

# 2009f & 2012f Future Case HGB SIP Modeling

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# 2009f & 2012f Future Case HGB SIP Modeling

Emission Inventory Development

Relative Reduction Factor Development

Future Ozone Design Value Projection



## 2009f Future Year Emissions by Source Category in the 8-County HGB Nonattainment Area

- Point source emissions (EGUs and NEGUs) were capped as per the MECT;
- On-road mobile sources were reduced as per the changes in vehicles and fuels projected to 2009;
- Non-road mobile sources were reduced as per the changes in engines and fuels projected to 2009;
- Ships were increased to account for growth between 2000 and 2009; and
- Area sources were increased to account for growth between 2000 and 2009.

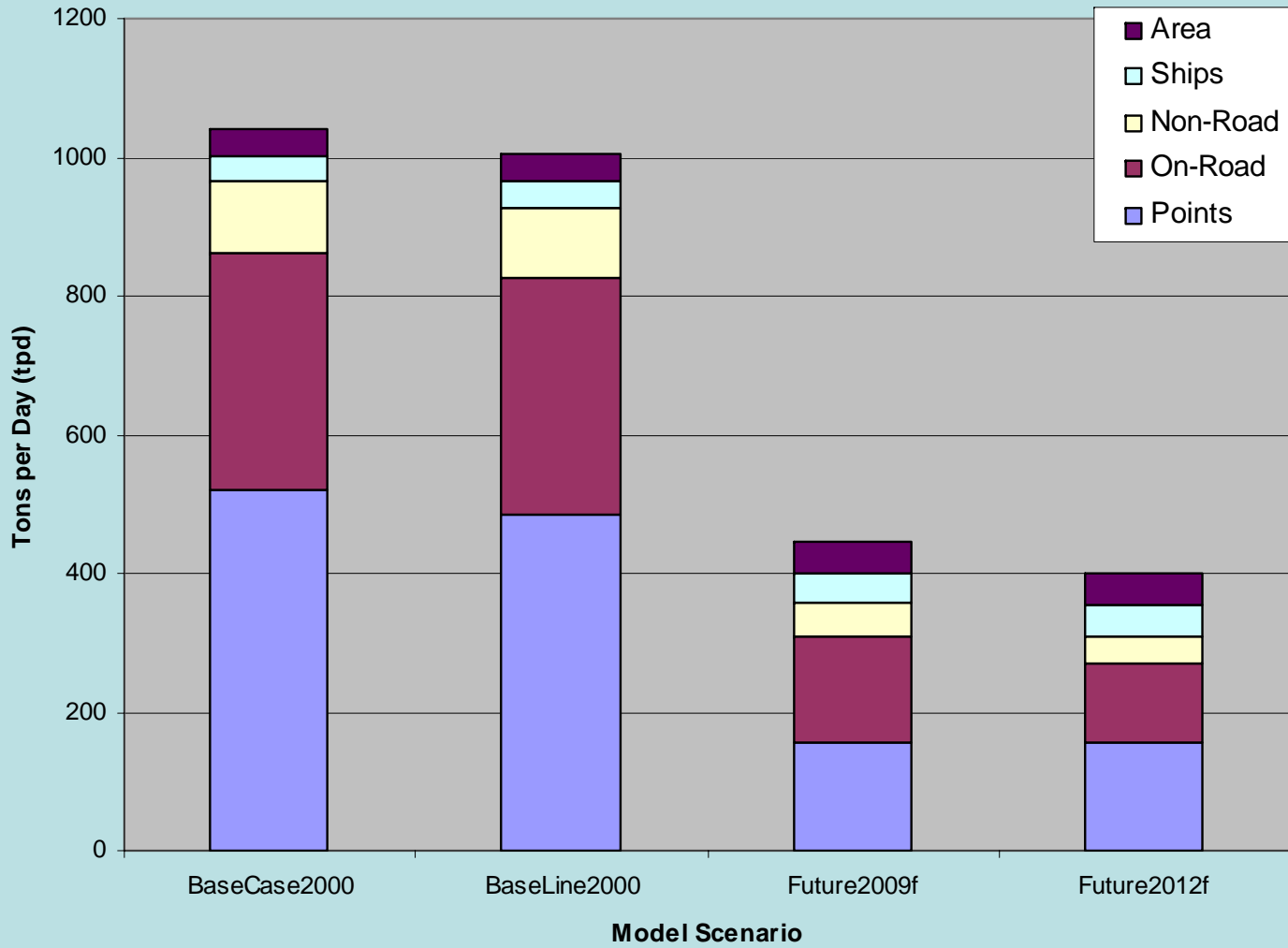


