

# 8-County HGB Low-Level NO<sub>x</sub> Reduction Modeling Sensitivity

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# 2009 HGAC+TxLED with Low-Level Source NO<sub>x</sub> Reduction Matrix of 25%, 50% & 75%

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## HGAC+TxLED

- **On-Road Mobile Sources (0.5 tpd);**
- **Non-Road Mobile sources (3.9 tpd); and**
- **Ships (0.9 tpd).**

## Low-Level sources include:

- **Low-Level Point Sources;**
- **On-Road Mobile Sources;**
- **Non-Road Mobile sources; and**
- **Area Sources.**

Note: Ships are treated as Elevated Sources



## 2009 HGAC+TxLED with Low-Level NO<sub>x</sub> Emissions in the 8-County HGB Nonattainment Area

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- **Low-Level Point Source (NGUs) NO<sub>x</sub> emissions = 7.0 tpd;**
- **On-Road Mobile Source NO<sub>x</sub> emissions = ..... 152.2 tpd;**
- **Non-Road Mobile Source NO<sub>x</sub> Emissions = ..... 42.5 tpd;**  
**and**
- **Area Source NO<sub>x</sub> emissions = ..... 45.3 tpd**
- **Total Low-Level Source NO<sub>x</sub> Emissions = ..... ~247 tpd**
  
- **25%, 50% & 75% Low-Level source NO<sub>x</sub> reductions are  
61.8 tpd, 124 tpd & 185 tpd, respectively.**

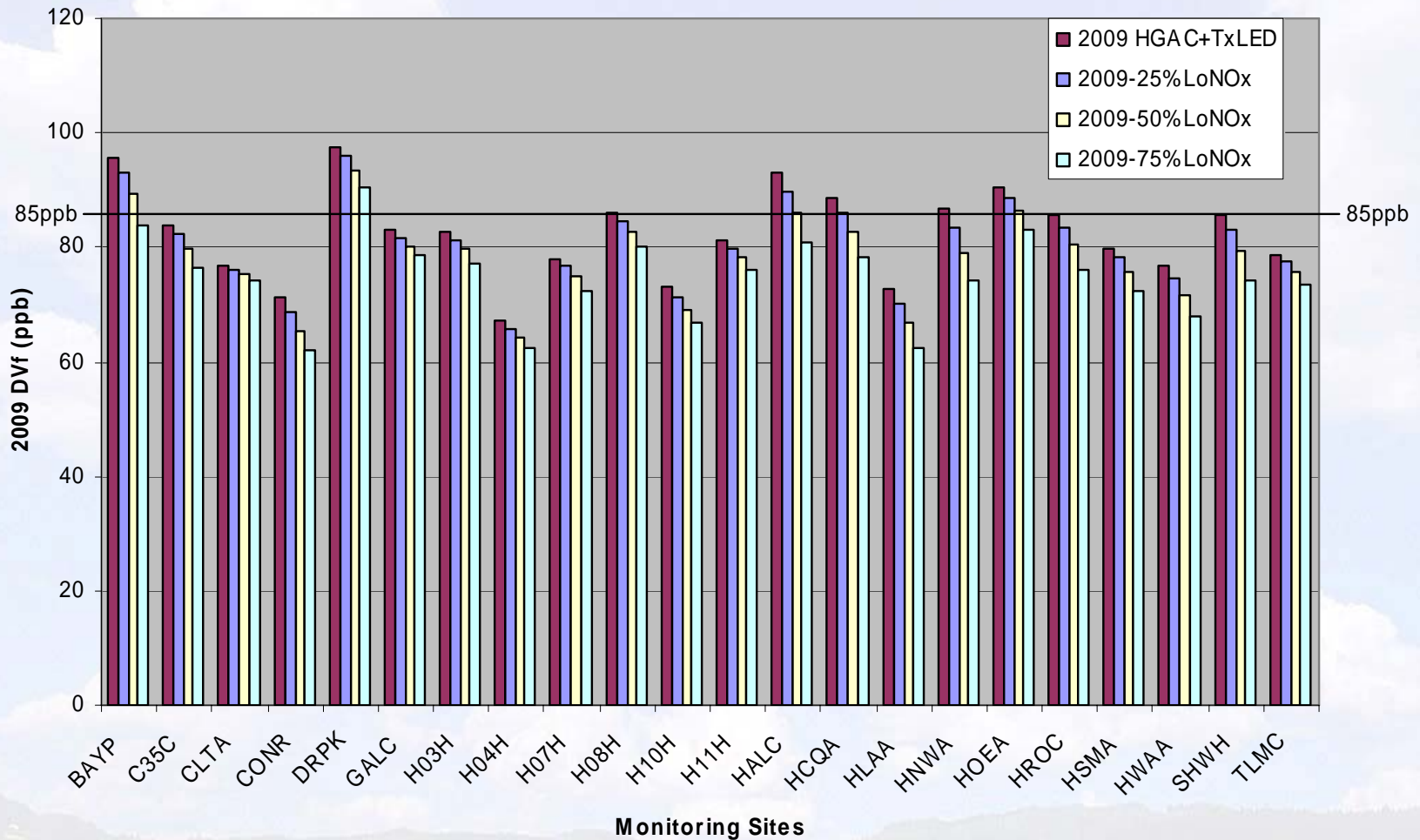


## HGB 8-County Total NO<sub>x</sub> Emissions (tpd) for 2009 Future Baseline, with Low-Level Reductions of 25% 50% & 75%

