Dallas/Fort Worth

DFW Modeling Update
and
Episode Extension Comparison

DFW Photochemical Modeling
Technical Committee

March 3, 2005

Pete Breitenbach

Discussions with EPA

- TCEQ met with EPA on February 1st to discuss DFW modeling performance

- Agreement on the following items
  - Current episode is typical and representative
  - Six out of 8 days are satisfactory
  - Guidance is not meant to be rigid
  - So don't discard the two marginal days
  - Performance recovers the following days so emissions are probably OK

Discussions with EPA

1. EPA wants to see more days in the performance evaluation.
2. EPA wants Texas to submit an ‘early’ SIP

Is there a way to satisfy both concerns?

- TCEQ agreed to evaluate whether other episodes might be useful to corroborate current results.
  - Evaluate Oklahoma 12k modeling in DFW
  - Consider TexAQS 2000 12k modeling in DFW

DFW Modeling Status

- Additional sensitivity tests complete under HARC contract
  - All ten tests are complete
  - Draft Report is being reviewed
  - Preliminary results show improvement in several areas
- Composite runs are complete
  - Good Performance
  - Process Analysis underway
- Plan to activate TCEQ umbrella contract to assure DFW SIP issues are addressed

DFW Sensitivity Tests

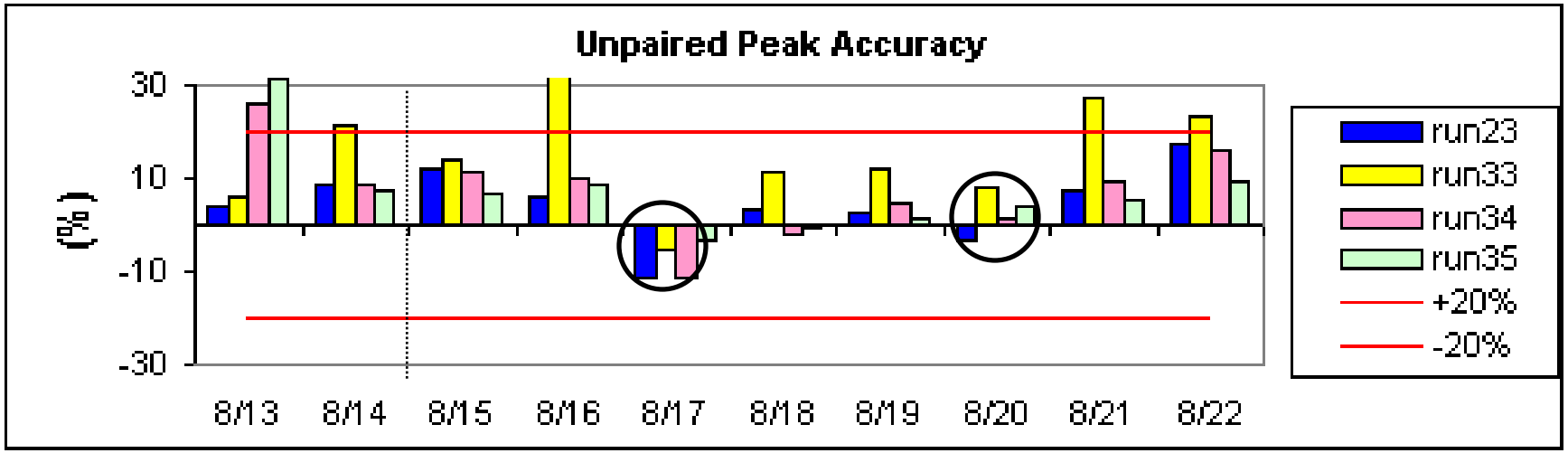
- O Extend Model Top to 14 km
- ✔ Extend Eastern Boundary into Atlantic
- ✘ CMAQ Vertical Mixing
- ✔ ETA Vertical Mixing
- ✘ Grell Convection mechanism
- ✘ Evaluate CB2002 Chemistry
- ✔ Evaluate CB4 chemistry with NOx Recycling

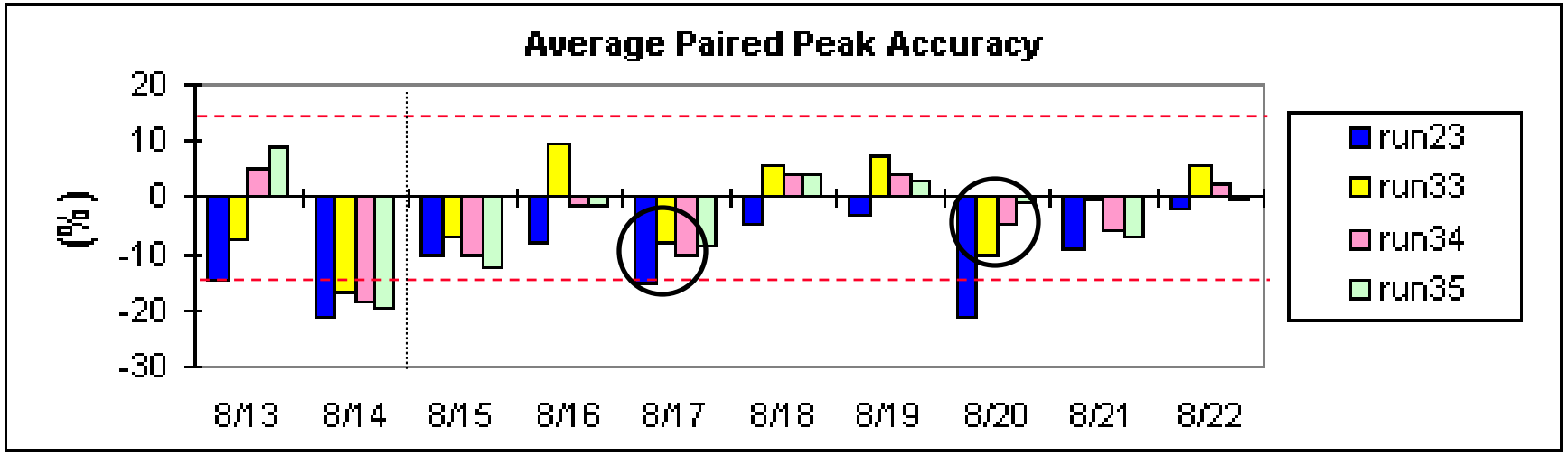
Composite Run Descriptions

- Run 23 = Base Run (Expanded Domain and Top)
- Run 33 = Run 23 with KV3 and NOx Recycling
- Run 34 = Run 24 ETA-PBL and NOx Recycling
- Run 35 = Run 24 ETA-PBL with NOx Recycling and 30% Mobile NOx reduction in the 4 DFW core counties