## **2012f Future Year Emissions by Source Category in the 8-County HGB Nonattainment Area**

- Point source emissions (EGUs and NEGUs) were assumed to be capped at the 2009 level (MECT Levels);
- On-road mobile sources were further reduced as per the changes in vehicles and fuels projected to 2012;
- Non-road mobile sources were further reduced as per the changes in engines and fuels projected to 2012;
- Ships were assumed to be the same as for 2009; and
- Area sources were increased to account for growth between 2009 and 2012.



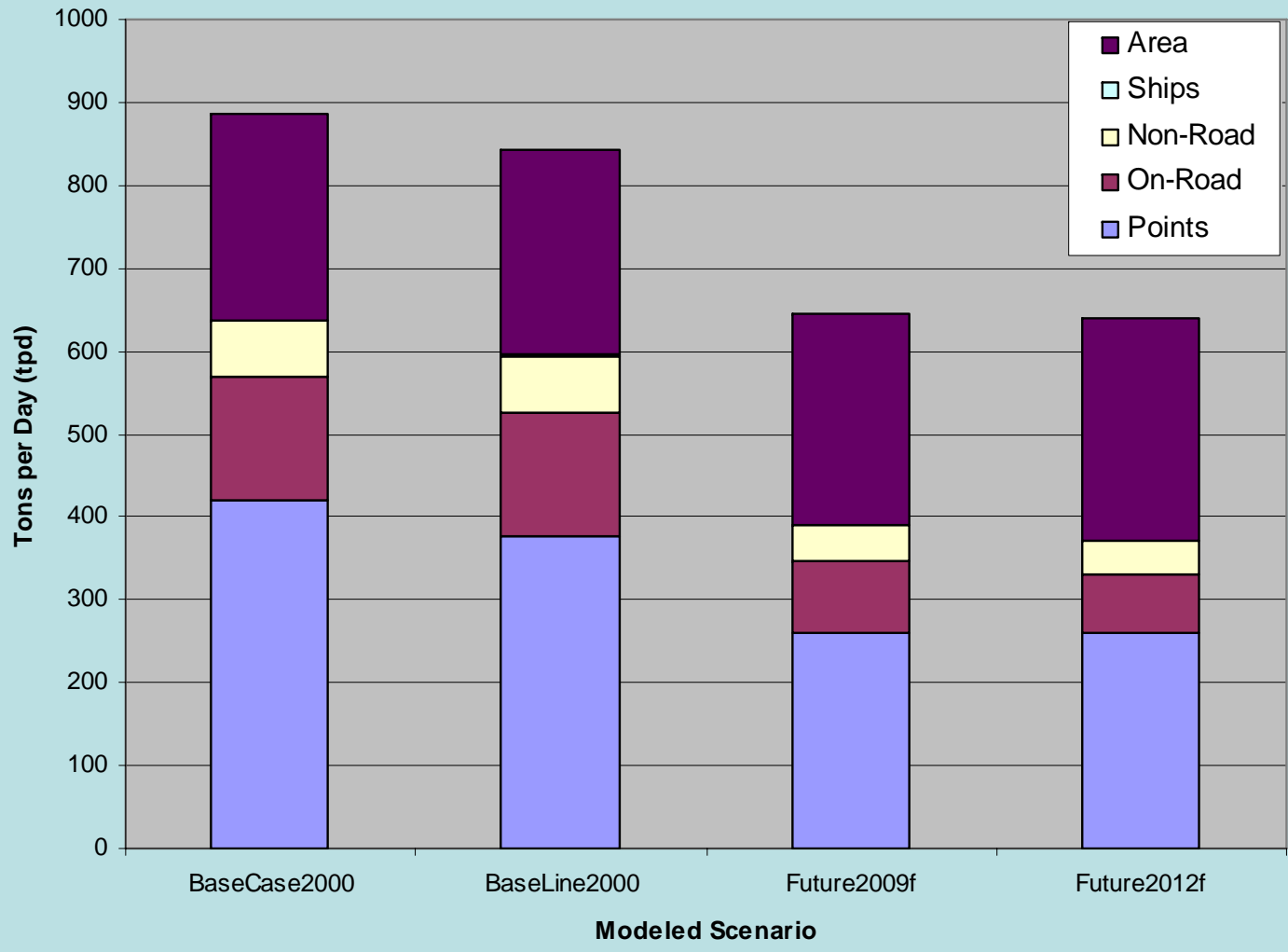
### Modeled NOx Emissions



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### Modeled VOC Emissions



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## HGB 8-County Anthropogenic NO<sub>x</sub> Emissions (tpd) for 2000 Baseline, and 2009 & 2012 Future Baselines