<b>Emission Category</b>	<b>2009 Baseline</b>	<b>25% Low-Level</b>	<b>50% Low-Level</b>	<b>75% Low-Level</b>
<b>Points</b>	<b>157.0</b>	<b>155.2</b>	<b>153.5</b>	<b>151.8</b>
<b>Ships</b>	<b>42.6</b>	<b>42.6</b>	<b>42.6</b>	<b>42.6</b>
<b>On-Road Mobile</b>	<b>152.2</b>	<b>114.2</b>	<b>76.1</b>	<b>38.0</b>
<b>Non-Road Mobile</b>	<b>42.5</b>	<b>31.9</b>	<b>21.2</b>	<b>10.6</b>
<b>Area</b>	<b>45.3</b>	<b>34.0</b>	<b>22.6</b>	<b>11.3</b>
<b>Totals</b>	<b>439.6</b>	<b>377.9</b>	<b>316.0</b>	<b>254.3</b>
<b>%-Reduction from 2009</b>	<b>0.0 %</b>	<b>-14.0 %</b>	<b>-28.1%</b>	<b>-42.2 %</b>



# 2009 Future Design Values (DVf's) with 25%, 50%, and 75% Low-Level NO<sub>x</sub> Reductions





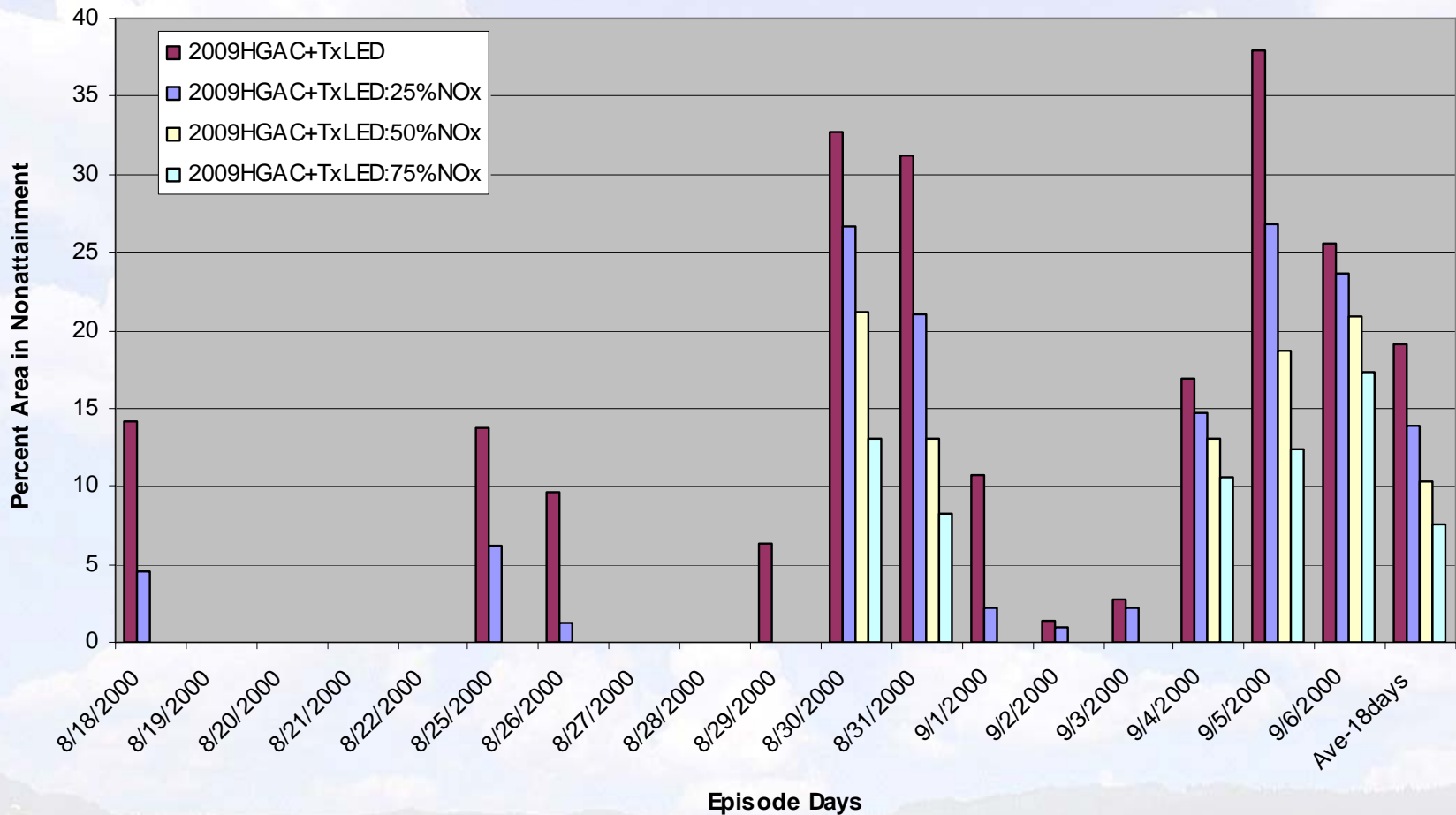
## 8-Hour 2009 HGAC+TxLED Ozone Design Values (DVf's)