Composite Run Performance

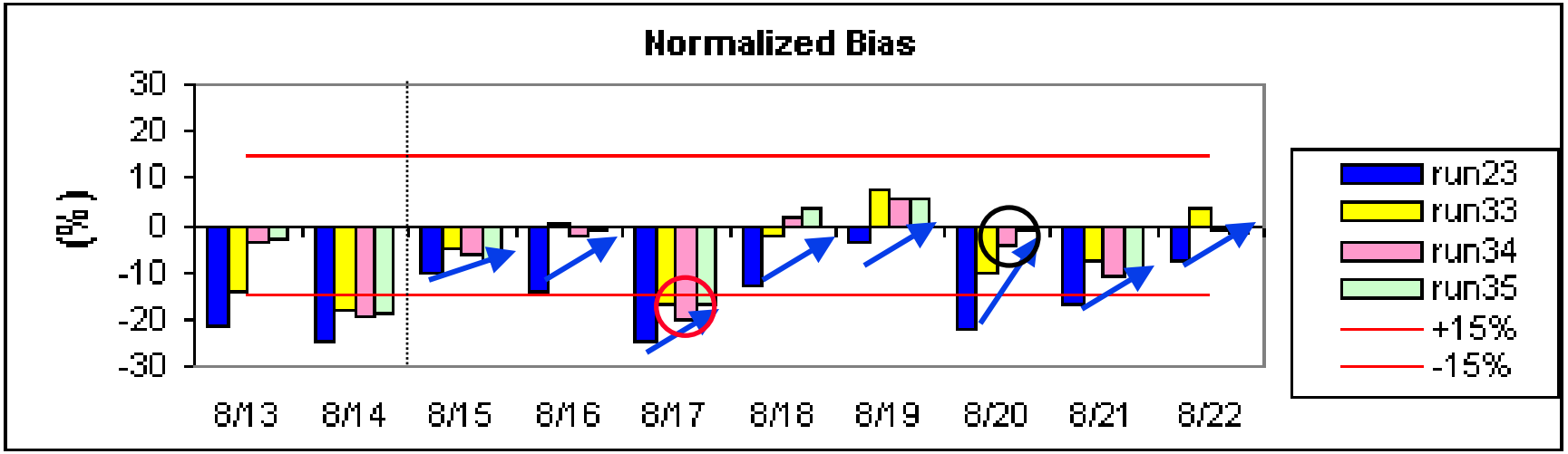
Daily Max and Paired Peaks

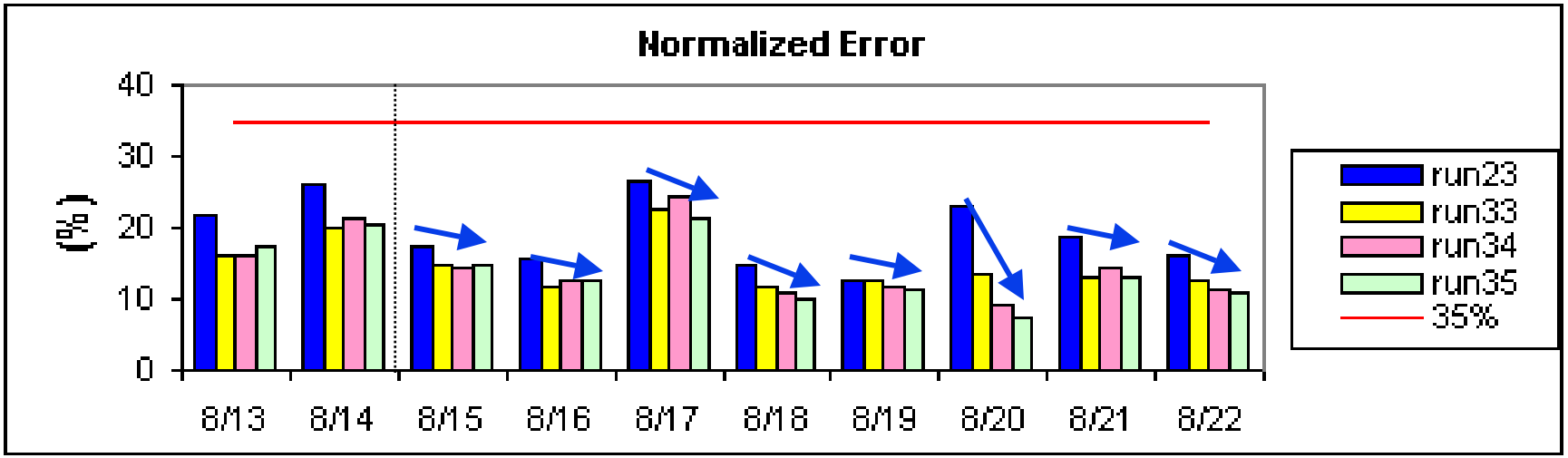




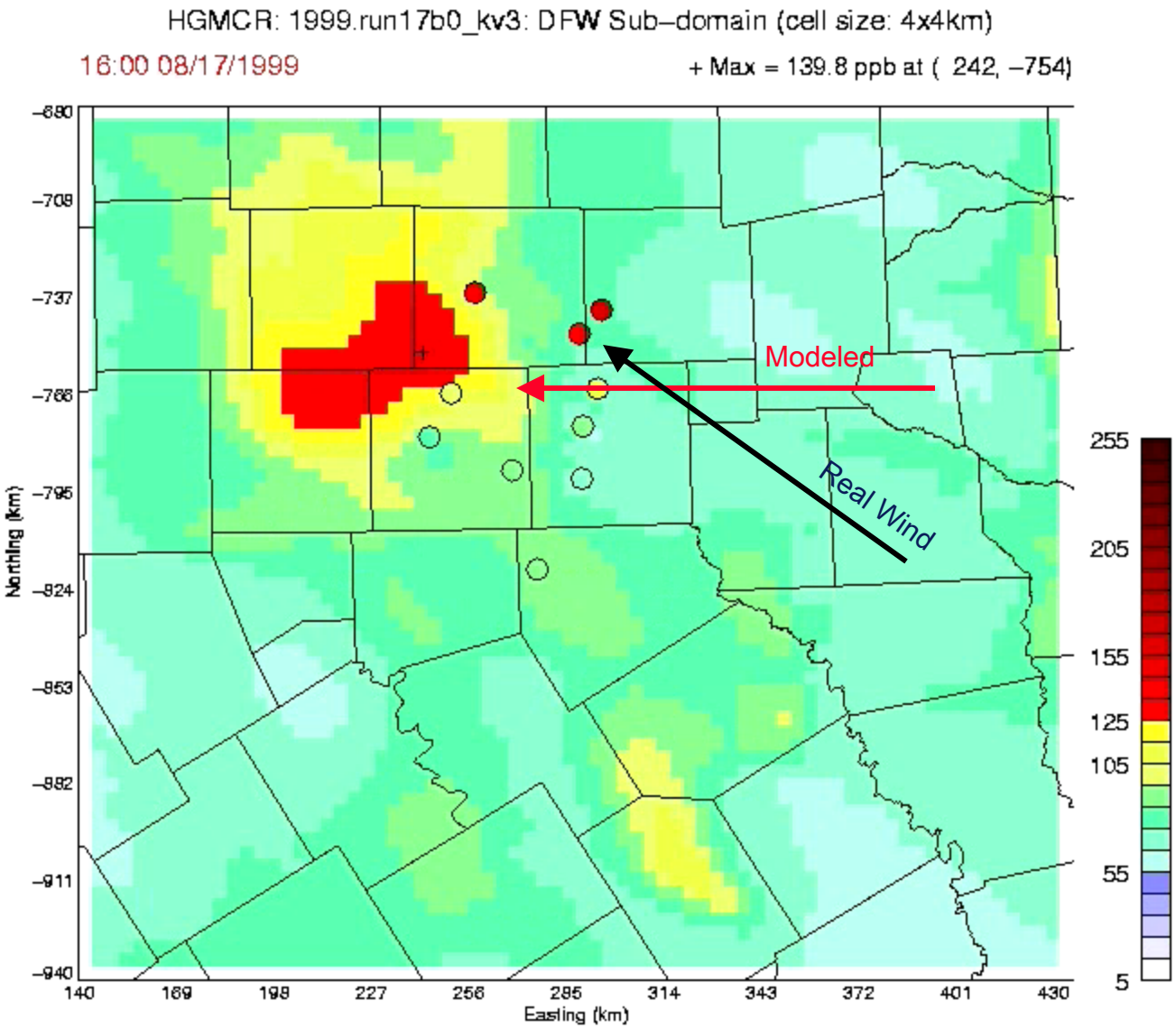
Composite Run Performance

Bias & Gross Error

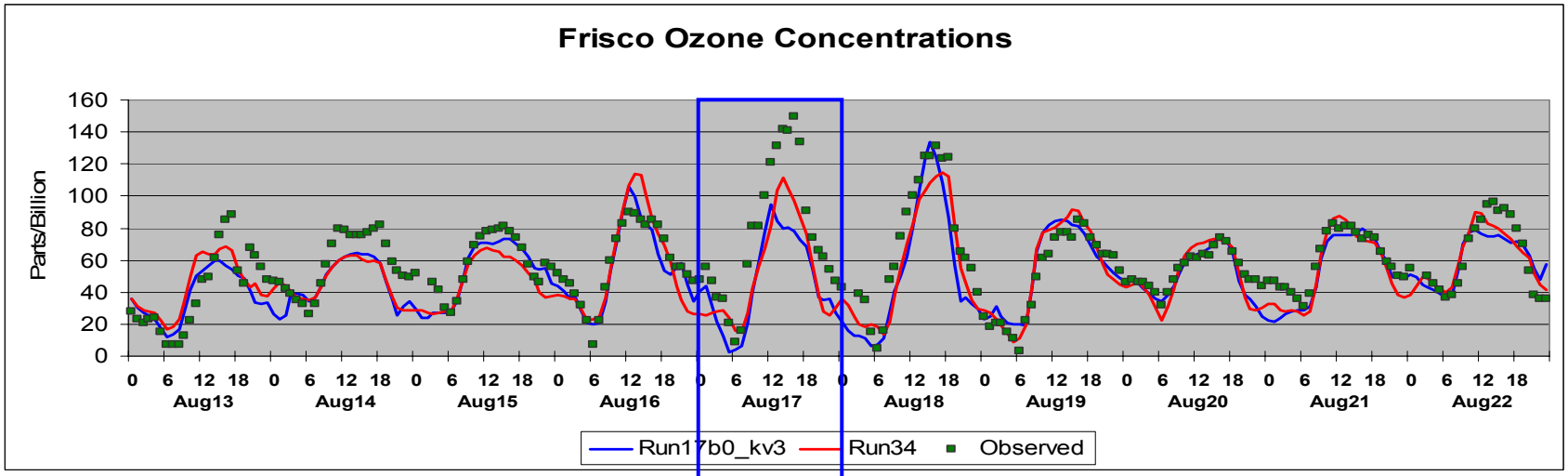


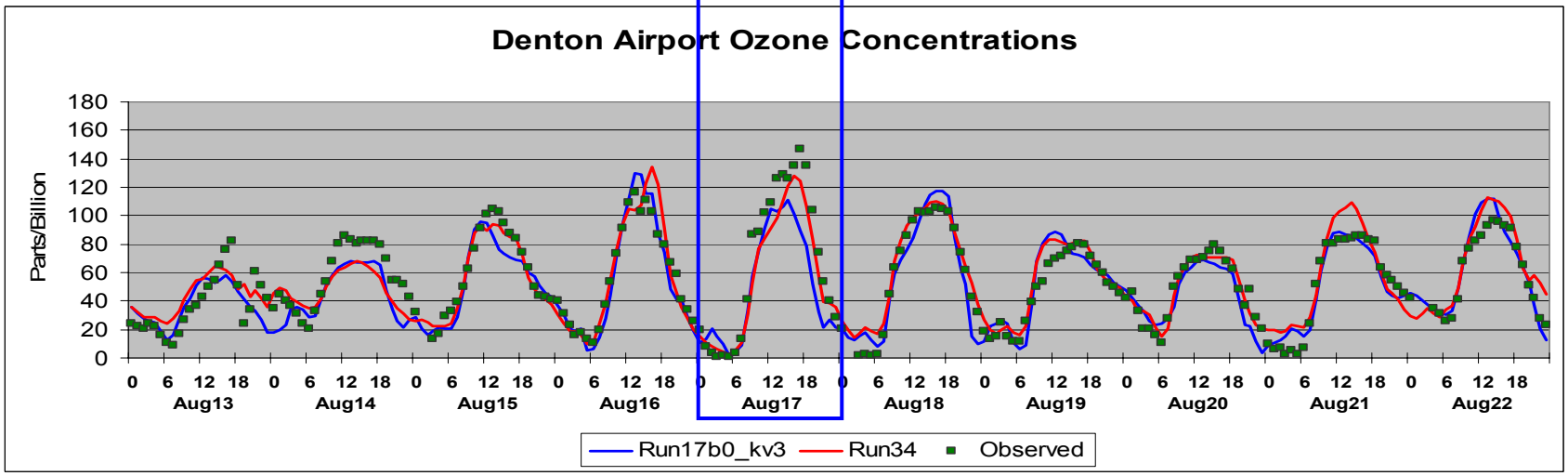


Tuesday, August 17, 1999

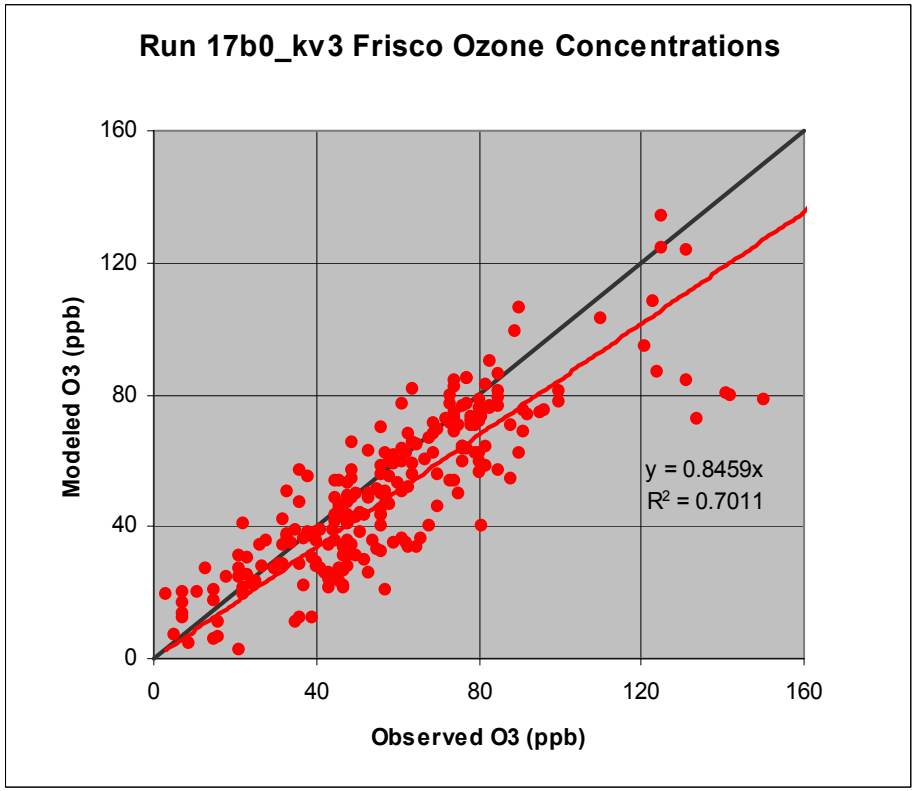


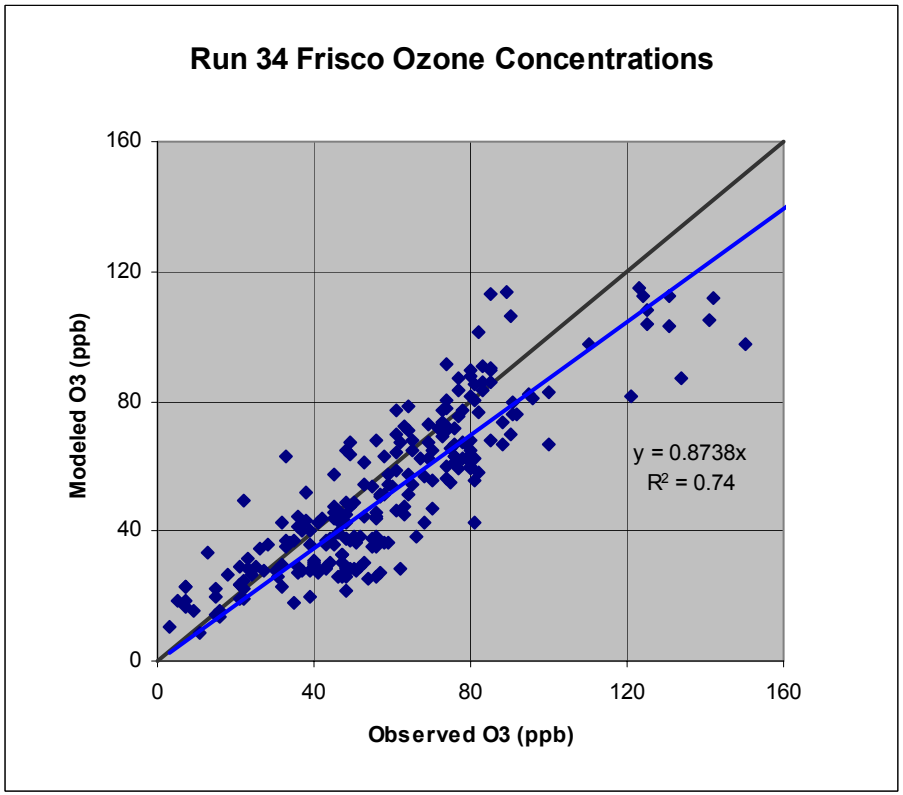
Frisco and Denton Ozone





Frisco Scatter Plots





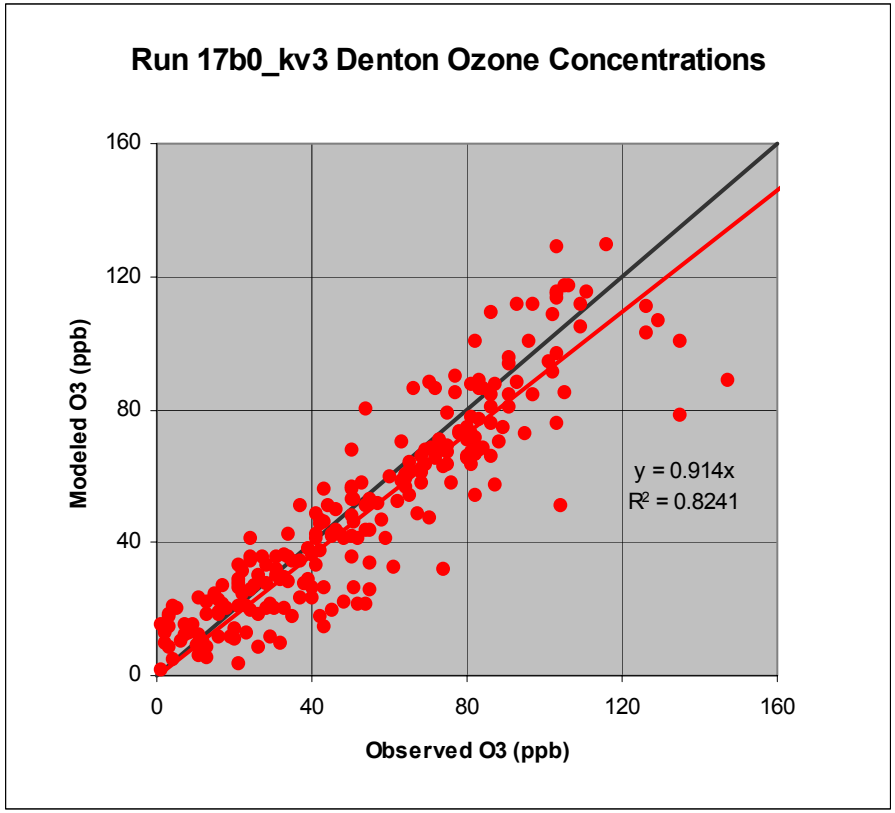
Y= .8459 x

