18% (3% times 6). The total reduction for 2011, 2014 and 2017 is 9% (3% times 3). The reduction required for 2018 is 3% (3% times 1). What percentage of nitrogen oxides (NO_x) and volatile organic compounds (VOC) reductions will be used to demonstrate reasonable further progress (RFP) for 2008, 2011, 2014, 2017, and 2018? The analyst only needs to input the NO_x percent. The VOC percent will be calculated automatically based upon the total required and the percent from NO_x.

RFP NO_x and VOC Percent Reductions for Milestone and Attainment Years			
RFP Milestone Year	NO _x %	VOC %	Total Percent
2008	17	1	18
2011	8.5	0.5	9
2014	8.5	0.5	9
2017	8.5	0.5	9
2018	2.5	0.5	3

A 3% 2008 to 2009 and 2018 to 2019 Contingency Measures Reduction is required. Input only the percent of the reductions that will be from NO_x. The VOC value will be calculated automatically as 3 minus the NO_x percent. For 2018 to 2019, a 3% contingency is also required for the attainment demonstration (AD).

RFP and AD NO_x and VOC Percent Reductions for 2009 and 2019 Contingency			
Contingency Year	NO _x %	VOC %	Total Percent
RFP 2008 to 2009	2.5	0.5	3
RFP 2018 to 2019	2.5	0.5	3
AD 2018 to 2019	2	1	3

If there are excess RFP control reductions, a transportation conformity safety margin is allowed. The safety margin amount must be less than or equal to the excess reductions. Entering a percent safety margin below will update the Motor Vehicle Emissions Budget (MVEB) calculation to include the percent safety margin entered. The amount of the safety margin will automatically be checked to verify it is less than the excess emissions. If not, a "check safety margin" will appear in the MVEB calculation box.

RFP Milestone Year	Conformity Safety Margin NO _x %	Conformity Safety Margin VOC %
2008	10	10
2011	10	10
2014	10	10
2017	10	10
2018	10	10

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Appendix C - Sheet 19

Enter Aircraft Emission Inventory
 Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
 Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

RFP Analysis Year	NO _x				VOC			
	Uncontrolled	Controlled	Total Reduction	Percent Reduction	Uncontrolled	Controlled	Total Reduction	Percent Reduction
2002	5.560	5.560	0.000	0.0	1.590	1.590	0.000	0.0
2008	8.203	8.203	0.000	0.0	1.940	1.940	0.000	0.0
2011	8.890	8.890	0.000	0.0	2.093	2.093	0.000	0.0
2014	10.178	10.178	0.000	0.0	2.266	2.266	0.000	0.0
2017	11.060	11.060	0.000	0.0	2.233	2.233	0.000	0.0
2018	11.471	11.471	0.000	0.0	2.308	2.308	0.000	0.0

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Appendix C - Sheet 20

Enter Area Source Emission Inventory
 Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
 Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

RFP Analysis Year	NO _x				VOC			
	Uncontrolled	Controlled	Total Reduction	Percent Reduction	Uncontrolled	Controlled	Total Reduction	Percent Reduction
2002	89.110	89.110	0.000	0.0	407.610	407.610	0.000	0.0
2008	89.630	89.630	0.000	0.0	371.820	371.820	0.000	0.0
2011	93.900	93.900	0.000	0.0	382.720	379.040	3.680	1.0
2014	96.010	96.010	0.000	0.0	393.070	383.420	9.650	2.5
2017	98.230	98.230	0.000	0.0	404.840	394.740	10.100	2.5
2018	99.380	99.380	0.000	0.0	408.820	398.570	10.250	2.5

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Appendix C - Sheet 21

**Enter Biogenics Emission Inventory
Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller**

RFP Analysis Year	NO _x				VOC			
	Uncontrolled	Controlled	Total Reduction	Percent Reduction	Uncontrolled	Controlled	Total Reduction	Percent Reduction
2002	17.97	N/A	N/A	N/A	962.35	N/A	N/A	N/A

The biogenics emissions are subtracted from the 2002 reasonable further progress (RFP) base year inventory as the first step of the RFP demonstration calculations. That is the only step for which biogenic emissions are required. Therefore, only the 2002 base year inventory for biogenics is entered on this page.

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Appendix C - Sheet 22

Enter Commercial Marine Vessels (CMV) Emission Inventory
Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

RFP Analysis Year	NO _x				VOC			
	Uncontrolled	Controlled	Total Reduction	Percent Reduction	Uncontrolled	Controlled	Total Reduction	Percent Reduction
2002	28.01	27.63	0.38	1.4	1.08	1.06	0.02	1.9
2008	30.97	29.01	1.96	6.3	1.20	1.12	0.08	6.7
2011	32.45	29.22	3.23	10.0	1.25	1.13	0.12	9.6
2014	33.93	29.20	4.73	13.9	1.31	1.13	0.18	13.7
2017	35.41	29.20	6.21	17.5	1.37	1.13	0.24	17.5
2018	35.90	29.00	6.90	19.2	1.39	1.13	0.26	18.7

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Appendix C - Sheet 23

Enter Oil and Gas Exploration Drilling Rigs Emission Inventory
 Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
 Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

RFP Analysis Year	NO _x				VOC			
	Uncontrolled	Controlled	Total Reduction	Percent Reduction	Uncontrolled	Controlled	Total Reduction	Percent Reduction
2002	9.409	9.409	0.000	0.0	0.251	0.251	0.000	0.0
2008	6.862	6.862	0.000	0.0	0.183	0.183	0.000	0.0
2011	6.793	6.793	0.000	0.0	0.181	0.181	0.000	0.0
2014	6.743	6.743	0.000	0.0	0.179	0.179	0.000	0.0
2017	6.710	6.710	0.000	0.0	0.179	0.179	0.000	0.0
2018	6.694	6.694	0.000	0.0	0.178	0.178	0.000	0.0

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Appendix C - Sheet 24

Enter Ground Support Equipment (GSE) Emission Inventory
 Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
 Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

RFP Analysis Year	NO _x				VOC			
	Uncontrolled	Controlled	Total Reduction	Percent Reduction	Uncontrolled	Controlled	Total Reduction	Percent Reduction
2002	0.790	0.790	0.000	0.0	0.090	0.090	0.000	0.0
2008	1.701	1.701	0.000	0.0	0.683	0.683	0.000	0.0
2011	1.539	1.539	0.000	0.0	0.614	0.614	0.000	0.0
2014	1.351	1.351	0.000	0.0	0.540	0.540	0.000	0.0
2017	1.057	1.057	0.000	0.0	0.410	0.410	0.000	0.0
2018	0.844	0.844	0.000	0.0	0.296	0.296	0.000	0.0

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Appendix C - Sheet 25

Enter Locomotive Emission Inventory
 Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
 Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