Monitoring Site Code	2009 HGAC+TxLED	25% NO <sub>x</sub> Low-Level	50% NO <sub>x</sub> Low-Level	75% NO <sub>x</sub> Low-Level
DRPK	97.4	95.8	93.5	90.3
BAYP	95.6	93.0	89.2	83.8*
HALC	92.9	89.8	85.9	80.9*
HOEA	90.4	88.7	86.4	83.1*
HCQA	88.6	86.1	82.6*	78.1*
HNWA	86.8	83.3*	79.1*	74.2*
H08H	86.0	84.5*	82.6*	80.1*
SHWH	85.6	83.0*	79.3*	74.2*
HROC	85.6	83.5*	80.6*	76.2*

\* denotes monitors below 85 ppb



# Percent of 2000 Baseline Area Remaining Nonattainment in 2009 with HGAC + TxLED and Low-Level NO<sub>x</sub> Reductions





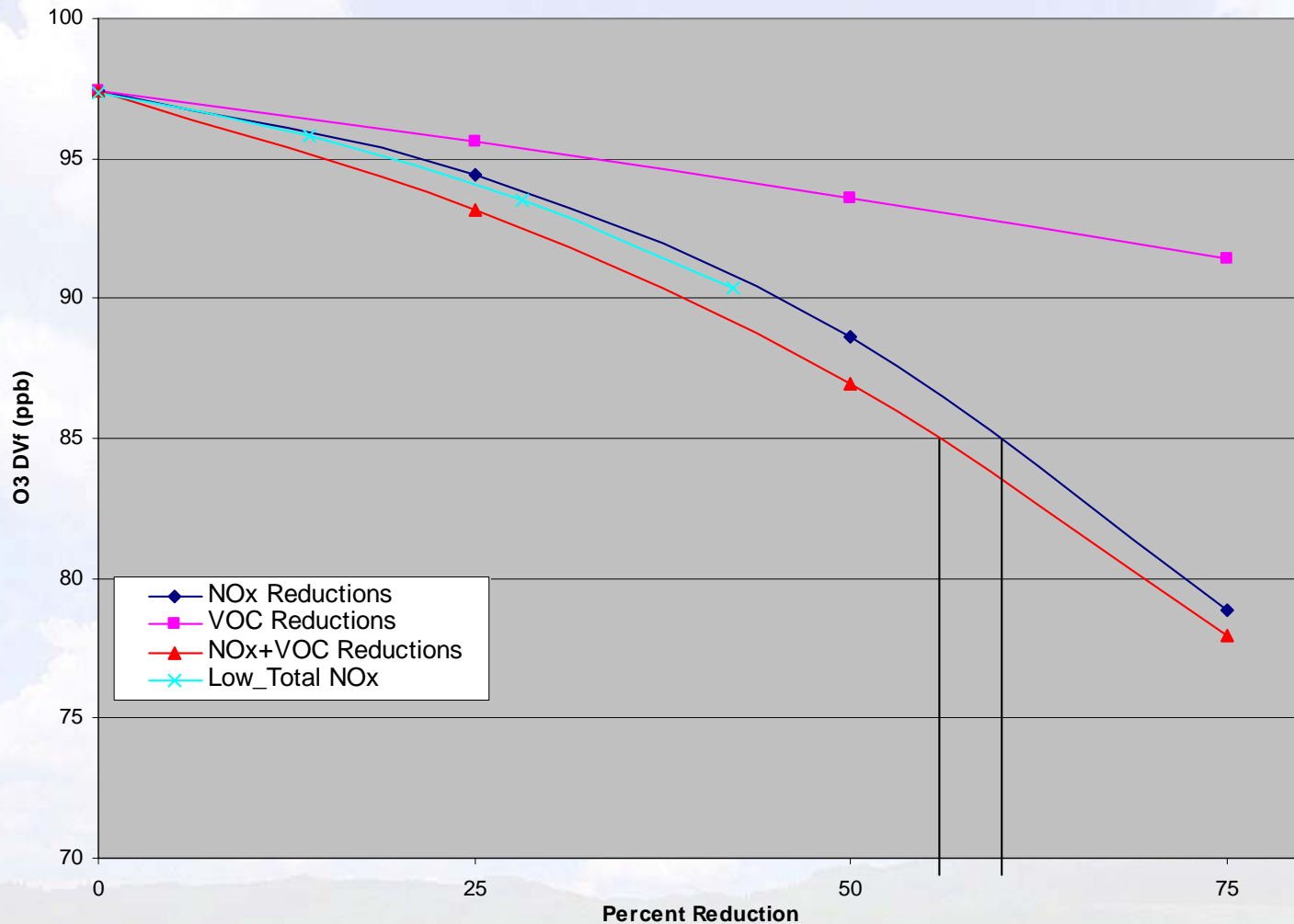
# Tabulation of Changes

Emissions Changes				Results In Eight-County HGB Area		
Change from 2009 Baseline	NO <sub>x</sub> (tpd)	VOC (tpd)	Change Max. Mon	Change in Exc Mon	Avg Change Exc Area	Change in Exc Days
<b>HGAC+TxLED</b>	<b>-5.3</b>	<b>0</b>	<b>0.0</b>	<b>0 monitors (9 to 9)</b>	<b>-20.4 km<sup>2</sup> (-2.5%)</b>	<b>0 days (12 to 12 days)</b>
<b>25% Low-level NO<sub>x</sub> Reduction</b>	<b>-67</b>	<b>0</b>	<b>-1.6 ppb (DRPK)</b>	<b>4 monitors (9 to 5)</b>	<b>- 236 km<sup>2</sup> (-29.1%)</b>	<b>1 days (12 to 11 days)</b>
<b>50% Low-level NO<sub>x</sub> Reduction</b>	<b>-129</b>	<b>0</b>	<b>-3.9 ppb (DRPK)</b>	<b>5 monitors (9 to 4)</b>	<b>- 387 km<sup>2</sup> (-47.7%)</b>	<b>7 days (12 to 5 days)</b>
<b>75% Low-level NO<sub>x</sub> Reduction</b>	<b>-191</b>	<b>0</b>	<b>-7.1 ppb (DRPK)</b>	<b>8 monitors (9 to 1)</b>	<b>- 497 km<sup>2</sup> (-61.4%)</b>	<b>7 days (12 to 5 days)</b>