Emission Category	2000c Baseline	2009f Future	2012f Future	%-Difference 2000 to 2009	%-Difference 2009 to 2012
Points	483.0	157.0	157.0	-67.5 %	0.0 %
On-Road Mobile	341.8	152.7	113.4	-55.3 %	-25.7 %
Non-Road Mobile	103.1	46.4	39.4	-55.0 %	-15.1 %
Ships	37.5	43.5	43.5	+16.0 %	0.0 %
Area	39.6	45.3	47.1	+14.4 %	+4.0 %
Totals	1005.1	444.9	400.4	-55.7 %	-10.0 %



## HGB 8-County Anthropogenic VOC Emissions (tpd) for 2000 Baseline, and 2009 & 2012 Future Baselines

Emission Category	2000c Baseline	2009f Future	2012f Future	%-Difference 2000 to 2009	%-Difference 2009 to 2012
Points	376.6	261.0	261.0	-30.9 %	0.0 %
On-Road Mobile	150.5	85.6	69.1	-43.1 %	-19.3 %
Non-Road Mobile	67.0	43.6	40.4	-34.9 %	-7.3 %
Ships	0.7	0.9	0.9	0.0 %	0.0 %
Area	248.3	254.2	267.7	+2.4 %	+5.3 %
Totals	843.1	645.3	639.1	-23.5 %	-1.0 %

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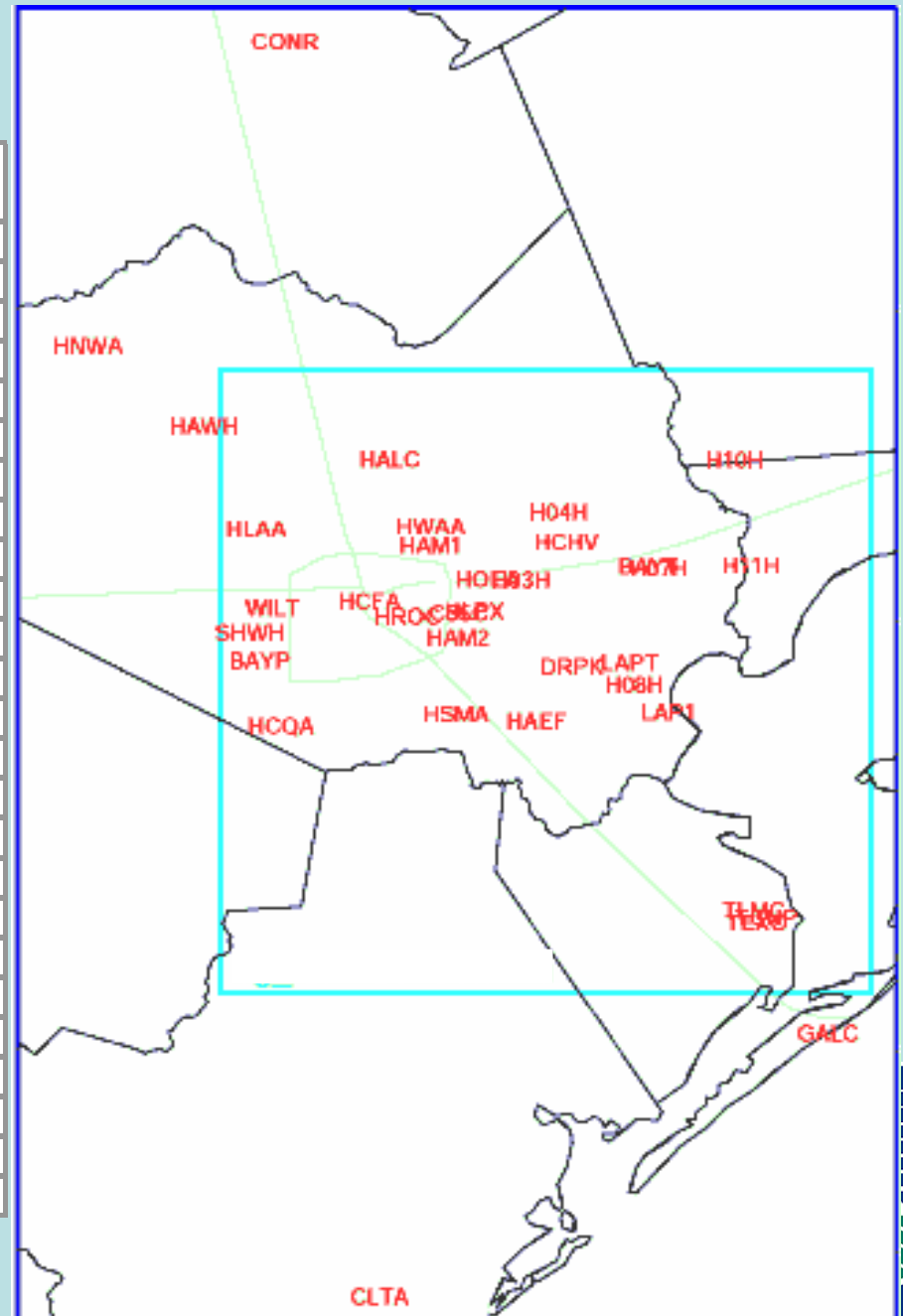
## RRF Development & DVf Calculation