RFP Analysis Year	NO _x				VOC			
	Uncontrolled	Controlled	Total Reduction	Percent Reduction	Uncontrolled	Controlled	Total Reduction	Percent Reduction
2002	34.58	34.58	0.00	0.0	2.28	2.28	0.00	0.0
2008	49.60	37.86	11.74	23.7	2.56	2.29	0.27	10.5
2011	49.17	36.42	12.75	25.9	2.59	2.25	0.34	13.1
2014	51.19	37.10	14.09	27.5	2.71	2.28	0.43	15.9
2017	52.42	37.18	15.24	29.1	2.85	2.32	0.53	18.6
2018	54.23	38.19	16.04	29.6	2.94	2.35	0.59	20.1

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Appendix C - Sheet 26

Enter NONROAD Model Categories Emission Inventory
 Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
 Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

RFP Analysis Year	NO _x				VOC			
	Uncontrolled	Controlled	Total Reduction	Percent Reduction	Uncontrolled	Controlled	Total Reduction	Percent Reduction
2002	88.630	79.01	9.62	10.9	94.8634	79.0500	15.8134	16.7
2008	105.384	65.80	39.58	37.6	107.1167	63.0100	44.1067	41.2
2011	111.166	55.97	55.20	49.7	113.3734	57.7600	55.6134	49.1
2014	117.089	43.88	73.21	62.5	119.2749	55.0200	64.2549	53.9
2017	124.330	35.94	88.39	71.1	125.3390	53.7800	71.5590	57.1
2018	128.114	33.68	94.43	73.7	127.1821	53.5800	73.6021	57.9

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Appendix C - Sheet 27

Enter On-Road Mobile Emission Inventory
Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

RFP Analysis Year	NO _x				VOC			
	Uncontrolled	Controlled	Total Reduction	Percent Reduction	Uncontrolled	Controlled	Total Reduction	Percent Reduction
2002	552.30	371.89	180.41	32.67	205.76	124.47	81.29	39.51
2008	653.33	238.13	415.20	63.55	233.94	92.91	141.03	60.28
2011	744.52	213.57	530.95	71.31	266.44	85.05	181.39	68.08
2014	793.84	156.03	637.81	80.34	279.29	65.04	214.25	76.71
2017	850.60	118.17	732.43	86.11	298.20	54.34	243.86	81.78
2018	870.89	109.98	760.91	87.37	304.27	51.84	252.43	82.96

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Appendix C - Sheet 28

Enter Adjusted Base Year (ABY) On-Road Mobile Emission Inventory
Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend,
Galveston, Harris, Liberty, Montgomery, Waller

RFP Analysis Year	NO _x	VOC
	ABY	ABY
2002	552.30	205.76
2008	578.29	205.89
2011	601.92	214.76
2014	600.98	210.66
2017	599.24	208.69
2018	598.95	208.33

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Appendix C - Sheet 29

Enter Point Source Emission Inventory
 Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
 Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

RFP Analysis Year	NO _x				VOC			
	Uncontrolled	Controlled	Total Reduction	Percent Reduction	Uncontrolled	Controlled	Total Reduction	Percent Reduction
2002	339.29	339.29	0.00	0.0	316.62	316.62	0.00	0.0
2008	375.56	155.73	219.83	58.5	333.14	170.05	163.09	49.0
2011	383.85	156.21	227.65	59.3	338.75	164.33	174.42	51.5
2014	401.05	157.17	243.87	60.8	347.70	172.31	175.40	50.4
2017	421.57	158.33	263.23	62.4	358.79	181.86	176.92	49.3
2018	428.69	158.75	269.94	63.0	362.90	185.38	177.52	48.9

Different VOC adjustments were used for the uncontrolled and controlled inventory projections. These adjustments were based on the most current science available for each base year used to project the uncontrolled and controlled inventories. The difference in emissions resulting from these two different adjustments has not been claimed as a reduction for the RFP demonstration.

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Appendix C - Sheet 30

**Enter 2008 Cumulative Control Measure Reductions
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller**

Explanation and direction:

RFP Control Strategy Description	Source Category	Total 2002 to 2008 NO _x Emissions Reductions (tpd)	Total 2002 to 2008 VOC Emissions Reductions (tpd)	Use This Control for 2008 RFP Demonstration? (Yes or No)	Is this an on-road mobile control that will change the MVEB? (Yes or No)
Mass Emissions Cap and Trade Program (MECT)	Point	219.83	0.00	Yes	No
Tank Landing Loss Rule	Point	0.00	0.00	Yes	No
Portable Fuel Containers	Area	0.00	0.00	Yes	No
Federal Reformulated Gasoline (RFG)	OR	150.64	22.03	Yes	Yes
Federal Motor Vehicle Control Program (FMVCP)	OR	241.17	109.17	Yes	Yes
Inspection and Maintenance Program (I/M)	OR	17.35	9.56	Yes	Yes
Texas Low Emission Diesel (TxLED)	OR	6.03	0.00	Yes	Yes
Tier I and II Locomotive NO _x Standards	NR	11.74	0.27	Yes	No
Small Non-Road Spark Ignition (SI) Phase I	NR	-0.30	1.77	Yes	No
Heavy Duty Non-road Engines	NR	5.76	4.73	Yes	No
Tier 2, and 3 Non-road Diesel Engines	NR	8.13	0.95	Yes	No
Small Non-road SI Engines (Phase II)	NR	1.25	16.70	Yes	No
Large Non-road SI & Recreational Marine	NR	12.27	4.14	Yes	No
Non-road Texas Low Emission Diesel	NR	2.87	0.00	Yes	No
Non-road Reformulated Gasoline	NR	0.00	0.04	Yes	No
Tier 4 Diesel Rule	NR	0.00	0.00	Yes	No
Federal Marine Diesel Tier 2	NR	1.96	0.08	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
Total		678.70	169.44		

Note: "This row not used for current RFP" rows were created only to allow for planners to easily add controls for alternative scenario analyses.

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Enter 2011 Cumulative Control Measure Reductions
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Explanation and direction:

RFP Control Strategy Description	Source Category	Total 2002 to 2011 NO _x Emissions Reductions (tpd)	Total 2002 to 2011 VOC Emissions Reductions (tpd)	Use This Control for 2011 RFP Demonstration? (Yes or No)	Is this an on-road mobile control that will change the MVEB? (Yes or No)
Mass Emissions Cap and Trade Program (MECT)	Point	227.65	0.00	Yes	No
Tank Landing Loss Rule	Point	0.00	11.50	Yes	No
Portable Fuel Containers	Area	0.00	3.68	Yes	No
Federal Reformulated Gasoline (RFG)	OR	189.54	22.79	Yes	Yes
Federal Motor Vehicle Control Program (FMVCP)	OR	319.72	148.83	Yes	Yes
Inspection and Maintenance Program (I/M)	OR	16.62	9.77	Yes	Yes
Texas Low Emission Diesel (TxLED)	OR	5.08	0.00	Yes	Yes
Tier I and II Locomotive NOX Standards	NR	12.75	0.34	Yes	No
Small Non-Road Spark Ignition (SI) Phase I	NR	-0.39	2.50	Yes	No
Heavy Duty Non-road Engines	NR	7.91	6.82	Yes	No
Tier 2, and 3 Non-road Diesel Engines	NR	14.01	1.68	Yes	No
Small Non-road SI Engines (Phase II)	NR	1.65	20.81	Yes	No
Large Non-road SI & Recreational Marine	NR	20.30	7.96	Yes	No
Non-road Texas Low Emission Diesel	NR	2.59	0.00	Yes	No
Non-road Reformulated Gasoline	NR	0.00	0.13	Yes	No
Tier 4 Diesel Rule	NR	0.52	0.03	Yes	No
Federal Marine Diesel Tier 2	NR	3.23	0.12	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
Total		821.18	236.96		

Note: "This row not used for current RFP" rows were created only to allow for planners to easily add controls for alternative scenario analyses.