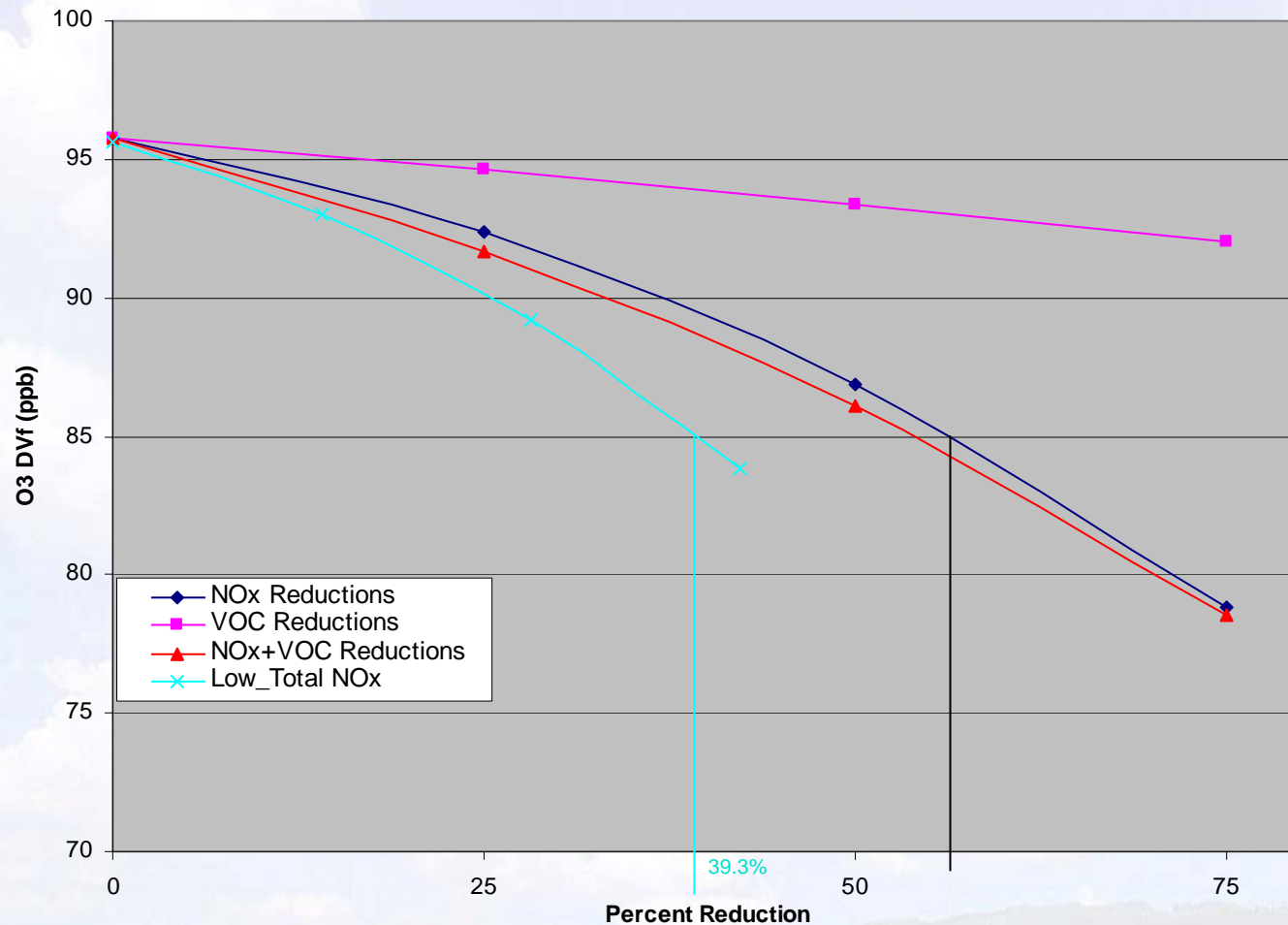


# DRPK Monitor 2009f Reduction Matrix



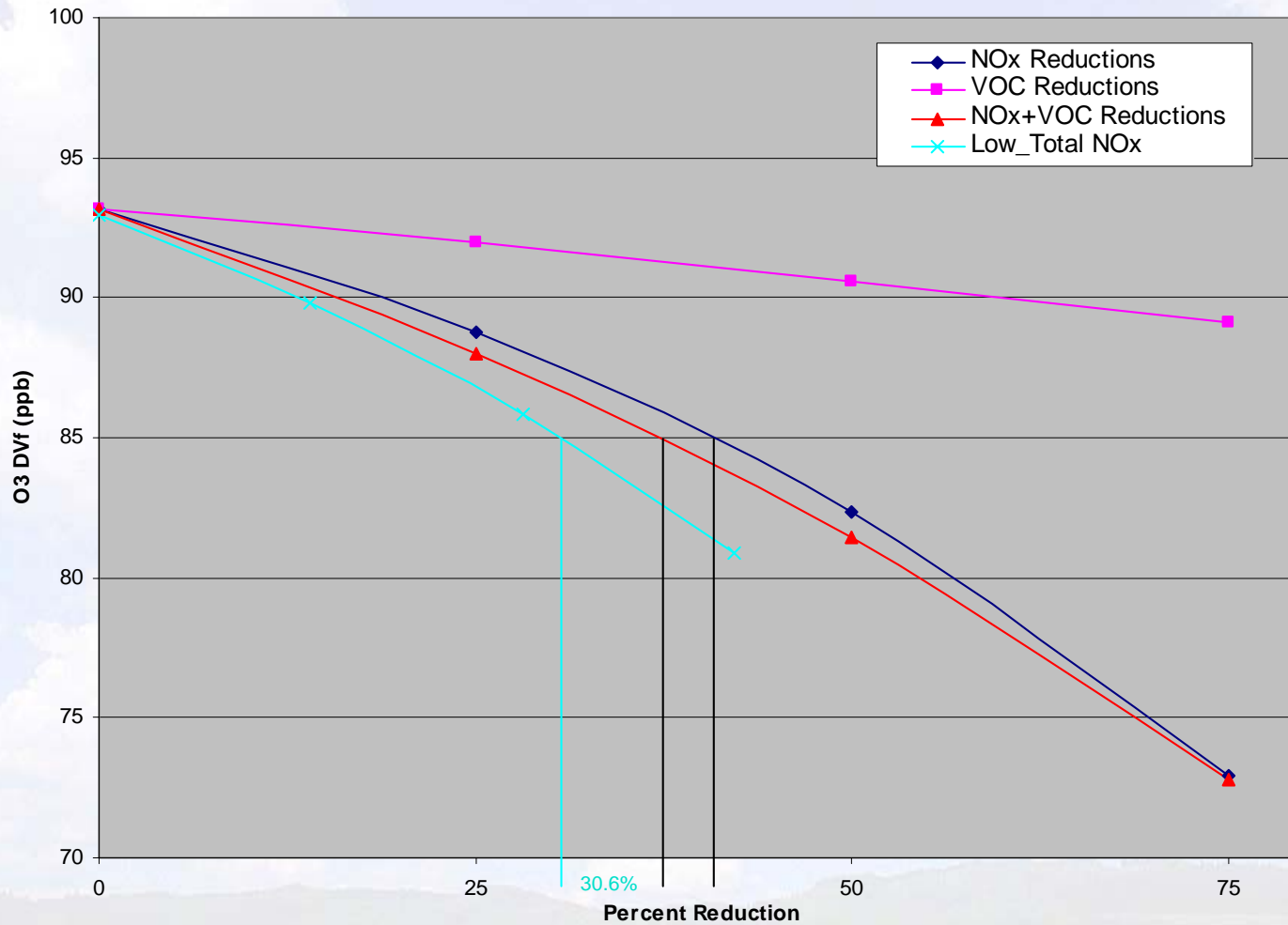


# BAYP Monitor 2009f Reduction Matrix



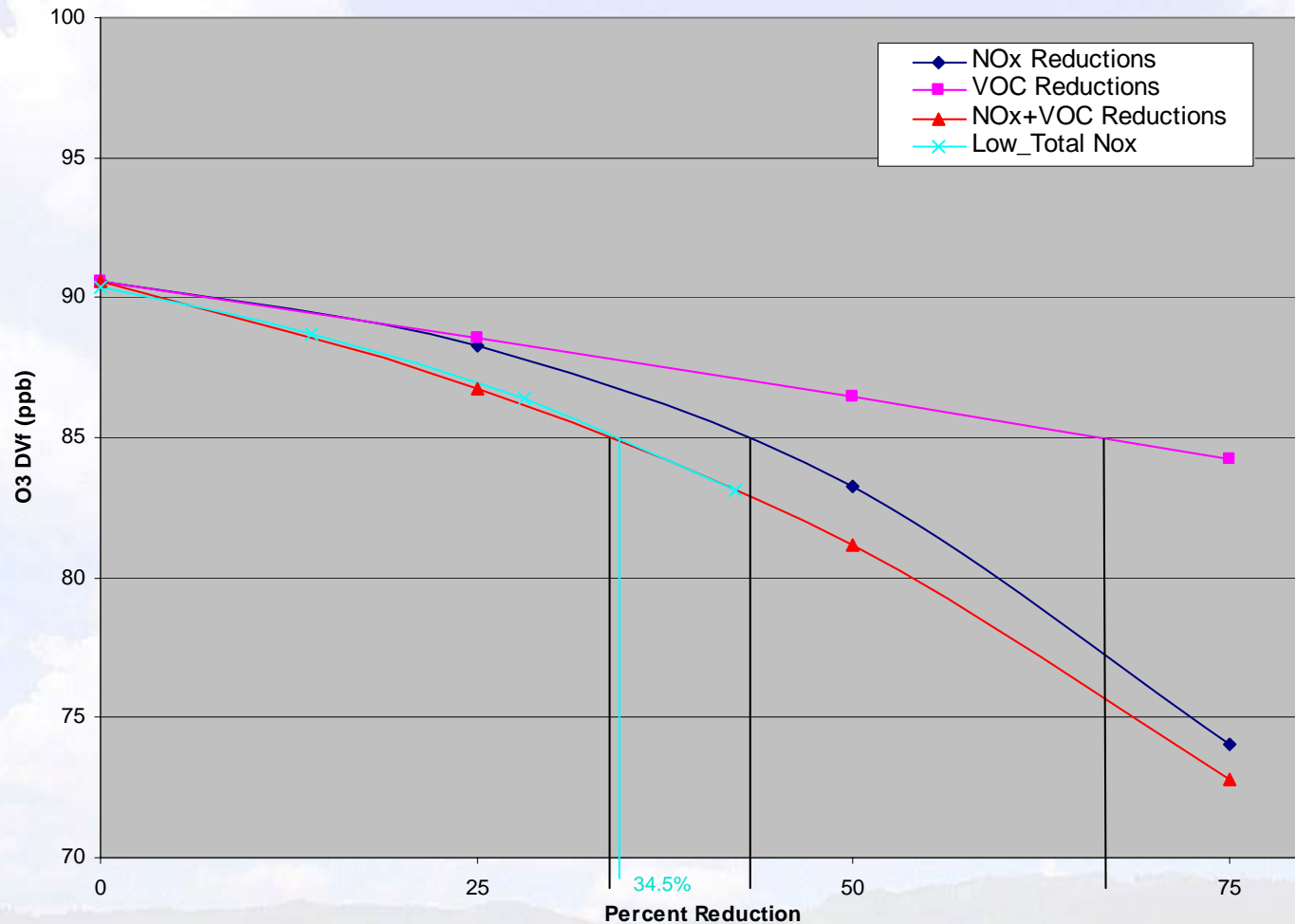


# HALC Monitor 2009f Reduction Matrix



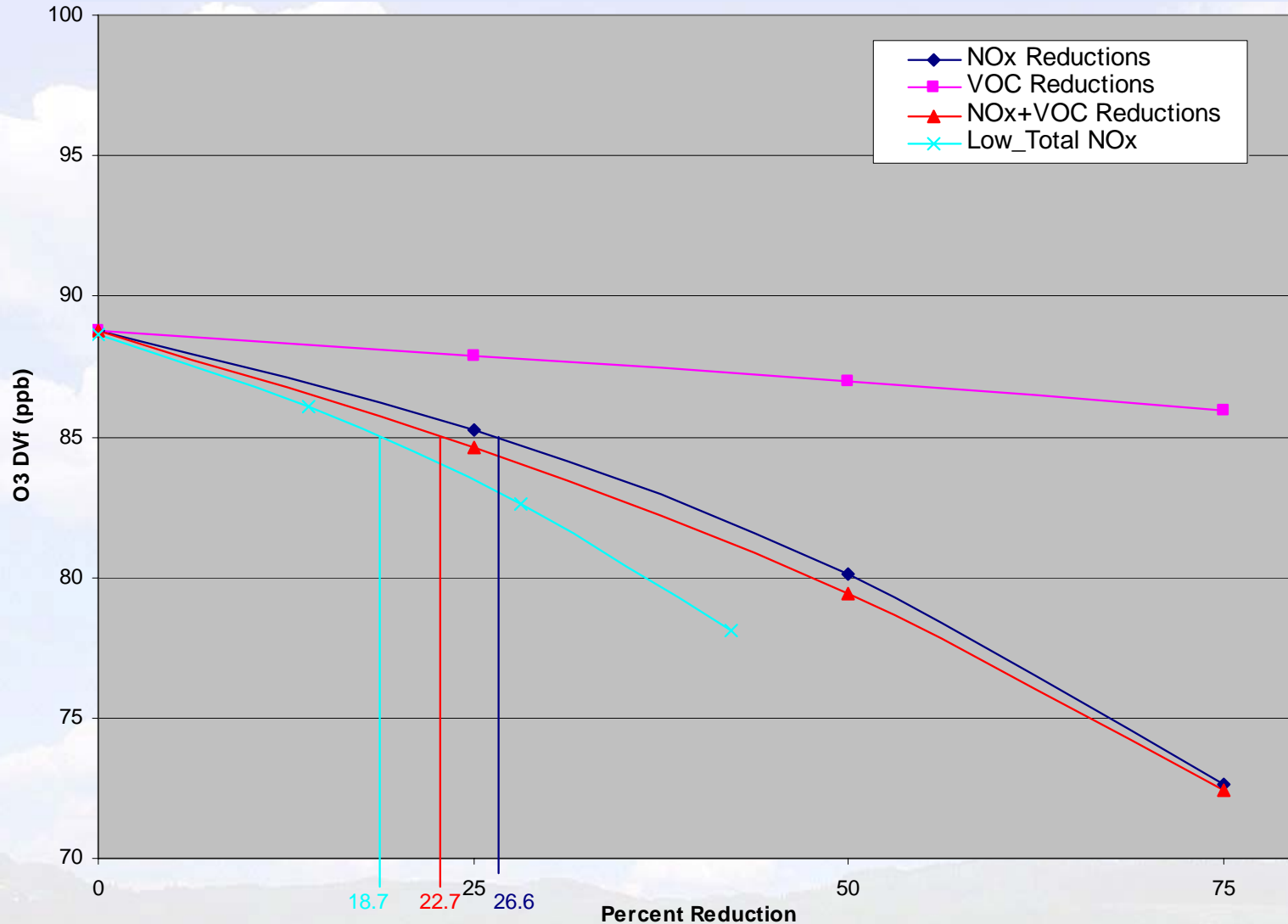