- Using these projected 2009 & 2012 emissions the CAMx model was executed.
- The resulting eight-hour ozone modeled concentrations at the various monitoring sites were compared to the Baseline (2000) modeled results, as per the EPA Guidance to develop a Relative Reduction Factor (RRF) at each of the various monitoring sites.
- These RRFs were then multiplied by the current ozone Design Values (DVC's) to calculate the 2009 & 2012 future ozone Design Values (DVf's).



## Monitor Site Codes and Locations

Site Code	Site Info
BAYP	Bayland Park, Harris Co., TX
C35C	Clinton, Harris Co., TX
CLTA	Clute, Brazoria Co., TX
CONR	Conroe, Montgomery Co., TX
DRPK	Deer Park, Harris Co., TX
GALC	Galveston, Galveston Co., TX
H03H	HRM Site 3, Houston, Harris Co., TX
H04H	HRM Site 4, Houston, Harris Co., TX
H07H	HRM Site 7, West Baytown, Harris Co., TX
H08H	HRM Site 8, Houston, Harris Co., TX
H10H	HRM Site 10, Mont Belvieu, Chambers Co., TX
H11H	HRM Site 11, Chambers Co., TX
HALC	Aldine, Houston, Harris Co., TX
HCFA	Crawford, Houston, Harris Co., TX
HCQA	Croquet, Houston, Harris Co., TX
HLAA	Lang, Houston, Harris Co., TX
HNWA	NW Harris, Tomball, Harris Co., TX
HOEA	Houston East, Houston, Harris Co., TX
HROC	TCEQ Houston Regional Office, Harris Co., TX
HSMA	Swiss & Monroe, Houston, Harris Co., TX
HWAA	North Wayside, Houston, Harris Co., TX
SHWH	Westhollow, Houston, Harris Co., TX
TLMC	Texas City, Galveston Co., TX
LAPT	La Porte, Harris Co., TX
WILT	Top of Williams Tower (254m AGL), Harris Co., TX



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### Current and Future DV



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## Summary of Results

The 2012 DVf's are lower than the 2009 DVf's at each of the monitoring sites.

Four more monitoring sites are projected to come into Attainment in 2012 leaving five sites in nonattainment:

	<u>2009</u>	<u>2012</u>
•Deer Park	97ppb	95ppb
•Bayland Park	95ppb	92ppb
•Aldine	93ppb	90ppb
•Croquet	88ppb	86ppb
•HRM-8	86ppb	84ppb*
•Houston East	90ppb	88ppb
•Houston NW	87ppb	83ppb*
•Region Office	85ppb	83ppb*
•Shell West	85ppb	82ppb*