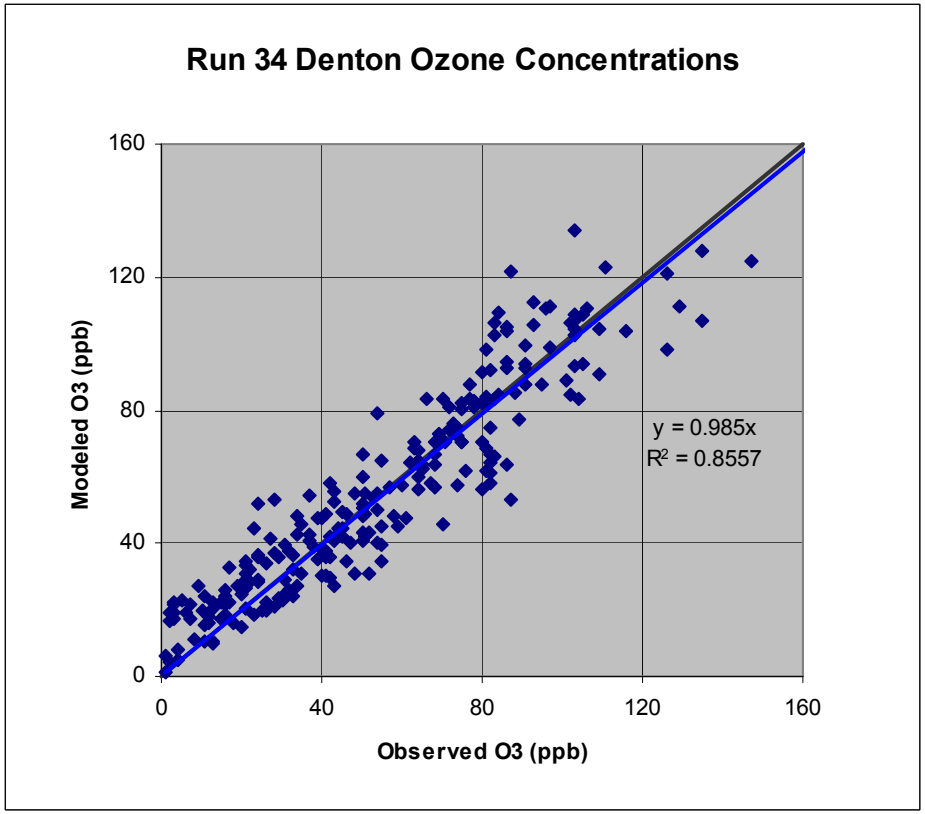
R^2= .7011

Y= .8738 x

R^2= .7400

Denton Scatter Plots





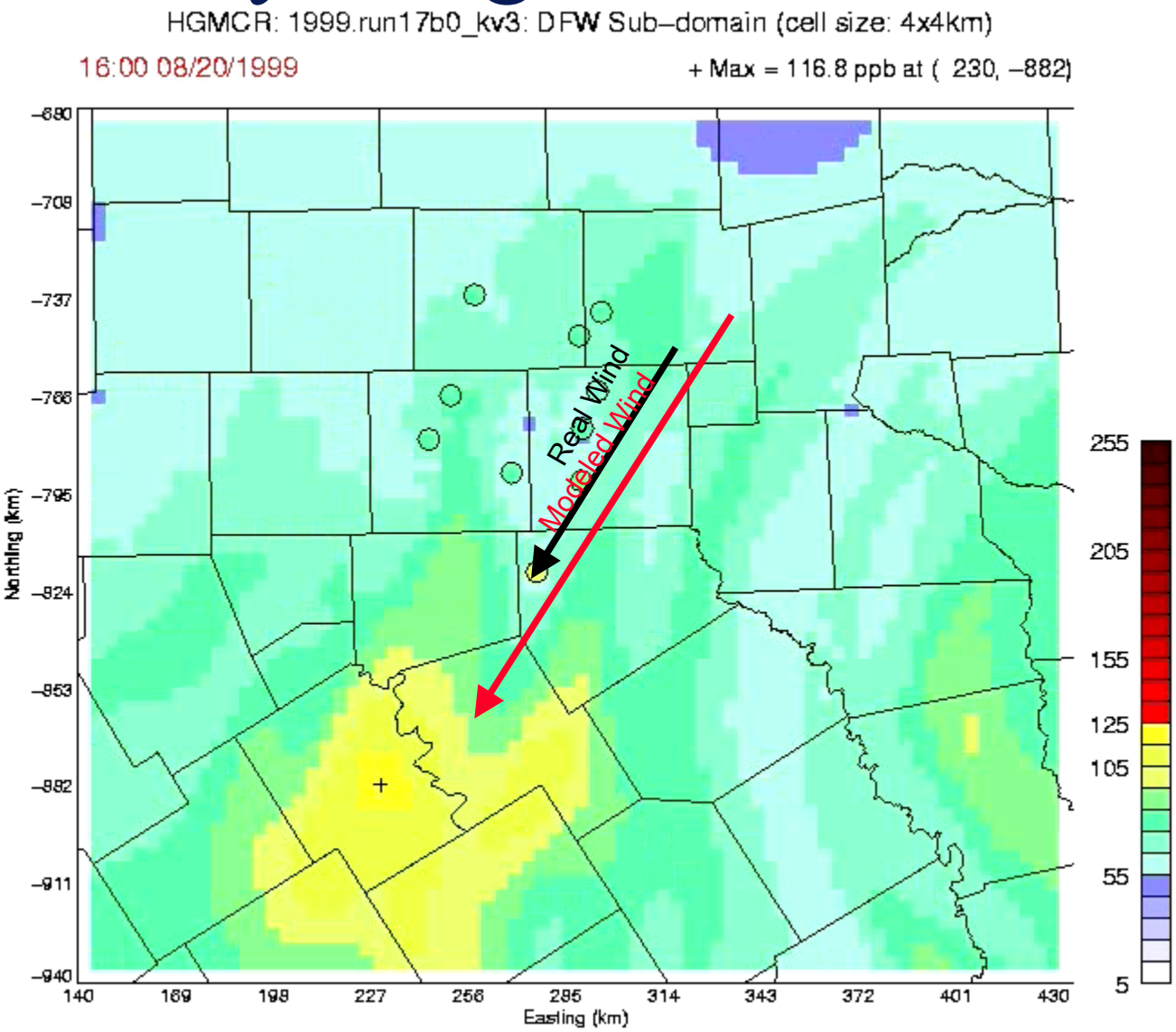
Y= .9140 x

R^2= .8241

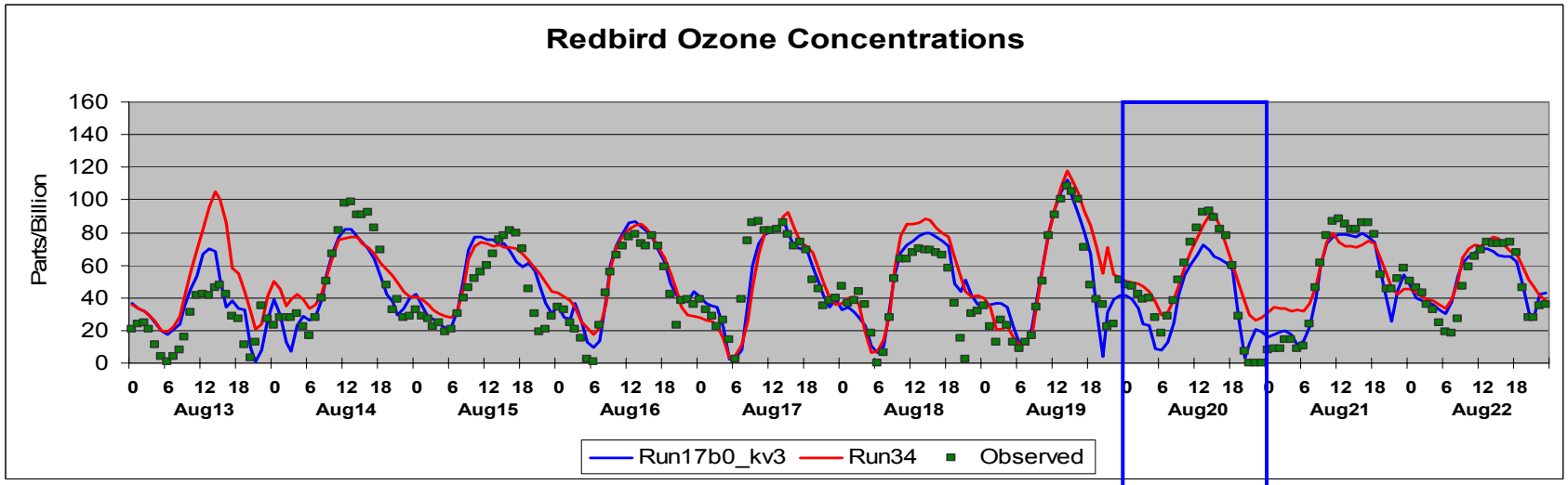
Y= .9850 x

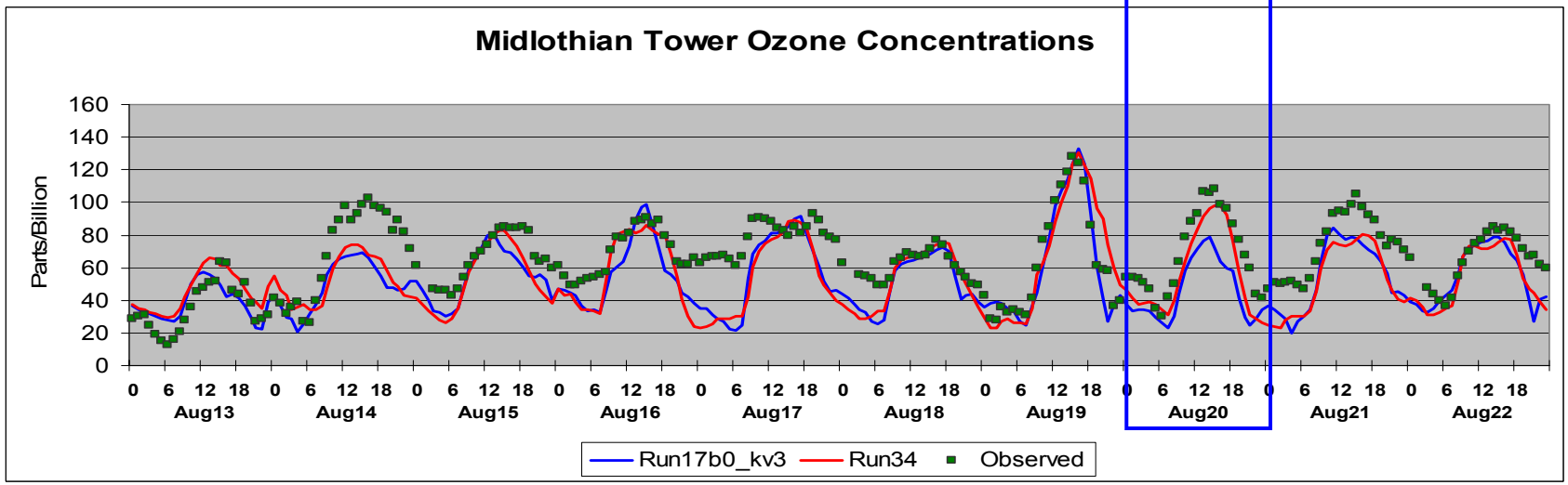
R^2= .8557

Friday, August 20, 1999

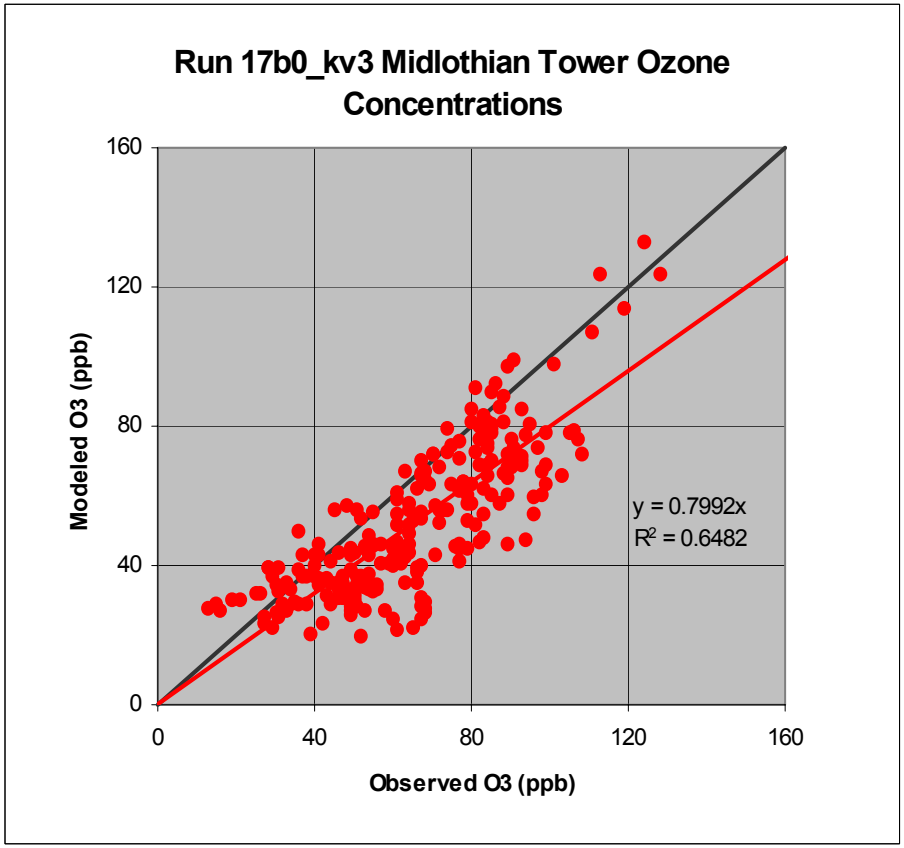


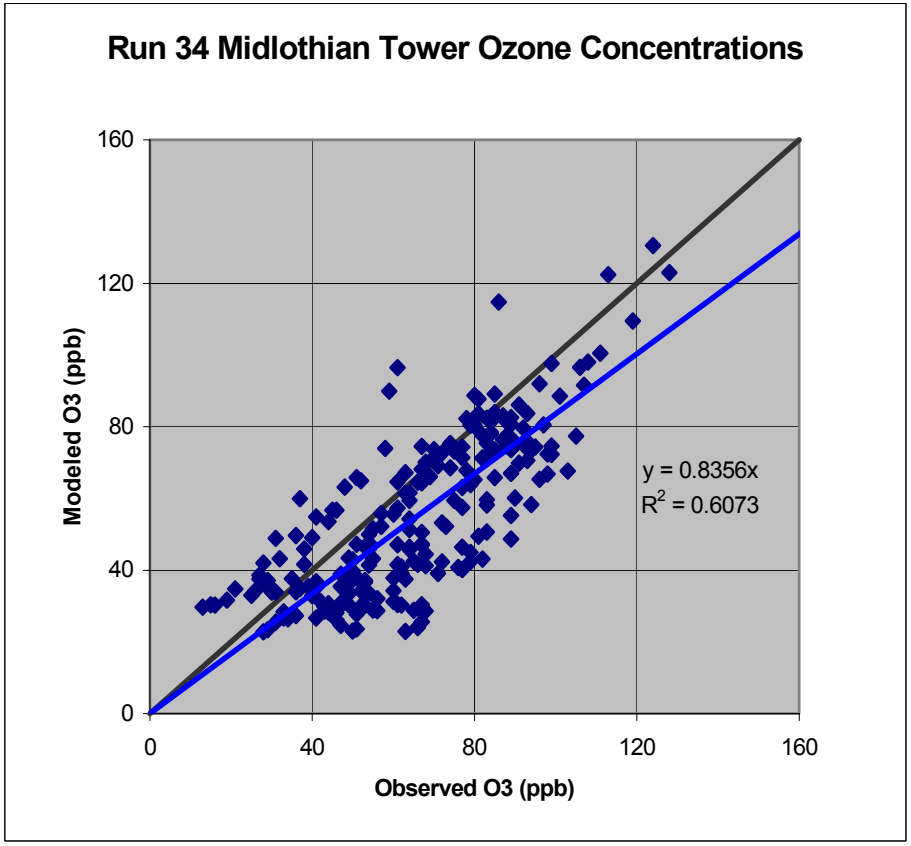
Midlothian and Redbird Ozone





Midlothian Scatter Plot





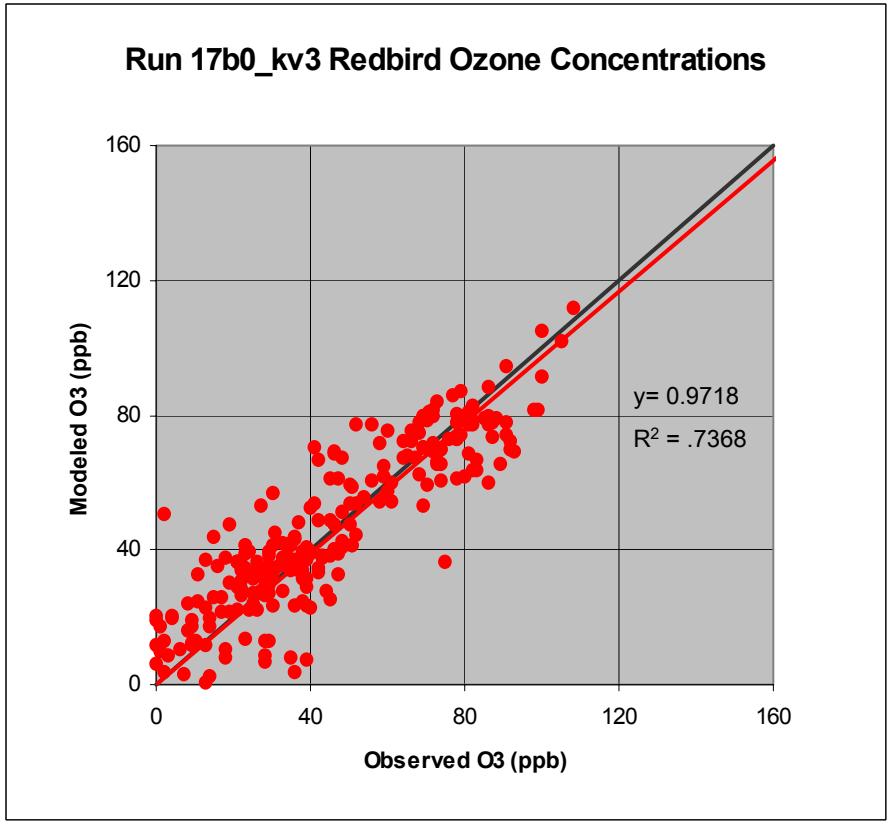
Y= .7992 x

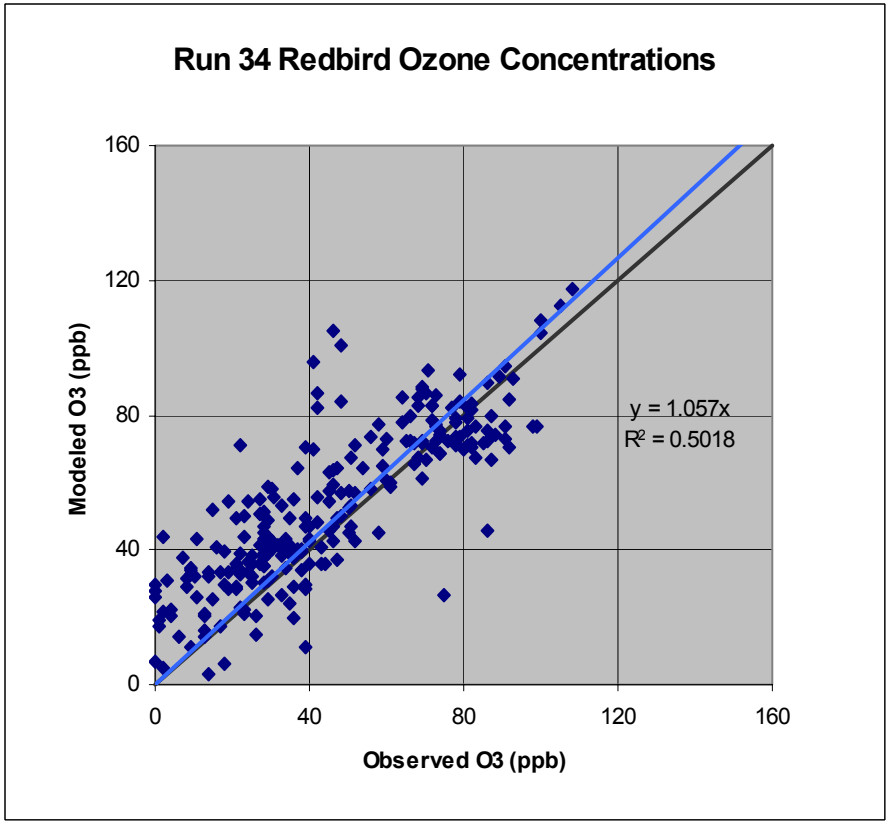