# HOEA Monitor 2009f Reduction Matrix





# HCQA Monitor 2009f Reduction Matrix





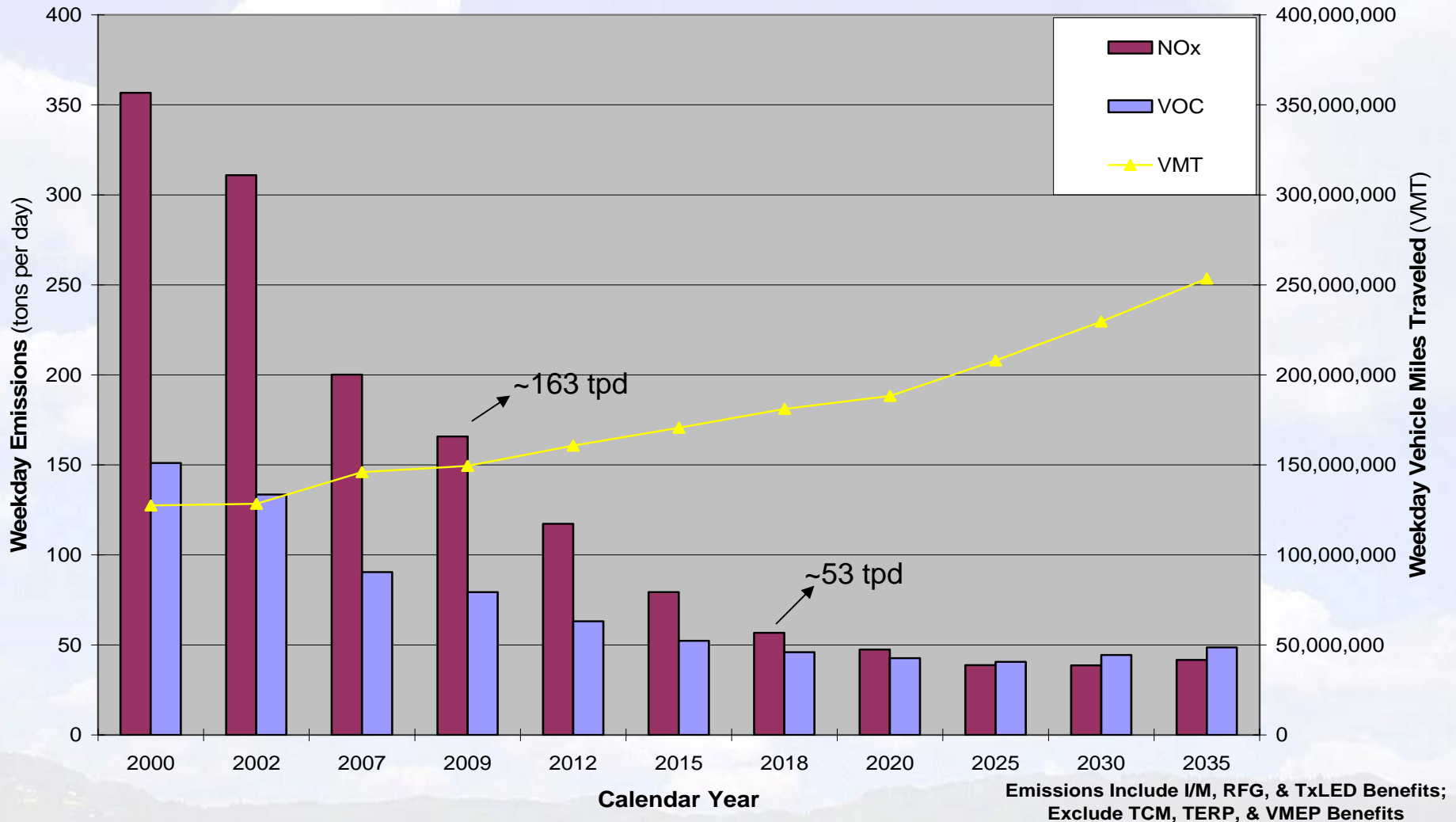
# NO<sub>x</sub> Reduction Features

Monitor Code	Attainment Reduction from All NO <sub>x</sub> Sources	Attainment Reduction from Ground-Level NO <sub>x</sub> Sources	Difference in NO <sub>x</sub> Reduction	Reduction Efficiency (ppb/ton)	
				All NO <sub>x</sub>	Ground-level NO <sub>x</sub>
DRPK	258 tpd (58.1%)	>248 tpd (55.1%)*	<10 tpd	0.048	<0.050
BAYP	237 tpd (53.2%)	177 tpd (39.3%)	60 tpd	0.045	0.060
HOEA	195 tpd (43.2%)	156 tpd (34.5%)	39 tpd	0.029	0.036
HALC	184 tpd (40.9%)	135 tpd (30.6%)	49 tpd	0.045	0.061
HCQA	121 tpd (26.6%)	87 tpd (18.7%)	34 tpd	0.031	0.044
HNWA	56 tpd (11.9%)	37 tpd (7.6%)	19 tpd	0.036	0.054
H08H	56 tpd (11.9%)	45 tpd (10.3%)	11 tpd	0.021	0.027
HROC	35 tpd (7.2%)	24 tpd (4.5%)	11 tpd	0.020	0.029
SHWH	30 tpd (6.0%)	18 tpd (3.3%)	12 tpd	0.023	0.039