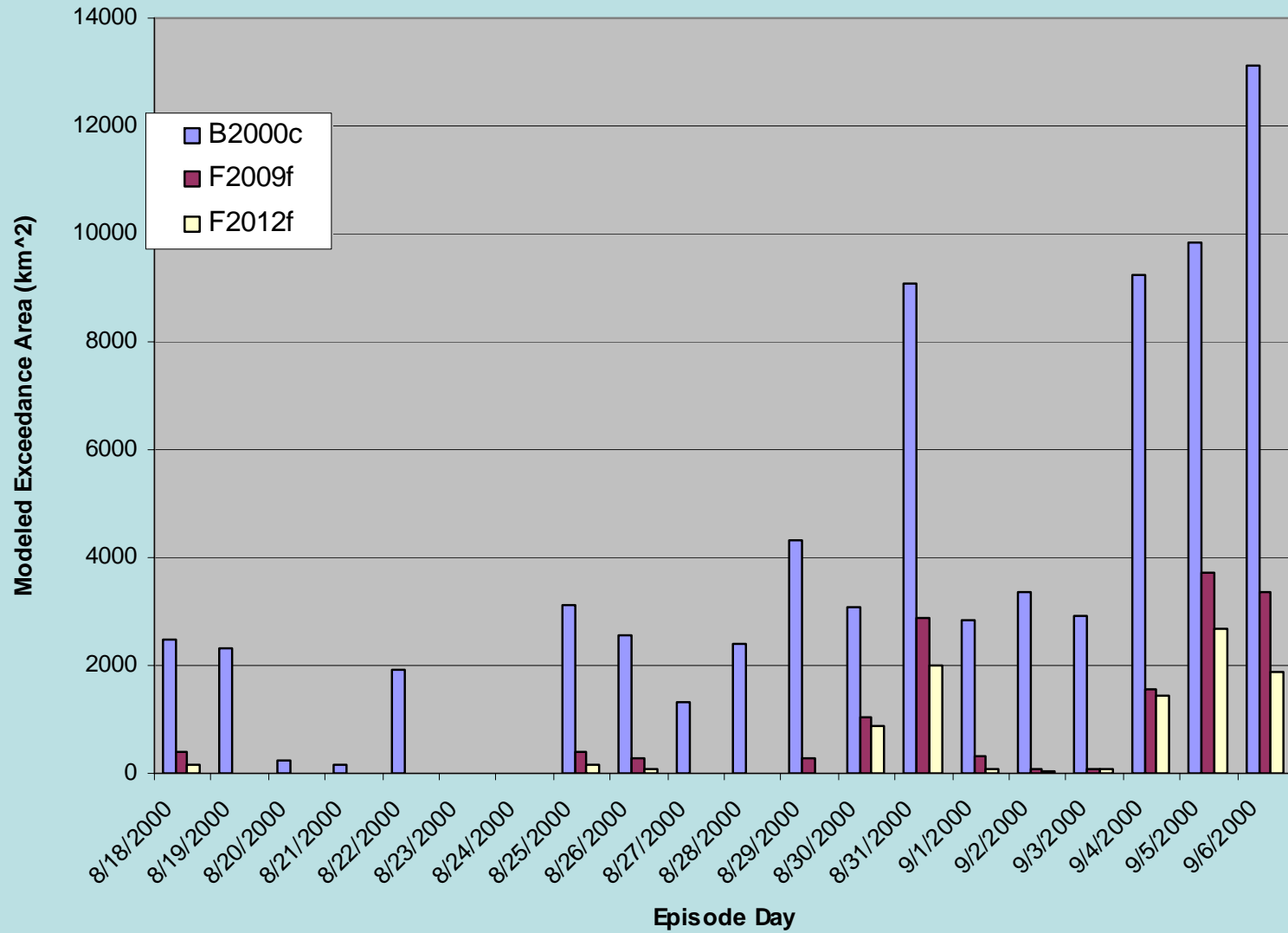
\* Projected attainment

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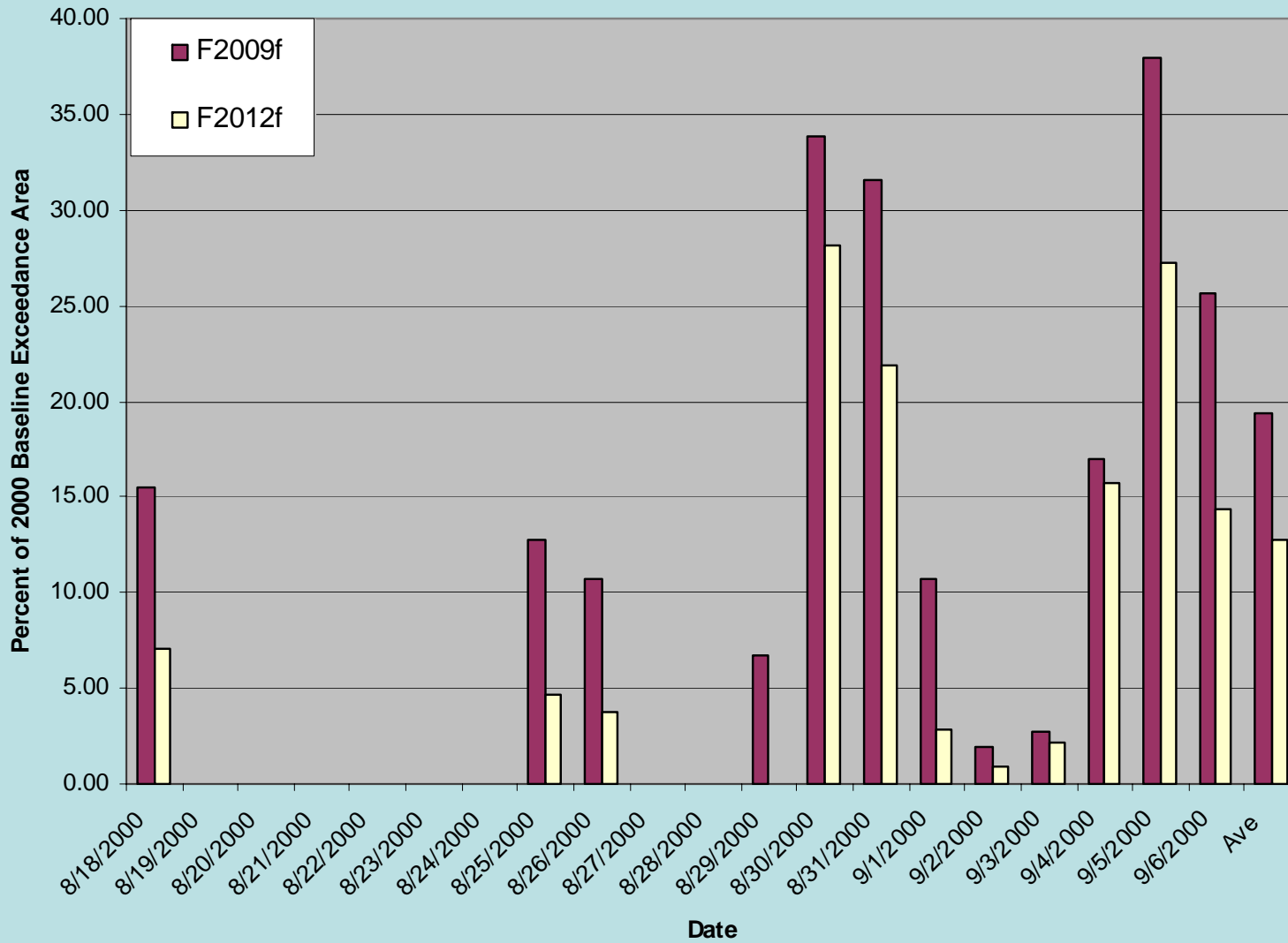
### HGB Eight-County Exceedance Area for 2000c, 2009f & 2012f Baselines



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### HGB Eight-County Percent Exceedance Area Remaining for 2009f & 2012f Baselines