R^2= .6482

Y= .8356 x

R^2= .6073

Redbird Scatter Plot





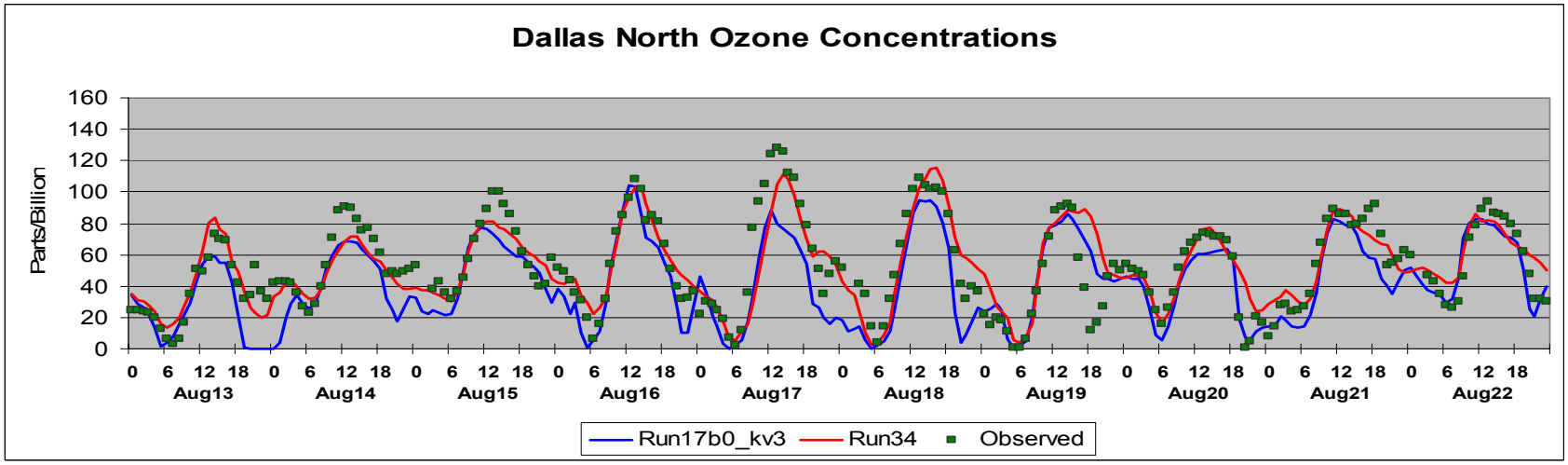
Y= .9718 x

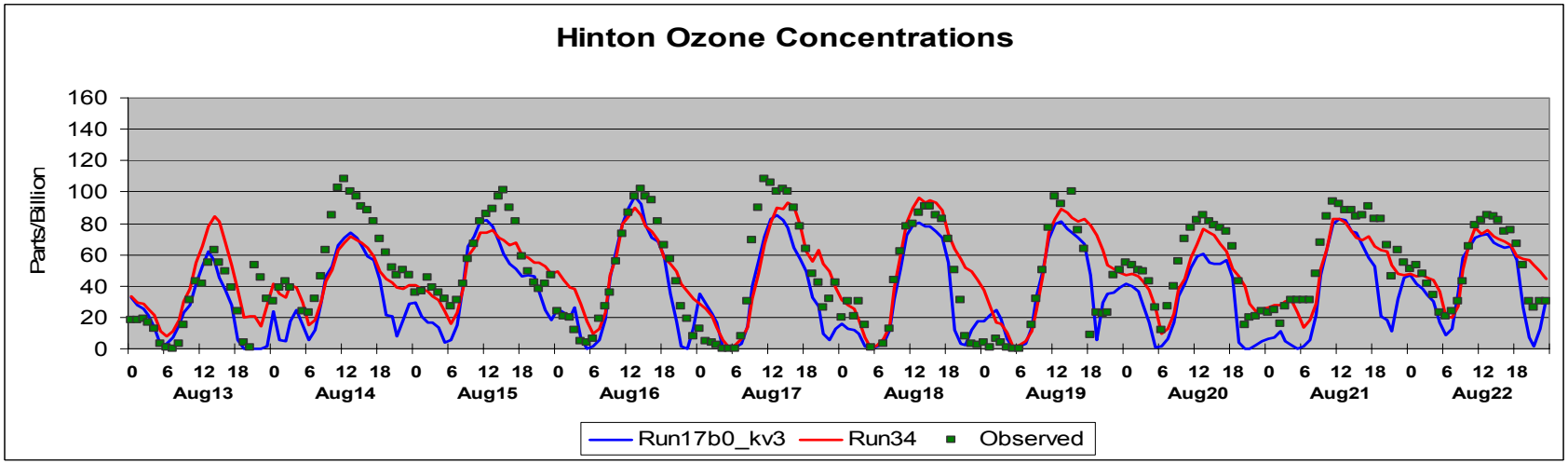
R^2= .7368

Y= 1.057 x

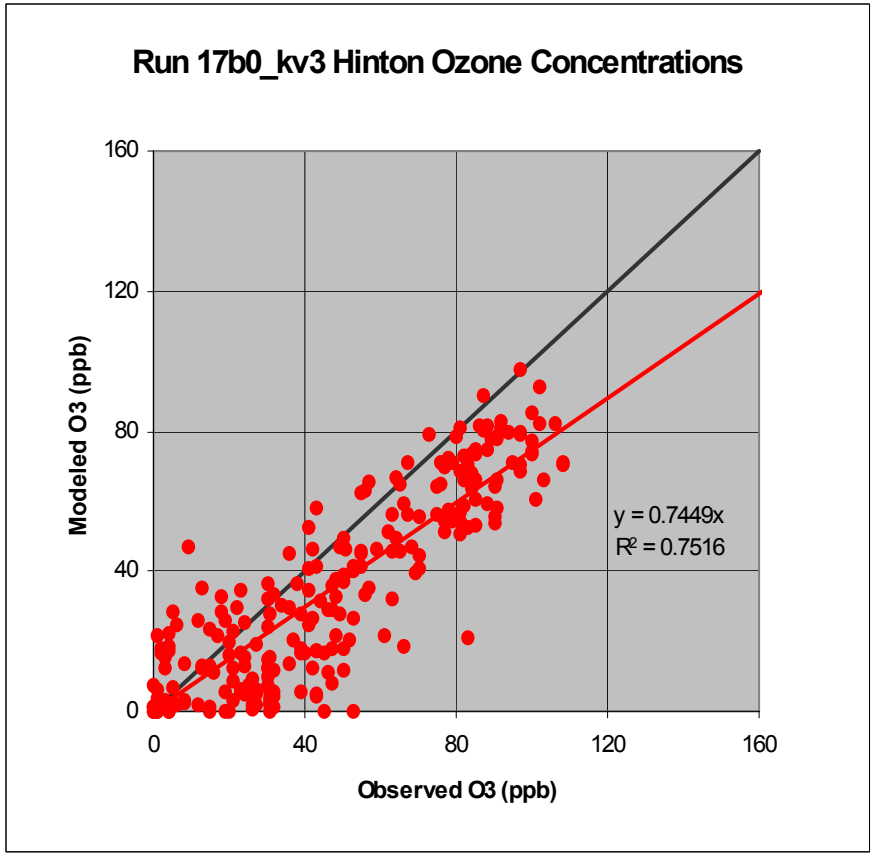
R^2= .5018

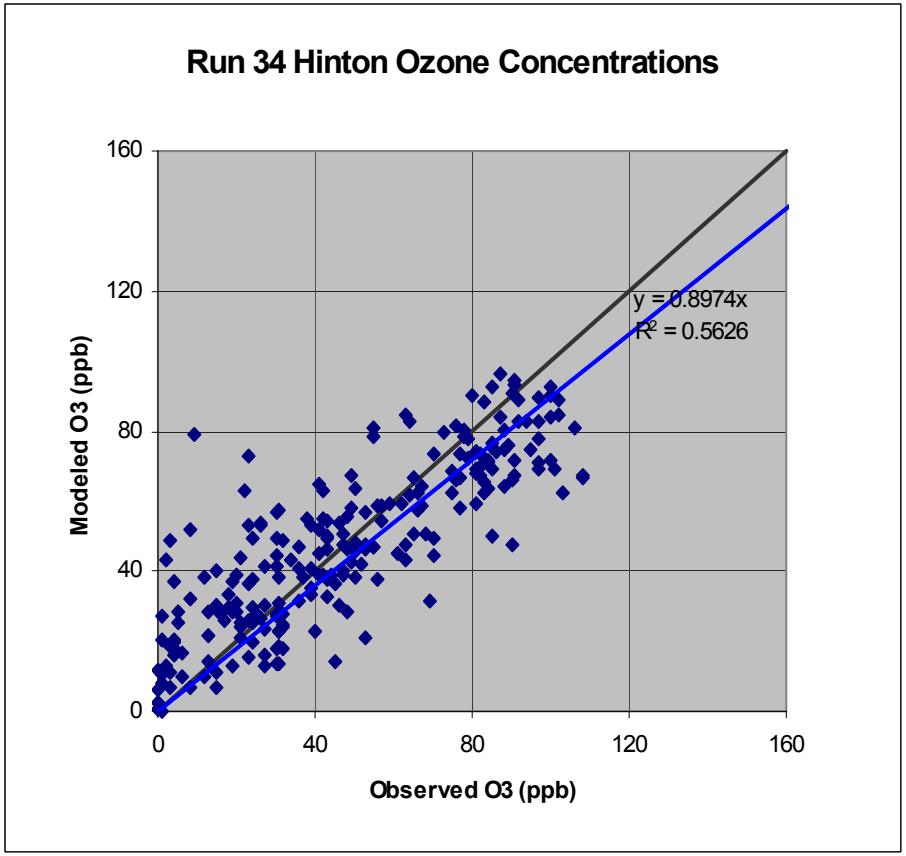
Hinton Drive and Dallas North





Hinton Drive Scatter Plot





Y= .7449 x

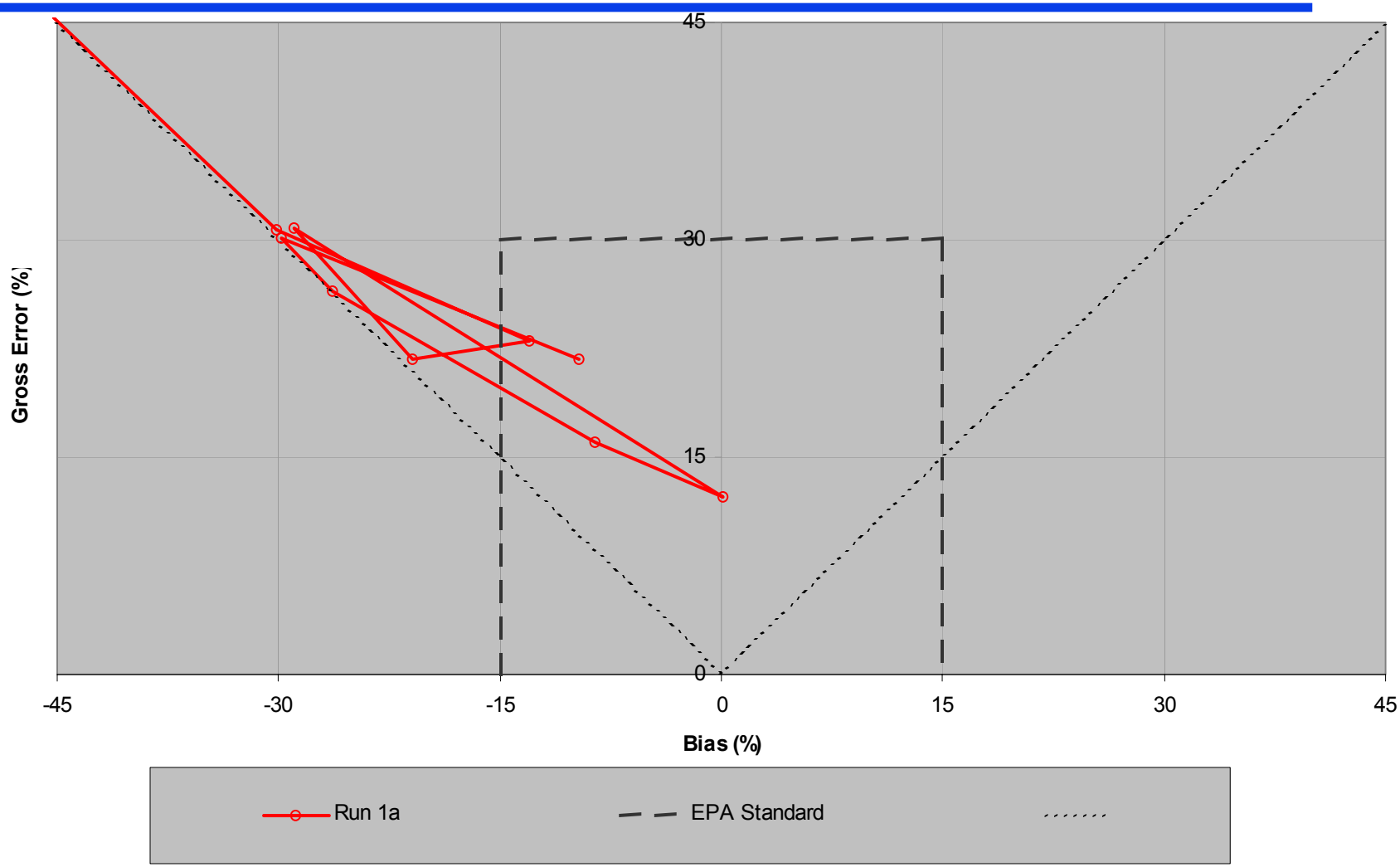
R^2= .7516

Y= .8974 x

R^2= .5626

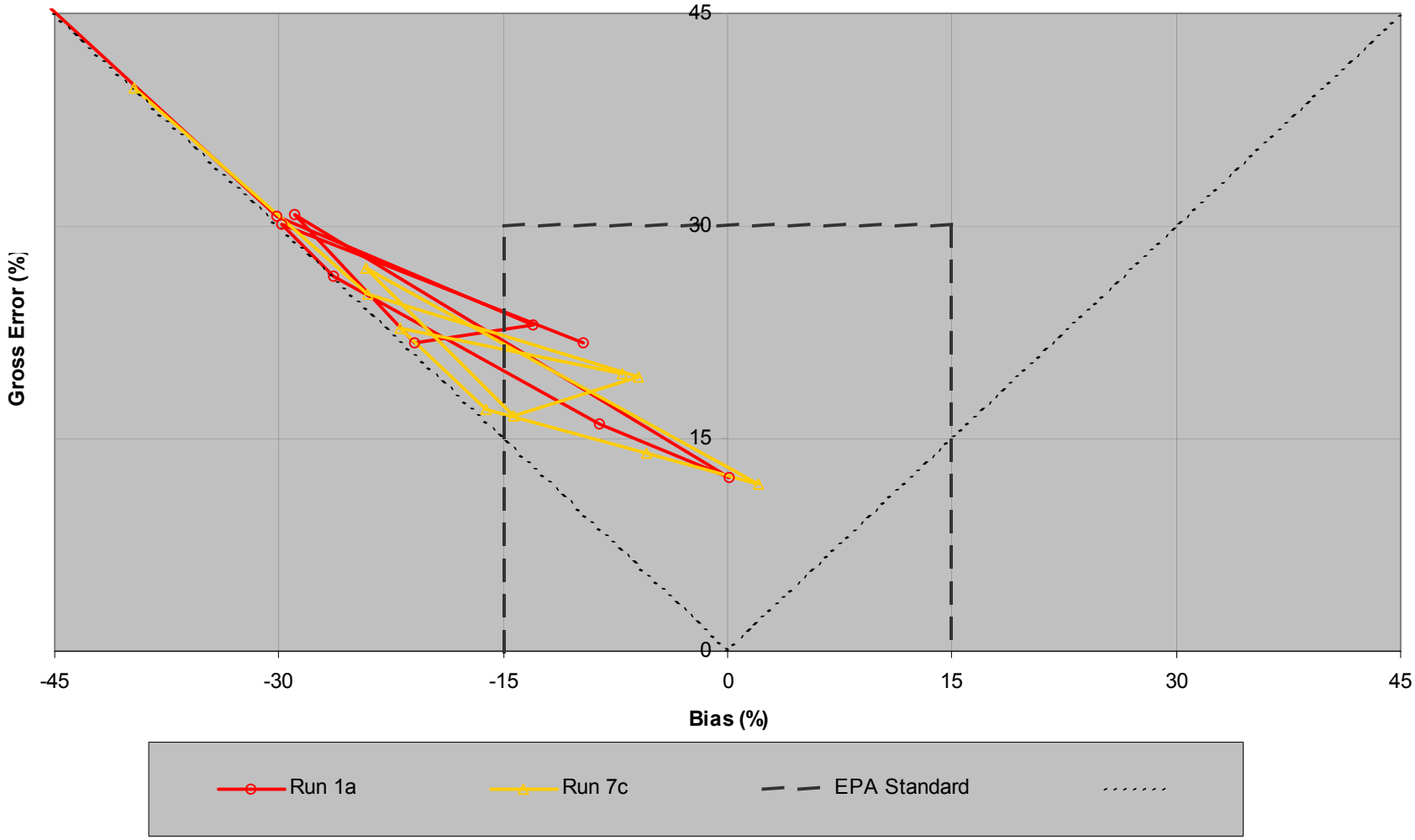
DFW Model Performance Improvement

August 13-22, 1999 Ozone Episode