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**Enter 2014 Cumulative Control Measure Reductions
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller**

Explanation and direction:

RFP Control Strategy Description	Source Category	Total 2002 to 2014 NO _x Emissions Reductions (tpd)	Total 2002 to 2014 VOC Emissions Reductions (tpd)	Use This Control for 2014 RFP Demonstration? (Yes or No)	Is this an on-road mobile control that will change the MVEB? (Yes or No)
Mass Emissions Cap and Trade Program (MECT)	Point	243.87	0.00	Yes	No
Tank Landing Loss Rule	Point	0.00	11.50	Yes	No
Portable Fuel Containers	Area	0.00	9.65	Yes	No
Federal Reformulated Gasoline (RFG)	OR	213.44	17.27	Yes	Yes
Federal Motor Vehicle Control Program (FMVCP)	OR	409.05	188.98	Yes	Yes
Inspection and Maintenance Program (I/M)	OR	11.80	7.99	Yes	Yes
Texas Low Emission Diesel (TxLED)	OR	3.52	0.00	Yes	Yes
Tier I and II Locomotive NOX Standards	NR	14.09	0.43	Yes	No
Small Non-Road Spark Ignition (SI) Phase I	NR	-0.47	3.23	Yes	No
Heavy Duty Non-road Engines	NR	9.64	8.54	Yes	No
Tier 2, and 3 Non-road Diesel Engines	NR	18.76	2.32	Yes	No
Small Non-road SI Engines (Phase II)	NR	1.85	22.72	Yes	No
Large Non-road SI & Recreational Marine	NR	27.01	11.37	Yes	No
Non-road Texas Low Emission Diesel	NR	2.14	0.00	Yes	No
Non-road Reformulated Gasoline	NR	0.00	0.22	Yes	No
Tier 4 Diesel Rule	NR	4.67	0.26	Yes	No
Federal Marine Diesel Tier 2	NR	4.72	0.18	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
Total		964.09	284.66		

Note: "This row not used for current RFP" rows were created only to allow for planners to easily add controls for alternative scenario analyses.

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Enter 2017 Cumulative Control Measure Reductions
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Explanation and direction:

RFP Control Strategy Description	Source Category	Total 2002 to 2017 NO _x Emissions Reductions (tpd)	Total 2002 to 2017 VOC Emissions Reductions (tpd)	Use This Control for 2017 RFP Demonstration? (Yes or No)	Is this an on-road mobile control that will change the MVEB? (Yes or No)
Mass Emissions Cap and Trade Program (MECT)	Point	263.23	0.00	Yes	No
Tank Landing Loss Rule	Point	0.00	11.50	Yes	No
Portable Fuel Containers	Area	0.00	10.10	Yes	No
Federal Reformulated Gasoline (RFG)	OR	235.00	14.12	Yes	Yes
Federal Motor Vehicle Control Program (FMVCP)	OR	486.84	222.89	Yes	Yes
Inspection and Maintenance Program (I/M)	OR	8.03	6.86	Yes	Yes
Texas Low Emission Diesel (TxLED)	OR	2.55	0.00	Yes	Yes
Tier I and II Locomotive NOX Standards	NR	15.24	0.53	Yes	No
Small Non-Road Spark Ignition (SI) Phase I	NR	-0.56	3.95	Yes	No
Heavy Duty Non-road Engines	NR	12.02	10.17	Yes	No
Tier 2, and 3 Non-road Diesel Engines	NR	23.25	2.95	Yes	No
Small Non-road SI Engines (Phase II)	NR	1.99	24.13	Yes	No
Large Non-road SI & Recreational Marine	NR	31.10	14.03	Yes	No
Non-road Texas Low Emission Diesel	NR	1.73	0.00	Yes	No
Non-road Reformulated Gasoline	NR	0.00	0.30	Yes	No
Tier 4 Diesel Rule	NR	10.96	0.52	Yes	No
Federal Marine Diesel Tier 2	NR	6.20	0.24	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
Total		1097.58	322.29		

Note: "This row not used for current RFP" rows were created only to allow for planners to easily add controls for alternative scenario analyses.

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**Enter 2018 Cumulative Control Measure Reductions
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller**

Explanation and direction:

RFP Control Strategy Description	Source Category	Total 2002 to 2018 NO _x Emissions Reductions (tpd)	Total 2002 to 2018 VOC Emissions Reductions (tpd)	Use This Control for 2018 RFP Demonstration? (Yes or No)	Is this an on-road mobile control that will change the MVEB? (Yes or No)
Mass Emissions Cap and Trade Program (MECT)	Point	269.94	0.00	Yes	No
Tank Landing Loss Rule	Point	0.00	11.50	Yes	No
Portable Fuel Containers	Area	0.00	10.25	Yes	No
Federal Reformulated Gasoline (RFG)	OR	241.29	13.48	Yes	Yes
Federal Motor Vehicle Control Program (FMVCP)	OR	510.15	232.44	Yes	Yes
Inspection and Maintenance Program (I/M)	OR	7.10	6.51	Yes	Yes
Texas Low Emission Diesel (TxLED)	OR	2.36	0.00	Yes	Yes
Tier I and II Locomotive NOX Standards	NR	16.04	0.59	Yes	No
Small Non-Road Spark Ignition (SI) Phase I	NR	-0.58	4.19	Yes	No
Heavy Duty Non-road Engines	NR	12.56	10.58	Yes	No
Tier 2, and 3 Non-road Diesel Engines	NR	24.29	3.10	Yes	No
Small Non-road SI Engines (Phase II)	NR	2.04	24.57	Yes	No
Large Non-road SI & Recreational Marine	NR	32.13	14.76	Yes	No
Non-road Texas Low Emission Diesel	NR	1.59	0.00	Yes	No
Non-road Reformulated Gasoline	NR	0.00	0.33	Yes	No
Tier 4 Diesel Rule	NR	12.82	0.59	Yes	No
Federal Marine Diesel Tier 2	NR	6.90	0.26	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
Total		1138.63	333.15		

Note: "This row not used for current RFP" rows were created only to allow for planners to easily add controls for alternative scenario analyses.