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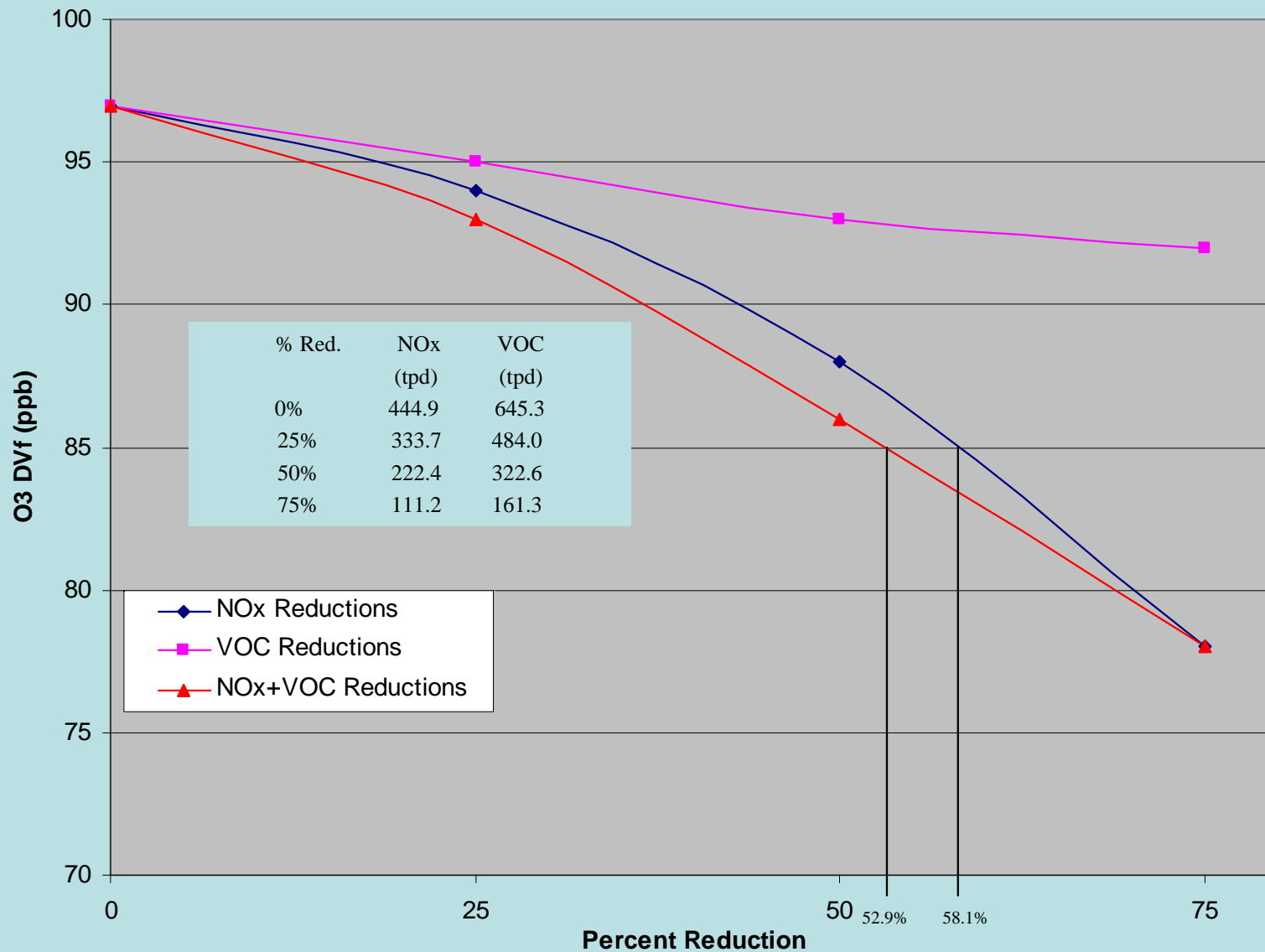


## Summary of Results

- The average percent of the 2000 baseline exceedance area (area with eight-hour ozone  $> 84\text{ppb}$ ) projected to be remaining in 2009 & 2012 is 19.3% and 12.7%, respectively.
- Of the 18 modeled exceedance days in the 2000 baseline, 12 exceedance days remain in 2009 and 11 exceedance days remain in 2012.