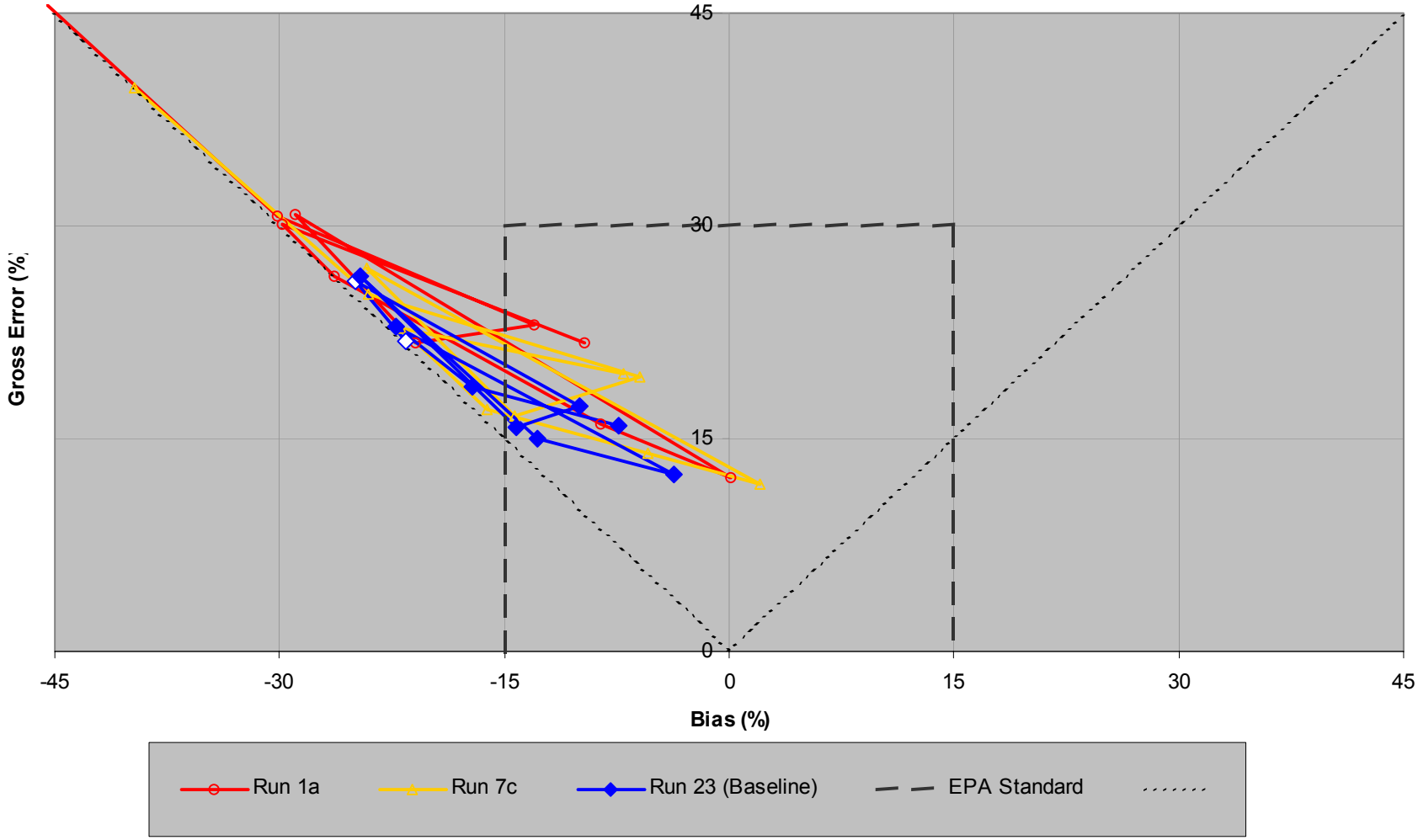
DFW Model Performance Improvement

August 13-22, 1999 Ozone Episode



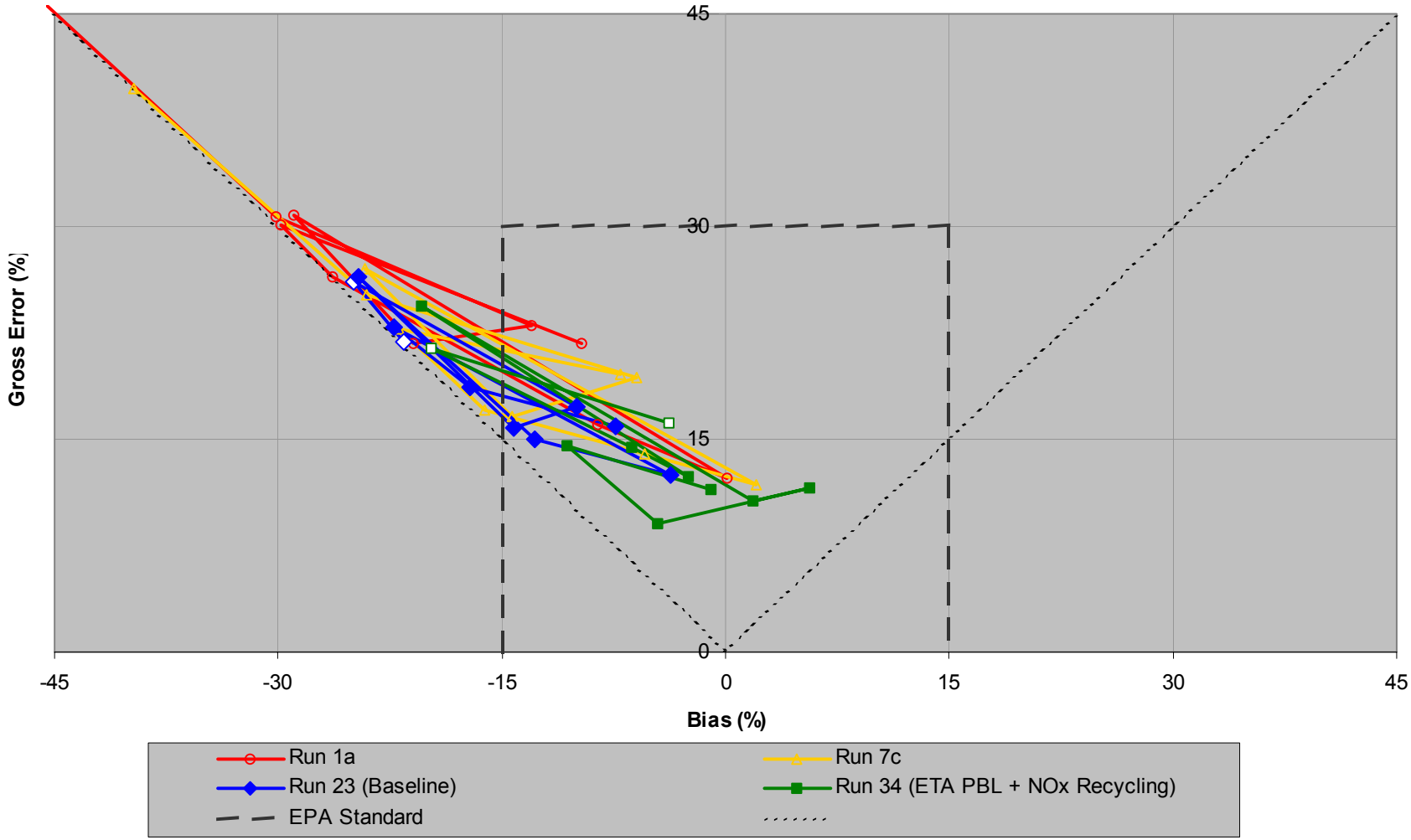
DFW Model Performance Improvement

August 13-22, 1999 Ozone Episode



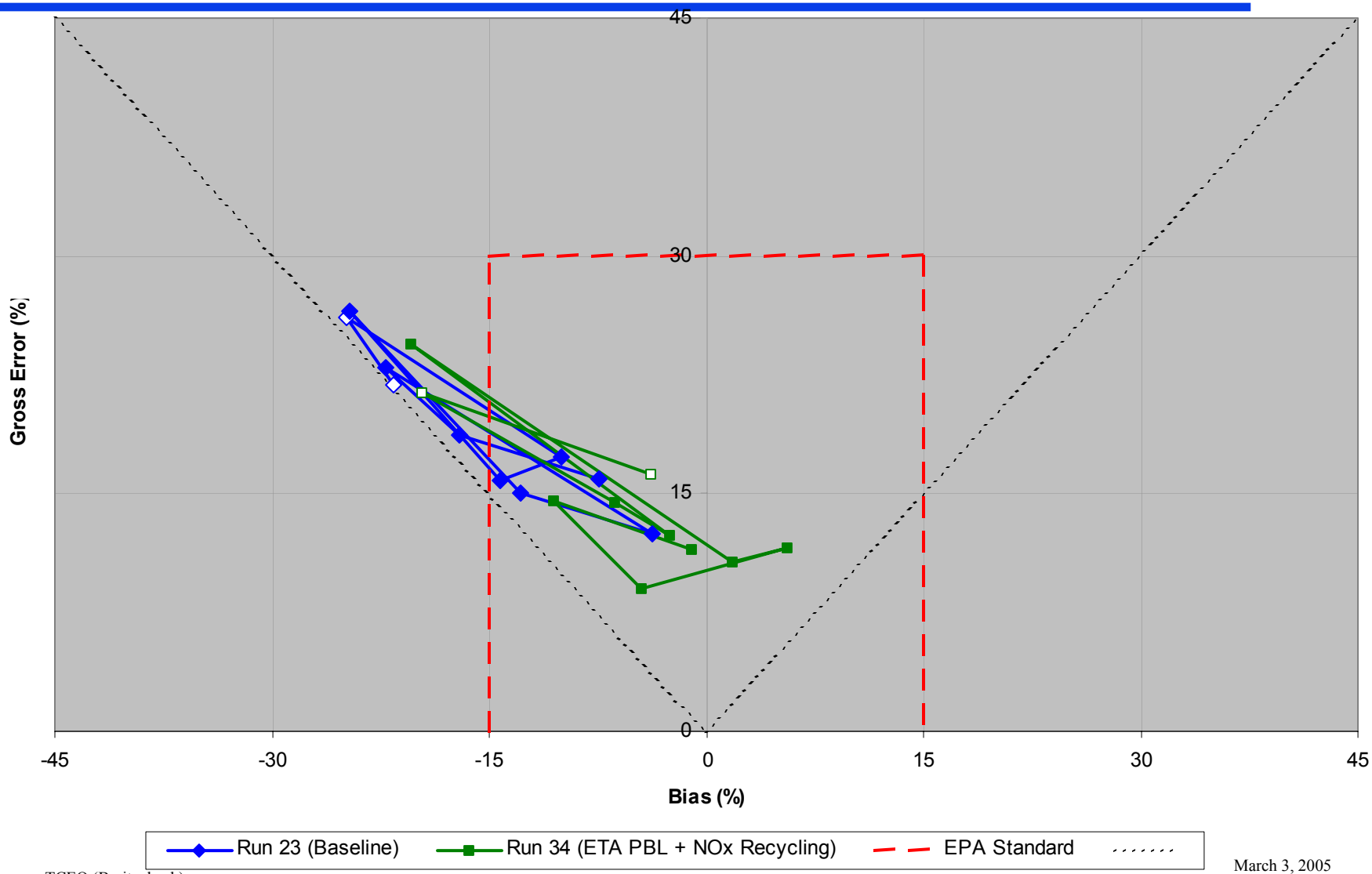
DFW Model Performance Improvement

August 13-22, 1999 Ozone Episode



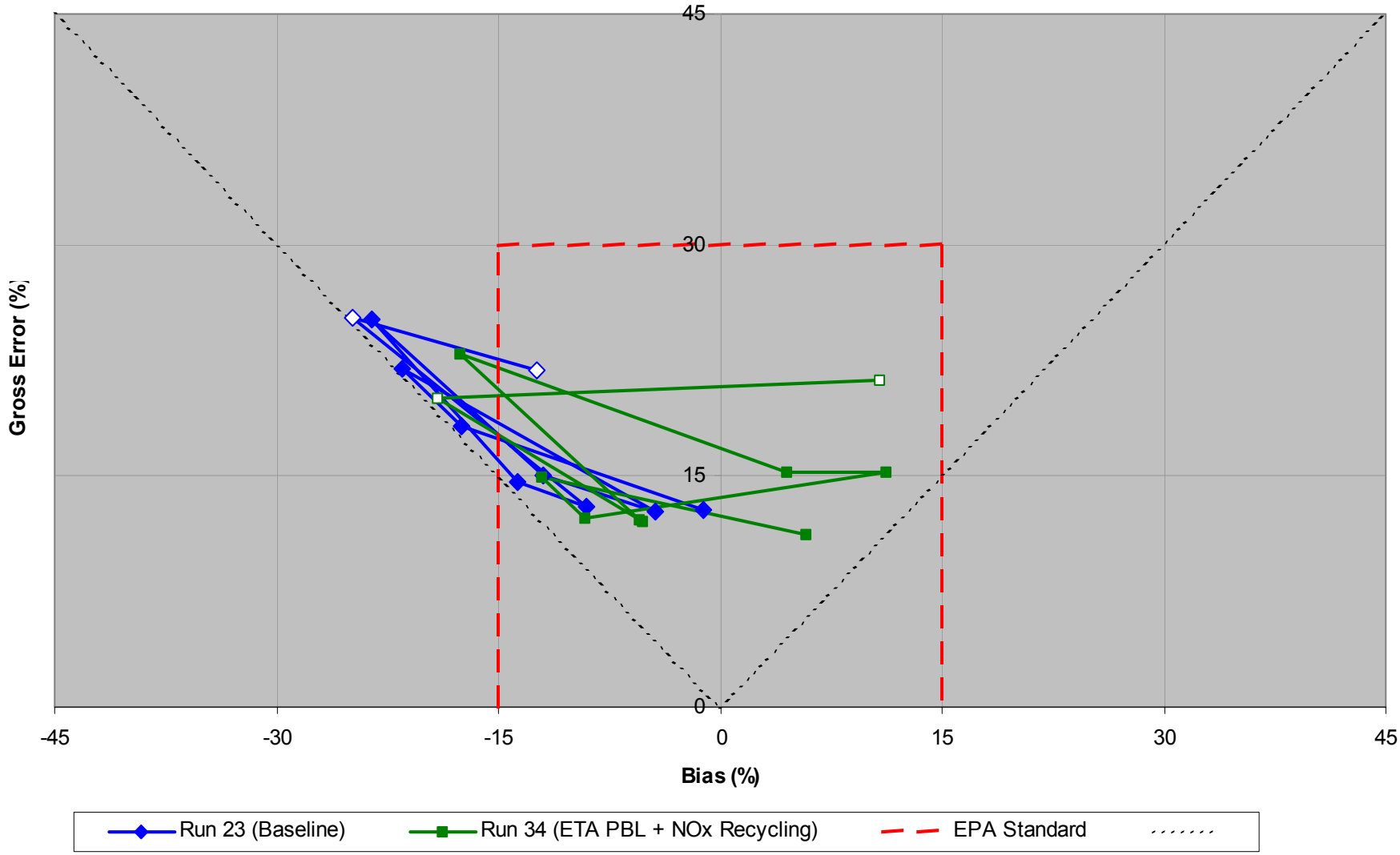
DFW 1-Hour Model Performance

August 13-22, 1999



DFW 8-Hour Model Performance

August 13-22, 1999



DFW Daily Max 8-Hour Ozone

August 13 - September 1, 1999