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**Enter 2019 Contingency Measure Control Measure Reductions
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller**

Explanation and direction:

RFP Control Strategy Description	Source Category	Total 2018 to 2019 NO _x Emissions Reductions (tpd)	Total 2018 to 2019 VOC Emissions Reductions (tpd)	Use This Control for 2019 RFP Demonstration? (Yes or No)
Mass Emissions Cap and Trade Program (MECT)	Point	0.00	0.00	No
Tank Landing Loss Rule	Point	0.00	0.00	No
Portable Fuel Containers	Area	0.00	0.00	No
Federal Reformulated Gasoline (RFG)	OR	6.80	-0.25	Yes
Federal Motor Vehicle Control Program (FMVCP)	OR	22.28	9.50	Yes
Inspection and Maintenance Program (I/M)	OR	-0.67	-0.26	Yes
Texas Low Emission Diesel (TxLED)	OR	-0.20	0.00	Yes
Tier I and II Locomotive NOX Standards	NR	0.68	0.01	Yes
Small Non-Road Spark Ignition (SI) Phase I	NR	-0.03	0.24	Yes
Heavy Duty Non-road Engines	NR	0.30	0.32	Yes
Tier 2, and 3 Non-road Diesel Engines	NR	0.72	0.11	Yes
Small Non-road SI Engines (Phase II)	NR	0.04	0.43	Yes
Large Non-road SI & Recreational Marine	NR	0.95	0.62	Yes
Non-road Texas Low Emission Diesel	NR	-0.13	0.00	No
Non-road Reformulated Gasoline	NR	0.00	0.03	Yes
Tier 4 Diesel Rule	NR	1.58	0.06	Yes
Federal Marine Diesel Tier 2	NR	0.55	0.02	Yes
This row not used for current RFP	N/A	0.00	0.00	No
This row not used for current RFP	N/A	0.00	0.00	No
This row not used for current RFP	N/A	0.00	0.00	No
This row not used for current RFP	N/A	0.00	0.00	No
This row not used for current RFP	N/A	0.00	0.00	No
This row not used for current RFP	N/A	0.00	0.00	No
This row not used for current RFP	N/A	0.00	0.00	No
This row not used for current RFP	N/A	0.00	0.00	No
Total		32.87	10.83	

Note: "This row not used for current RFP" rows were created only to allow for planners to easily add controls for alternative scenario analysis

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Appendix C - Sheet 36

Calculate 2002 RFP Base Year Emission Inventory
Add Emissions from Outside the Nonattainment Area that are to be Included in RFP Analysis
Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

The 2002 Base Year Inventory	NO_x (tons/day)	VOC (tons/day)
Point Source 2002 EI	339.29	316.62
Area Source 2002 EI	89.11	407.61
On-road mobile 2002 EI	371.89	124.47
Non-road mobile 2002 EI	156.98	84.32
Biogenic 202 EI	17.97	962.35
Total 2002 Base Year Inventory	975.24	1895.37

The 2002 RFP Base Year Inventory Out of Area Adjustments	NO_x (tons/day)	VOC (tons/day)
What is the total amount of biogenic emissions from sources in the area in tons/day for 2002 to be subtracted ?	17.97	962.35
What is the total amount of point source emissions from outside the nonattainment to be included/excluded for 2002 ?	0.00	0.00
What is the total amount of area source emissions from outside the nonattainment to be included/excluded for 2002 ?	0.00	0.00
What is the total amount of on-road source emissions from outside the nonattainment to be included/excluded for 2002 ?	0.00	0.00
What is the total amount of non-road source emissions from outside the nonattainment to be included/excluded for 2002 ?	0.00	0.00
Total 2002 RFP Base Year Adjustments	17.97	962.35

Total 2002 RFP Base Year Inventory with Adjustments	NO_x (tons/day)	VOC (tons/day)
	957.27	933.02

Notes:

- 1) Biogenic emission are part of the 2002 Base Year Inventory, but are not included in the RFP calculations. One step in the RFP calculations is to subtract all biogenic emissions from the base year inventory.
- 2) Input lines allow for input of emissions from outside the subject counties to be included in the calculation of the RFP base year emissions. Emission reductions from the included sources can then be used to meet RFP requirements.
- 3) Values in lines should be input as positive values for emissions from outside the area that need to be included in the calculations and as negative values for emissions which need to be excluded from the RFP calculations.

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Appendix C - Sheet 37

2008 Forecasted Uncontrolled Emissions Inventory with Pre-2002 Controls

Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x

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

Uncontrolled Emissions Inventory with pre-2002 Controls - These calculations sum the total uncontrolled NO_x and VOC emissions [tons per day (tpd)] for the 2008 RFP milestone year. The totals for each source category used in these calculations were entered on "enter EI" sheets.

Forecasted 2008 Uncontrolled Emissions Inventory with pre-2002 Controls		
Emissions Description	NO _x (tpd)	VOC (tpd)
Point Source	375.558	333.137
Area Source	89.630	371.820
On-road Mobile Source	653.330	233.940
Non-road Mobile Source	202.720	113.683
Total	1321.238	1052.580

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Appendix C - Sheet 38

2011 Forecasted Uncontrolled Emissions Inventory with Pre-2002 Controls
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x

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

Uncontrolled Emissions Inventory with pre-2002 Controls - These calculations sum the total uncontrolled NO_x and VOC emissions [tons per day (tpd)] for the 2011 RFP milestone year. The totals for each source category used in these calculations were entered on "enter EI" sheets.

Forecasted 2011 Uncontrolled Emissions Inventory with pre-2002 Controls		
Emissions Description	NO _x (tpd)	VOC (tpd)
Point Source	383.851	338.752
Area Source	93.900	382.720
On-road Mobile Source	744.520	266.440
Non-road Mobile Source	210.008	120.101
Total	1432.279	1108.013

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Appendix C - Sheet 39

**2014 Forecasted Uncontrolled Emissions Inventory with Pre-2002 Controls
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston,
Harris, Liberty, Montgomery, Waller**

Uncontrolled Emissions Inventory with pre-2002 Controls - These calculations sum the total uncontrolled NO_x and VOC emissions [tons per day (tpd)] for the 2014 RFP milestone year. The totals for each source category used in these calculations were entered on "enter EI" sheets.

Forecasted 2014 Uncontrolled Emissions Inventory with pre-2002 Controls		
Emissions Description	NO _x (tpd)	VOC (tpd)
Point Source	401.046	347.701
Area Source	96.010	393.070
On-road Mobile Source	793.840	279.290
Non-road Mobile Source	220.481	126.280
Total	1511.377	1146.341

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[Go To Sheet 18: Enter % RFP Cont & Conf](#)

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Appendix C - Sheet 40

2017 Forecasted Uncontrolled Emissions Inventory with Pre-2002 Controls
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x
Eight Non-attainment Counties: Brazoria, Chambers, Fort Bend, Galveston,
Harris, Liberty, Montgomery, Waller

Uncontrolled Emissions Inventory with pre-2002 Controls - These calculations sum the total uncontrolled NO_x and VOC emissions [tons per day (tpd)] for the 2017 RFP milestone year. The totals for each source category used in these calculations were entered on "enter EI" sheets.