\* Although tpd values in this column reflect ground-level NO<sub>x</sub> emissions reductions, the corresponding percentages are relative to total NO<sub>x</sub> emissions (450 tpd). Reducing ground-level NO<sub>x</sub> emissions alone by 100% (248 tpd) is not predicted to yield a DRPK DVf < 85ppb

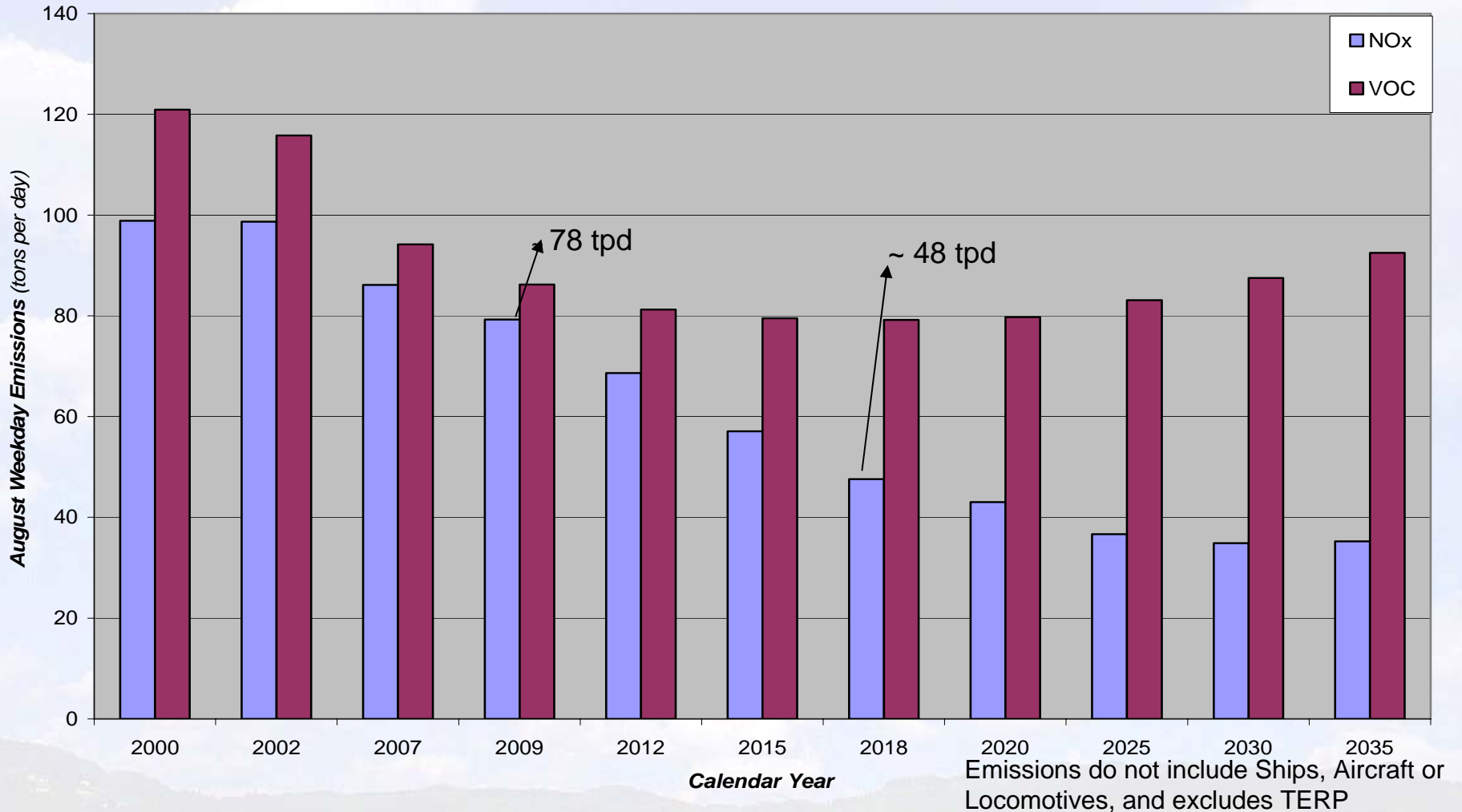


# 8-County HGB On-Road Weekday Emissions Summary from 2000-2035





# 8-County HGB Non-Road Emissions Based on National Mobile Inventory Model Default Inputs







## Implications for 2018

Adjusting the 2009 to 2018 NO<sub>x</sub> emission reductions from on-road and NMIM non-road mobile source categories for VMEP & TERP yields a value of 98 tpd, which can be compared to the low-level NO<sub>x</sub> modeling results.

Source Category	2009	2018
On-Road Mobile	163 tpd	53 tpd
Non-Road Mobile	78 tpd	48 tpd
Total TERP + VMEP (on-road & non-road)	-42 tpd	NA
Subtotal On-Road & Non-Road	199 tpd	101 tpd
2009 to 2018 difference	NA	98 tpd

Low-level NO<sub>x</sub> reduction modeling indicates that emission reductions in excess of 98 tpd will be needed for the Deer Park (>248 tpd), Bayland Park (177 tpd), Houston East (156 tpd) and Aldine (135 tpd) monitors to be brought into attainment.