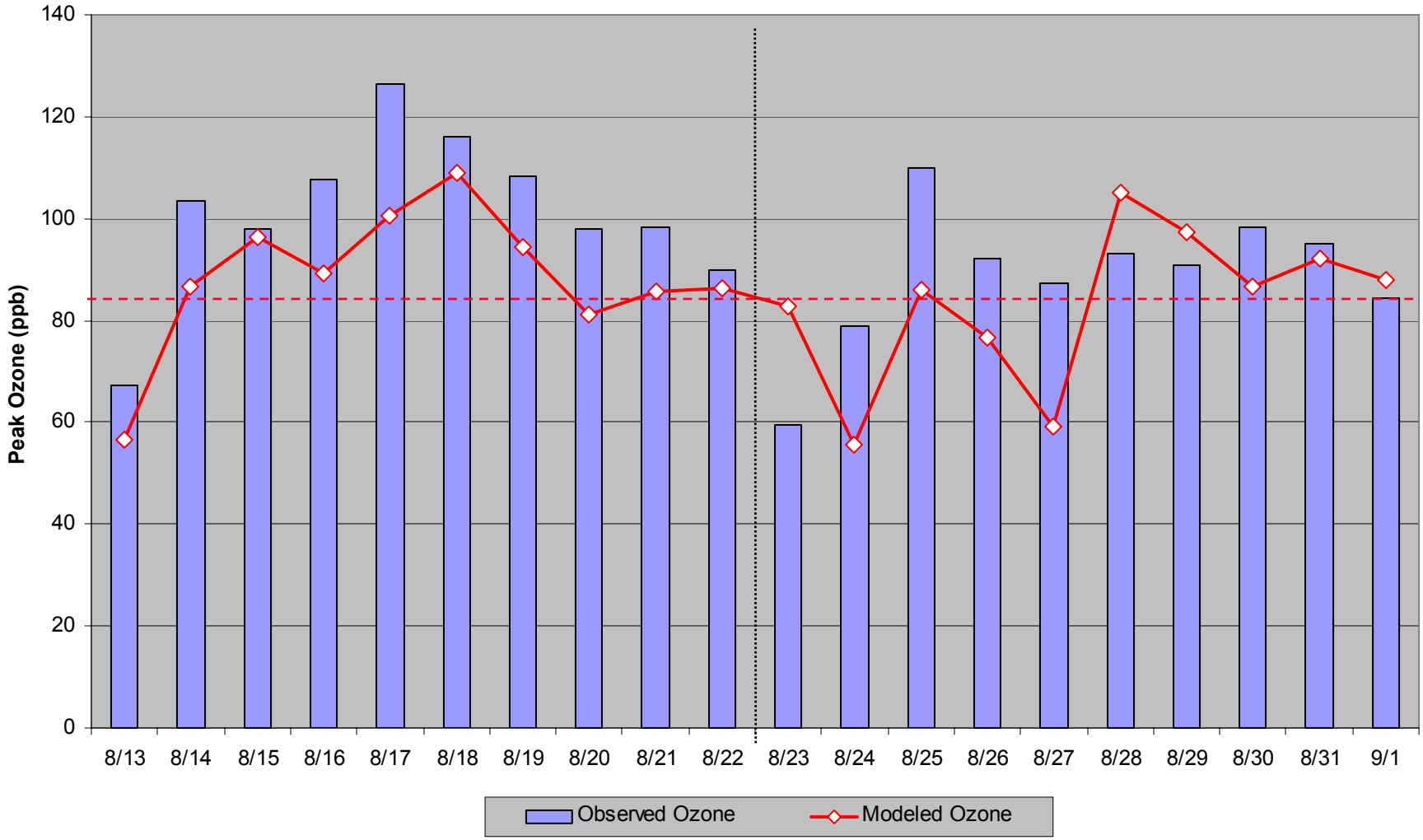
First Half

Second Half

Area	Dallas-Fort Worth										Tyler-Longview		
Site	Fort Worth NW C13	Keller C17	Frisco C31	Denton Airport S C56	Arlington Office C57	Dallas North C63	Anna C68	Midlothian Tower C94	Hinton C401	Redbird C402	Longview C19	Cypress River C50	Tyler C86
08/13/99	46	55	67	57	39	58	NO	52	NA	NA	55	55	56
08/14/99	92	86	78	82	103	80	NO	96	NA	NA	80	62	83
08/15/99	87	97	76	93	85	86	NO	82	NA	NA	66	55	73
08/16/99	100	107	83	100	90	89	NO	85	NA	NA	105	71	92