Forecasted 2017 Uncontrolled Emissions Inventory with pre-2002 Controls		
Emissions Description	NO _x (tpd)	VOC (tpd)
Point Source	421.566	358.787
Area Source	98.230	404.840
On-road Mobile Source	850.600	298.200
Non-road Mobile Source	230.987	132.381
Total	1601.383	1194.208

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Appendix C - Sheet 41

2018 Forecasted Uncontrolled Emissions Inventory with Pre-2002 Controls

Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x

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

Uncontrolled Emissions Inventory with pre-2002 Controls - These calculations sum the total uncontrolled NO_x and VOC emissions [tons per day (tpd)] for the 2018 RFP milestone year. The totals for each source category used in these calculations were entered on "enter EI" sheets.

Forecasted 2018 Uncontrolled Emissions Inventory with pre-2002 Controls		
Emissions Description	NO _x (tpd)	VOC (tpd)
Point Source	428.691	362.896
Area Source	99.380	408.820
On-road Mobile Source	870.890	304.270
Non-road Mobile Source	237.253	134.294
Total	1636.214	1210.280

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Appendix C - Sheet 42

Calculations: 2002 Adjusted Base Year Emissions Inventory with Pre-1990 Controls
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NOx

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

Adjusted Base Year (ABY) Emissions Inventory (EI) with pre-1990 Controls - These calculations sum the total adjusted base year NO_x and VOC emissions [tons per day (tpd)] for the 2002 RFP Base Year. The totals for each source category used in these calculations were entered on "enter EI" sheets. For on-road mobile, there are separate data entry sheets for the ABY inventory for each milestone year. For all other source categories, the 2002 ABY is equal to the base year because there are no non-creditable controls for point, area, or non-road sources after 2002.

2002 RFP ABY EI with pre-1990		
Emissions Description	NO _x (tpd)	VOC (tpd)
Point Source 2002 ABY EI	339.29	316.62
Area Source 2002 ABY EI	89.11	407.61
On-road Mobile Source 2002 ABY EI	371.89	124.47
Non-road Mobile Source 2002 ABY EI	156.98	84.32
Total 2002 RFP ABY EI	957.27	933.02

Note: The ABY EI for all source categories, except on-road mobile, are identical to the base year EI. For on-road mobile, the ABY EI is calculated using 2002 vehicle miles travelled and emission factors that account only for the effects of pre-1990 Federal Clean Air Act controls. Since there is fleet turnover from Tier 0 vehicles between 1990 and 2002, the ABY EI for 2008 is less than the ABY for 2002.

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Appendix C - Sheet 43

Calculations: 2008 Adjusted Base Year Emissions Inventory with Pre-1990 Controls
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x

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

Adjusted Base Year (ABY) Emissions Inventory (EI) with pre-1990 Controls - These calculations sum the total ABY NO_x and VOC emissions [tons per day (tpd)] for the 2002 RFP Base Year. The totals for each source category used in these calculations were entered on "enter EI" sheets. For on-road mobile, there are separate data entry sheets for the ABY inventory for each milestone year. For all other source categories, the 2002 ABY is equal to the base year because there are no non-creditable controls for point, area, or non-road sources after 2002.

2008 RFP ABY EI with pre-1990		
Emissions Description	NO _x (tpd)	VOC (tpd)
Point Source 2002 ABY EI	339.29	316.62
Area Source 2002 ABY EI	89.11	407.61
On-road Mobile Source 2008 ABY EI	397.88	124.60
Non-road Mobile Source 2002 ABY EI	156.98	84.32
Total 2002 RFP ABY EI	983.26	933.15

Note: The ABY EI for all source categories, except on-road mobile, are identical to the base year emission inventory. For on-road mobile, the ABY EI is calculated using 2002 vehicle miles travelled and emission factors that account only for the effects of pre-1990 Federal Clean Air Act controls. Since there is additional fleet turnover from Tier 0 vehicles between 2002 and 2008, the ABY EI for 2008 is less than the ABY for 2002.

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Appendix C - Sheet 44

Calculations: 2011 Adjusted Base Year Emissions Inventory with Pre-1990 Controls
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x

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

Adjusted Base Year (ABY) Emissions Inventory (EI) with pre-1990 Controls - These calculations sum the total ABY NO_x and VOC emissions [tons per day (tpd)] for the 2002 RFP Base Year. The totals for each source category used in these calculations were entered on "enter EI" sheets. For on-road mobile, there are separate data entry sheets for the ABY inventory for each milestone year. For all other source categories, the 2002 ABY is equal to the base year because there are no non-creditable controls for point, area, or non-road sources after 2002.

2011 RFP ABY EI with pre-1990		
Emissions Description	NO _x (tpd)	VOC (tpd)
Point Source 2002 ABY EI	339.29	316.62
Area Source 2002 ABY EI	89.11	407.61
On-road Mobile Source 2011 ABY EI	421.51	133.47
Non-road Mobile Source 2002 ABY EI	156.98	84.32
Total 2002 RFP ABY EI	1006.89	942.02

Note: The ABY EI for all source categories, except on-road mobile, are identical to the base year emission inventory. For on-road mobile the ABY EI is calculated using 2002 vehicle miles travelled and emission factors that account only for the effects of pre-1990 Federal Clean Air Act controls. Since there is additional fleet turnover from Tier 0 vehicles between 2008 and 2011, the ABY EI for 2011 is less than the ABY for 2008.

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Appendix C - Sheet 45

Calculations: 2014 Adjusted Base Year Emissions Inventory with Pre-1990 Controls
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x

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

Adjusted Base Year (ABY) Emissions Inventory (EI) with pre-1990 Controls - These calculations sum the total adjusted base year NO_x and VOC emissions [tons per day (tpd)] for the 2002 RFP Base Year. The totals for each source category used in these calculations were entered on "enter EI" sheets. For on-road mobile, there are separate data entry sheets for the ABY inventory for each milestone year. For all other source categories, the 2002 ABY is equal to the base year because there are no non-creditable controls for point, area, or non-road sources after 2002.

2014 RFP ABY EI with pre-1990		
Emissions Description	NO _x (tpd)	VOC (tpd)
Point Source 2002 ABY EI	339.29	316.62
Area Source 2002 ABY EI	89.11	407.61
On-road Mobile Source 2014 ABY EI	420.57	129.37
Non-road Mobile Source 2002 ABY EI	156.98	84.32
Total 2002 RFP ABY EI	1005.95	937.92

Note: The ABY EI for all source categories, except on-road mobile, are identical to the base year EI. For on-road mobile, the ABY EI is calculated using 2002 vehicle miles travelled and emission factors that account only for the effects of pre-1990 Federal Clean Air Act controls. Since there is additional fleet turnover from Tier 0 vehicles between 2011 and 2014, the ABY EI for 2014 is less than the ABY for 2011.