### HGB Eight-County 2009f Across-the-Board Reduction Matrix

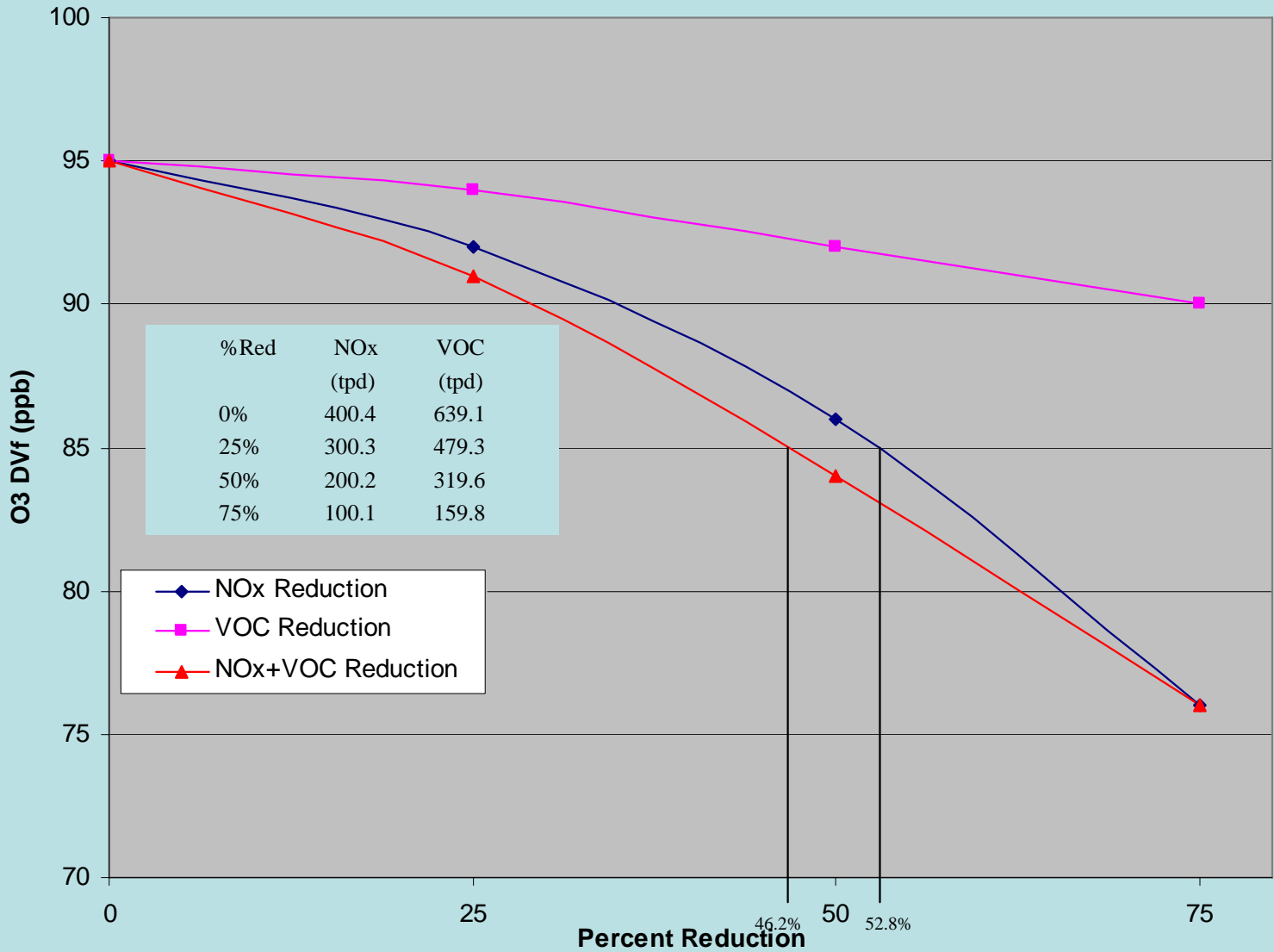


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### HGB Eight-County 2012f Across-the-Board Reduction Matrix



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## Summary of Results

The Reduction Matrix Modeling results for both 2009 & 2012 indicate:

- Anthropogenic NO<sub>x</sub> reductions alone at 58.1% and 52.8% for 2009 and 2012, respectively, project attainment. These NO<sub>x</sub> reductions correspond to a projected attainment emission budget of ~188 tpd (186.5 tpd and 188.8 tpd for 2009 and 2012, respectively); and
- Anthropogenic VOC & NO<sub>x</sub> reductions at 52.9% and 46.2% for 2009 and 2012, respectively, project attainment. These VOC & NO<sub>x</sub> reductions correspond to a projected attainment emission budget of ~324 tpd VOC & ~212 tpd NO<sub>x</sub>.

(Note: As these matrix modeling results indicate, the ozone DVf responds differently to VOC and NO<sub>x</sub> reductions. Similarly, the ozone DVf is expected to respond differently to comparable reductions from various emission source categories. Therefore the actual VOC & NO<sub>x</sub> attainment emission budget may be slightly larger than projected with this “Across-the-Board” reduction matrix.)