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Appendix C - Sheet 46

Calculations: 2017 Adjusted Base Year Emissions Inventory with Pre-1990 Controls
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x

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

Adjusted Base Year (ABY) Emissions Inventory (EI) with pre-1990 Controls - These calculations sum the total ABY NO_x and VOC emissions [tons per day (tpd)] for the 2002 RFP Base Year. The totals for each source category used in these calculations were entered on "enter EI" sheets. For on-road mobile, there are separate data entry sheets for the ABY inventory for each milestone year. For all other source categories, the 2002 ABY is equal to the base year because there are no non-creditable controls for point, area, or non-road sources after 2002.

2017 RFP ABY EI with pre-1990		
Emissions Description	NO _x (tpd)	VOC (tpd)
Point Source 2002 ABY EI	339.29	316.62
Area Source 2002 ABY EI	89.11	407.61
On-road Mobile Source 2017 ABY EI	418.83	127.40
Non-road Mobile Source 2002 ABY EI	156.98	84.32
Total 2002 RFP ABY EI	1004.21	935.95

Note: The ABY EI for all source categories, except on-road mobile, are identical to the base year EI. For on-road mobile, the ABY EI is calculated using 2002 vehicle miles travelled and emission factors that account only for the effects of pre-1990 Federal Clean Air Act controls. Since there is additional fleet turnover from Tier 0 vehicles between 2014 and 2017, the ABY EI for 2017 is less than the ABY for 2014.

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Appendix C - Sheet 47

Calculations: 2018 Adjusted Base Year Emissions Inventory with Pre-1990 Controls
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x

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

Adjusted Base Year (ABY) Emissions Inventory (EI) with pre-1990 Controls - These calculations sum the total adjusted base year NO_x and VOC emissions [tons per day (tpd)] for the 2002 RFP Base Year. The totals for each source category used in these calculations were entered on "enter EI" sheets. For on-road mobile, there are separate data entry sheets for the ABY inventory for each milestone year. For all other source categories, the 2002 ABY is equal to the base year because there are no non-creditable controls for point, area, or non-road sources after 2002.

2018 RFP ABY EI with pre-1990		
Emissions Description	NO _x (tpd)	VOC (tpd)
Point Source 2002 ABY EI	339.29	316.62
Area Source 2002 ABY EI	89.11	407.61
On-road Mobile Source 2018 ABY EI	418.54	127.04
Non-road Mobile Source 2002 ABY EI	156.98	84.32
Total 2002 RFP ABY EI	1003.92	935.59

Note: The ABY EI for all source categories, except on-road mobile, are identical to the base year EI. For on-road mobile, the ABY EI is calculated using 2002 vehicle miles travelled and emission factors that account only for the effects of pre-1990 Federal Clean Air Act controls. Since there is additional fleet turnover from Tier 0 vehicles between 2017 and 2018, the ABY EI for 2018 is less than the ABY for 2017.

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Appendix C - Sheet 48

**Calculations: 2002-2008 Control Measures Reductions
Houston-Galveston-Brazoria Nonattainment Area 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, the status of inclusion of the control in the reasonable further progress (RFP) calculations, and whether the control is for on-road mobile sources were all input in the "30 Enter Reductions 2008" sheet. The reduction is the reduction that is creditable from each control between 2002 and 2008. If the control has been turned off by inputting a "No" in the "Use this Control for 2008 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 2008" sheet. If it was intended to have a positive reduction for the control, but there is a zero, go back to the "Enter Reductions 2008" 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 2002 to 2008 NOx Emissions Reductions (tpd)	Total 2002 to 2008 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)
Mass Emissions Cap and Trade Program (MECT)	Point	219.83	0.00	Yes	No
Tank Landing Loss Rule	Point	0.00	0.00	Yes	No
Portable Fuel Containers	Area	0.00	0.00	Yes	No
Federal Reformulated Gasoline (RFG)	OR	150.64	22.03	Yes	Yes
Federal Motor Vehicle Control Program (FMVCP)	OR	241.17	109.17	Yes	Yes
Inspection and Maintenance Program (I/M)	OR	17.35	9.56	Yes	Yes
Texas Low Emission Diesel (TxLED)	OR	6.03	0.00	Yes	Yes
Tier I and II Locomotive NOX Standards	NR	11.74	0.27	Yes	No
Small Non-Road Spark Ignition (SI) Phase I	NR	-0.30	1.77	Yes	No
Heavy Duty Non-road Engines	NR	5.76	4.73	Yes	No
Tier 2, and 3 Non-road Diesel Engines	NR	8.13	0.95	Yes	No
Small Non-road SI Engines (Phase II)	NR	1.25	16.70	Yes	No
Large Non-road SI & Recreational Marine	NR	12.27	4.14	Yes	No
Non-road Texas Low Emission Diesel	NR	2.87	0.00	Yes	No
Non-road Reformulated Gasoline	NR	0.00	0.04	Yes	No
Tier 4 Diesel Rule	NR	0.00	0.00	Yes	No
Federal Marine Diesel Tier 2	NR	1.96	0.08	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
Total 2008 RFP Control Reductions		678.70	169.44		

Note: "This row not used for current RFP" rows were created only to allow for planners to easily add controls for alternative scenario analyses.

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Appendix C - Sheet 49

Calculations: 2008-2011 Control Measures Reductions
Houston-Galveston-Brazoria Nonattainment Area 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, the status of inclusion of the control in the reasonable further progress (RFP) calculations, and whether the control is for on-road mobile sources were all input in the "30 Enter Reductions 2008" sheet. The reduction is the reduction that is creditable from each control between 2002 and 2008. If the control has been turned off by inputting a "No" in the "Use this Control for 2008 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 2008" sheet. If it was intended to have a positive reduction for the control, but there is a zero, go back to the "Enter Reductions 2008" 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 2008 to 2011 NO _x Emissions Reductions (tpd)	Total 2008 to 2011 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)
Mass Emissions Cap and Trade Program (MECT)	Point	7.82	0.00	Yes	No
Tank Landing Loss Rule	Point	0.00	11.50	Yes	No
Portable Fuel Containers	Area	0.00	3.68	Yes	No
Federal Reformulated Gasoline (RFG)	OR	38.90	0.76	Yes	Yes
Federal Motor Vehicle Control Program (FMVCP)	OR	78.55	39.66	Yes	Yes
Inspection and Maintenance Program (I/M)	OR	-0.73	0.21	Yes	Yes
Texas Low Emission Diesel (TxLED)	OR	-0.95	0.00	Yes	Yes
Tier I and II Locomotive NOX Standards	NR	1.01	0.07	Yes	No
Small Non-Road Spark Ignition (SI) Phase I	NR	-0.09	0.73	Yes	No
Heavy Duty Non-road Engines	NR	2.15	2.09	Yes	No
Tier 2, and 3 Non-road Diesel Engines	NR	5.88	0.73	Yes	No
Small Non-road SI Engines (Phase II)	NR	0.40	4.11	Yes	No
Large Non-road SI & Recreational Marine	NR	8.03	3.82	Yes	No
Non-road Texas Low Emission Diesel	NR	-0.28	0.00	Yes	No
Non-road Reformulated Gasoline	NR	0.00	0.09	Yes	No
Tier 4 Diesel Rule	NR	0.52	0.03	Yes	No
Federal Marine Diesel Tier 2	NR	1.27	0.04	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
Total 2011 RFP Control Reductions		142.48	67.52		

Note: "This row not used for current RFP" rows were created only to allow for planners to easily add controls for alternative scenario analyses.

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Appendix C - Sheet 50

Calculations: 2011-2014 Control Measures Reductions
Houston-Galveston-Brazoria Nonattainment Area 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, the status of inclusion of the control in the reasonable further progress (RFP) calculations, and whether the control is for on-road mobile sources were all input in the "30 Enter Reductions 2008" sheet. The reduction is the reduction that is creditable from each control between 2002 and 2008. If the control has been turned off by inputting a "No" in the "Use this Control for 2008 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 2008" sheet. If it was intended to have a positive reduction for the control, but there is a zero, go back to the "Enter Reductions 2008" 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 2011 to 2014 NO _x Emissions Reductions (tpd)	Total 2011 to 2014 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)
Mass Emissions Cap and Trade Program (MECT)	Point	16.22	0.00	Yes	No
Tank Landing Loss Rule	Point	0.00	0.00	Yes	No
Portable Fuel Containers	Area	0.00	5.97	Yes	No
Federal Reformulated Gasoline (RFG)	OR	23.90	-5.52	Yes	Yes
Federal Motor Vehicle Control Program (FMVCP)	OR	89.33	40.15	Yes	Yes
Inspection and Maintenance Program (I/M)	OR	-4.82	-1.78	Yes	Yes
Texas Low Emission Diesel (TxLED)	OR	-1.56	0.00	Yes	Yes
Tier I and II Locomotive NOX Standards	NR	1.34	0.09	Yes	No
Small Non-Road Spark Ignition (SI) Phase I	NR	-0.08	0.73	Yes	No
Heavy Duty Non-road Engines	NR	1.73	1.72	Yes	No
Tier 2, and 3 Non-road Diesel Engines	NR	4.75	0.64	Yes	No
Small Non-road SI Engines (Phase II)	NR	0.20	1.91	Yes	No
Large Non-road SI & Recreational Marine	NR	6.71	3.41	Yes	No
Non-road Texas Low Emission Diesel	NR	-0.45	0.00	Yes	No
Non-road Reformulated Gasoline	NR	0.00	0.09	Yes	No
Tier 4 Diesel Rule	NR	4.15	0.23	Yes	No
Federal Marine Diesel Tier 2	NR	1.49	0.06	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
Total RFP Control Reductions		142.91	47.70		

Note: "This row not used for current RFP" rows were created only to allow for planners to easily add controls for alternative scenario analyses.

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Appendix C - Sheet 51

Calculations: 2014-2017 Control Measures Reductions
Houston-Galveston-Brazoria Nonattainment Area 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, the status of inclusion of the control in the reasonable further progress (RFP) calculations, and whether the control is for on-road mobile sources were all input in the "30 Enter Reductions 2008" sheet. The reduction is the reduction that is creditable from each control between 2002 and 2008. If the control has been turned off by inputting a "No" in the "Use this Control for 2008 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 2008" sheet. If it was intended to have a positive reduction for the control, but there is a zero, go back to the "Enter Reductions 2008" 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 2014 to 2017 NOx Emissions Reductions (tpd)	Total 2014 to 2017 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)
Mass Emissions Cap and Trade Program (MECT)	Point	19.36	0.00	Yes	No
Tank Landing Loss Rule	Point	0.00	0.00	Yes	No
Portable Fuel Containers	Area	0.00	0.45	Yes	No
Federal Reformulated Gasoline (RFG)	OR	21.56	-3.15	Yes	Yes
Federal Motor Vehicle Control Program (FMVCP)	OR	77.79	33.91	Yes	Yes
Inspection and Maintenance Program (I/M)	OR	-3.77	-1.13	Yes	Yes
Texas Low Emission Diesel (TxLED)	OR	-0.97	0.00	Yes	Yes
Tier I and II Locomotive NOX Standards	NR	1.15	0.10	Yes	No
Small Non-Road Spark Ignition (SI) Phase I	NR	-0.09	0.72	Yes	No
Heavy Duty Non-road Engines	NR	2.38	1.63	Yes	No
Tier 2, and 3 Non-road Diesel Engines	NR	4.49	0.63	Yes	No
Small Non-road SI Engines (Phase II)	NR	0.14	1.41	Yes	No
Large Non-road SI & Recreational Marine	NR	4.09	2.66	Yes	No
Non-road Texas Low Emission Diesel	NR	-0.41	0.00	Yes	No
Non-road Reformulated Gasoline	NR	0.00	0.08	Yes	No
Tier 4 Diesel Rule	NR	6.29	0.26	Yes	No
Federal Marine Diesel Tier 2	NR	1.48	0.06	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
Total RFP Control Reductions		133.49	37.63		

Note: "This row not used for current RFP" rows were created only to allow for planners to easily add controls for alternative scenario analyses.

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[Go To Sheet 33: Enter Reductions 2017](#)

Appendix C - Sheet 52

Calculations: 2017-2018 Control Measures Reductions
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NOx

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

Explanation: The control strategy name, control reduction amount, the status of inclusion of the control in the reasonable further progress (RFP) calculations, and whether the control is for on-road mobile sources were all input in the "30 Enter Reductions 2008" sheet. The reduction is the reduction that is creditable from each control between 2002 and 2008. If the control has been turned off by inputting a "No" in the "Use this Control for 2008 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 2008" sheet. If it was intended to have a positive reduction for the control, but there is a zero, go back to the "Enter Reductions 2008" 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 2017 to 2018 NOx Emissions Reductions (tpd)	Total 2017 to 2018 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)
Mass Emissions Cap and Trade Program (MECT)	Point	6.71	0.00	Yes	No
Tank Landing Loss Rule	Point	0.00	0.00	Yes	No
Portable Fuel Containers	Area	0.00	0.15	Yes	No
Federal Reformulated Gasoline (RFG)	OR	6.29	-0.64	Yes	Yes
Federal Motor Vehicle Control Program (FMVCP)	OR	23.31	9.55	Yes	Yes
Inspection and Maintenance Program (I/M)	OR	-0.93	-0.35	Yes	Yes
Texas Low Emission Diesel (TxLED)	OR	-0.19	0.00	Yes	Yes
Tier I and II Locomotive NOX Standards	NR	0.80	0.06	Yes	No
Small Non-Road Spark Ignition (SI) Phase I	NR	-0.02	0.24	Yes	No
Heavy Duty Non-road Engines	NR	0.54	0.41	Yes	No
Tier 2, and 3 Non-road Diesel Engines	NR	1.04	0.15	Yes	No
Small Non-road SI Engines (Phase II)	NR	0.05	0.44	Yes	No
Large Non-road SI & Recreational Marine	NR	1.03	0.73	Yes	No
Non-road Texas Low Emission Diesel	NR	-0.14	0.00	Yes	No
Non-road Reformulated Gasoline	NR	0.00	0.03	Yes	No
Tier 4 Diesel Rule	NR	1.86	0.07	Yes	No
Federal Marine Diesel Tier 2	NR	0.70	0.02	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
Total RFP Control Reductions		41.05	10.86		

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[Go To Sheet 7: Calc RFP Demo 2018](#)

[Go To Sheet 34: Enter Reductions 2018](#)

Appendix C - Sheet 53

**Calculations: 2018-2019 Contingency Control Measures Reductions
Houston-Galveston-Brazoria Nonattainment Area Ozone Season VOC and NO_x**

Eight Non-attainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller

Explanation: The control strategy name, control reduction amount, the status of inclusion of the control in the reasonable further progress (RFP) calculations, and whether the control is for on-road mobile sources were all input in the "30 Enter Reductions 2008" sheet. The reduction is the reduction that is creditable from each control between 2002 and 2008. If the control has been turned off by inputting a "No" in the "Use this Control for 2008 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 2008" sheet. If it was intended to have a positive reduction for the control, but there is a zero, go back to the "Enter Reductions 2008" 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 2018 to 2019 NOx Emissions Reductions (tpd)	Total 2018 to 2019 VOC Emissions Reductions (tpd)	Use This Control for 2019 RFP Contingency Demonstration? (Yes or No)
Mass Emissions Cap and Trade Program (MECT)	Point	0.00	0.00	No
Tank Landing Loss Rule	Point	0.00	0.00	No
Portable Fuel Containers	Area	0.00	0.00	No
Federal Reformulated Gasoline (RFG)	OR	6.80	-0.25	Yes
Federal Motor Vehicle Control Program (FMVCP)	OR	22.28	9.50	Yes
Inspection and Maintenance Program (I/M)	OR	-0.67	-0.26	Yes
Texas Low Emission Diesel (TxLED)	OR	-0.20	0.00	Yes
Tier I and II Locomotive NOX Standards	NR	0.68	0.01	Yes
Small Non-Road Spark Ignition (SI) Phase I	NR	-0.03	0.24	Yes
Heavy Duty Non-road Engines	NR	0.30	0.32	Yes
Tier 2, and 3 Non-road Diesel Engines	NR	0.72	0.11	Yes
Small Non-road SI Engines (Phase II)	NR	0.04	0.43	Yes
Large Non-road SI & Recreational Marine	NR	0.95	0.62	Yes
Non-road Texas Low Emission Diesel	NR	0.00	0.00	No
Non-road Reformulated Gasoline	NR	0.00	0.03	Yes
Tier 4 Diesel Rule	NR	1.58	0.06	Yes
Federal Marine Diesel Tier 2	NR	0.55	0.02	Yes
This row not used for current RFP	N/A	0.00	0.00	No
This row not used for current RFP	N/A	0.00	0.00	No
This row not used for current RFP	N/A	0.00	0.00	No
This row not used for current RFP	N/A	0.00	0.00	No
This row not used for current RFP	N/A	0.00	0.00	No
This row not used for current RFP	N/A	0.00	0.00	No
This row not used for current RFP	N/A	0.00	0.00	No
This row not used for current RFP	N/A	0.00	0.00	No
Total RFP Control Reductions		33.00	10.83	

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- [Go To Sheet 8: Calc 2019 RFP Contingency](#)
- [Go To Sheet 35: Enter Cont Reductions 2019](#)

Appendix C - Sheet 54

Summary Sheet: Uncontrolled NO_x Emission Inventory
Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris,
Liberty, Montgomery, Waller

Uncontrolled NO_x (tons per day)

RFP Analysis Year	Point Sources	Area Sources	Non-Road Mobile Sources	On-Road Mobile Sources	Total
2002	339.29	89.11	166.98	552.30	1147.68
2008	375.56	89.63	202.72	653.33	1321.24
2011	383.85	93.90	210.01	744.52	1432.28
2014	401.05	96.01	220.48	793.84	1511.38
2017	421.57	98.23	230.99	850.60	1601.38
2018	428.69	99.38	237.25	870.89	1636.21

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Appendix C - Sheet 55

Summary Sheet: Controlled NO_x Emission Inventory
Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris,
Liberty, Montgomery, Waller

Controlled NO_x (tons per day)

RFP Analysis Year	Point Sources	Area Sources	Non-Road Mobile Sources	On-Road Mobile Sources	Total
2002	339.29	89.11	156.98	371.89	957.27
2008	155.73	89.63	149.44	238.13	632.93
2011	156.21	93.90	138.83	213.57	602.51
2014	157.17	96.01	128.45	156.03	537.67
2017	158.33	98.23	121.15	118.17	495.88
2018	158.75	99.38	119.88	109.98	487.99

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 C - Sheet 56

Summary Sheet: Uncontrolled VOC Emission Inventory
Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area

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

Uncontrolled VOC (tons per day)

RFP Analysis Year	Point Sources	Area Sources	Non-Road Mobile Sources	On-Road Mobile Sources	Total
2002	316.62	407.61	100.15	205.76	1030.14
2008	333.14	371.82	113.68	233.94	1052.58
2011	338.75	382.72	120.10	266.44	1108.01
2014	347.70	393.07	126.28	279.29	1146.34
2017	358.79	404.84	132.38	298.20	1194.21
2018	362.90	408.82	134.29	304.27	1210.28

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Appendix C - Sheet 57

Summary Sheet: Controlled VOC Emission Inventory
Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Nonattainment Area
Eight Nonattainment Counties: Brazoria, Chambers, Fort Bend, Galveston, Harris,
Liberty, Montgomery, Waller

Controlled VOC (tons per day)

RFP Analysis Year	Point Sources	Area Sources	Non-Road Mobile Sources	On-Road Mobile Sources	Total
2002	316.62	407.61	84.32	124.47	933.02
2008	170.05	371.82	69.23	92.91	704.00
2011	164.33	379.04	64.03	85.05	692.45
2014	172.31	383.42	61.42	65.04	682.18
2017	181.86	394.74	60.05	54.34	691.00
2018	185.38	398.57	59.84	51.84	695.63

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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