08/17/99	97	100	**126**	**126**	92	111	NO	86	NA	NA	110	90	97
08/18/99	77	90	116	101	74	99	NO	70	NA	NA	88	91	74
08/19/99	77	69	76	74	96	73	NO	108	NA	NA	91	81	85
08/20/99	83	77	66	71	78	70	NO	98	NA	NA	80	70	86
08/21/99	95	94	78	83	98	85	NO	95	NA	NA	87	67	92
08/22/99	72	81	88	89	80	84	NO	80	NA	NA	91	82	77
08/23/99	37	45	49	59	41	44	NO	49	NA	NA	36	50	28
08/24/99	58	53	64	59	79	67	NO	64	NA	NA	49	56	NV
08/25/99	108	104	87	110	96	91	NO	78	NA	NA	93	73	NV
08/26/99	65	70	84	78	69	92	NO	72	NA	NA	89	83	76
08/27/99	76	73	57	56	83	70	NO	87	NA	NA	46	59	64
08/28/99	78	89	82	93	77	87	NO	72	NA	NA	85	71	94
08/29/99	88	87	81	83	91	85	NO	85	NA	NA	89	85	89
08/30/99	93	91	80	83	98	85	NO	94	NA	NA	82	71	83
08/31/99	90	95	79	85	89	78	NO	91	NA	NA	81	72	80
09/01/99	75	84	74	82	78	79	NO	80	NA	NA	56	49	65

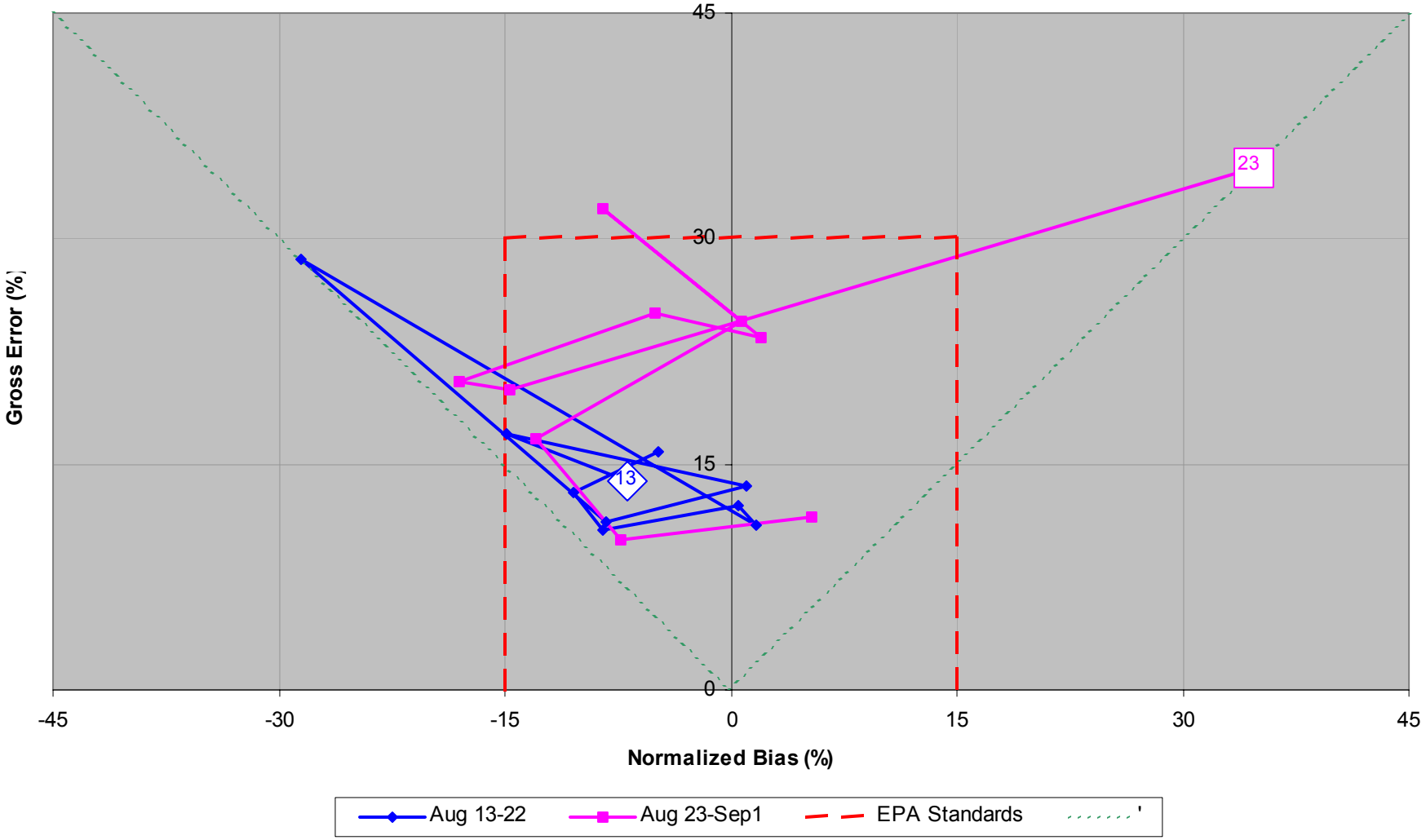
Oklahoma 12k Performance in Dallas

8-Hour Daily Peaks



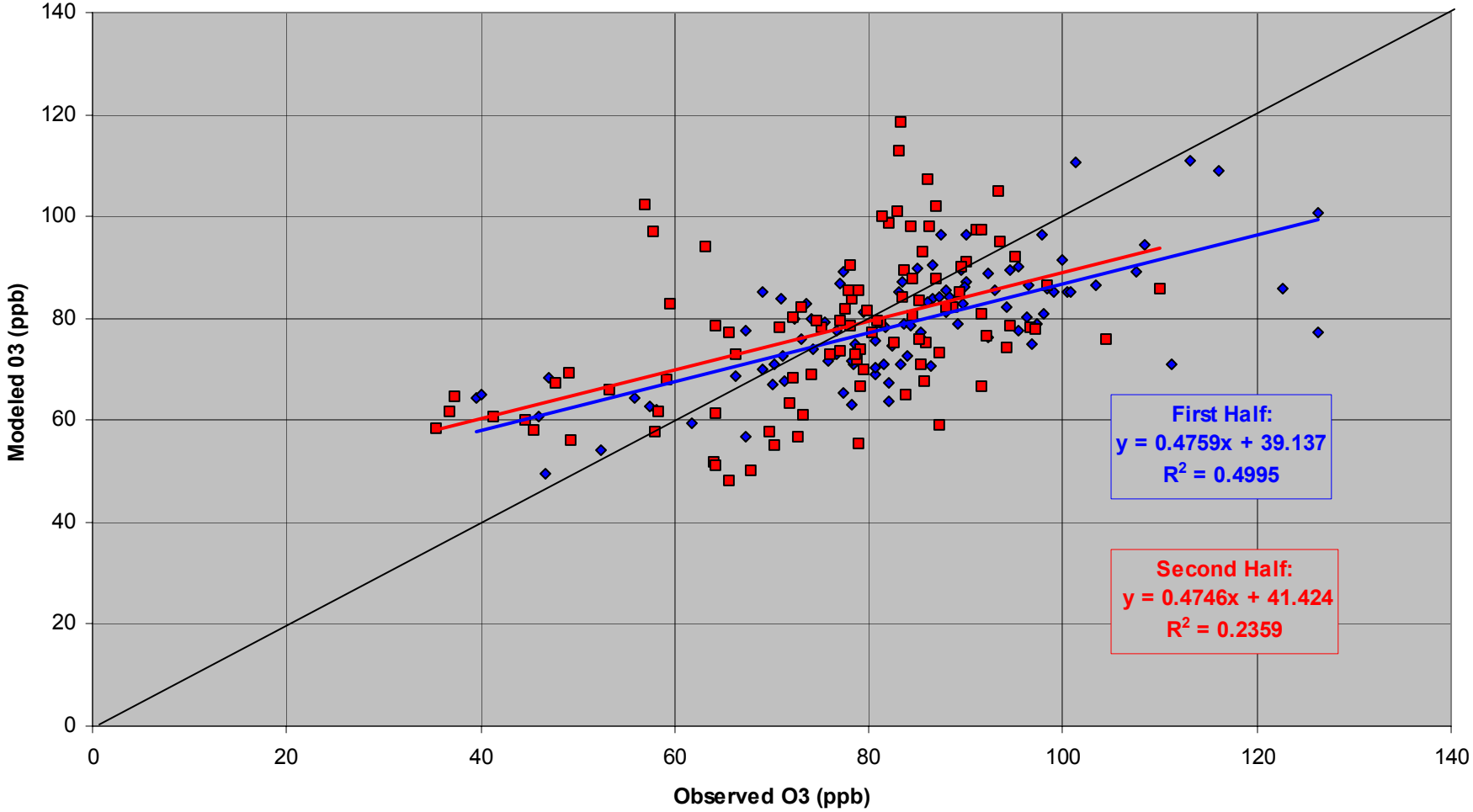
Oklahoma 12k Performance in Dallas

Bias and Gross Error Plot



Oklahoma 12k Performance in Dallas

8-hour Ozone Peaks at all Monitors



Clint Harper

DFW Daily Max 8-Hour Ozone

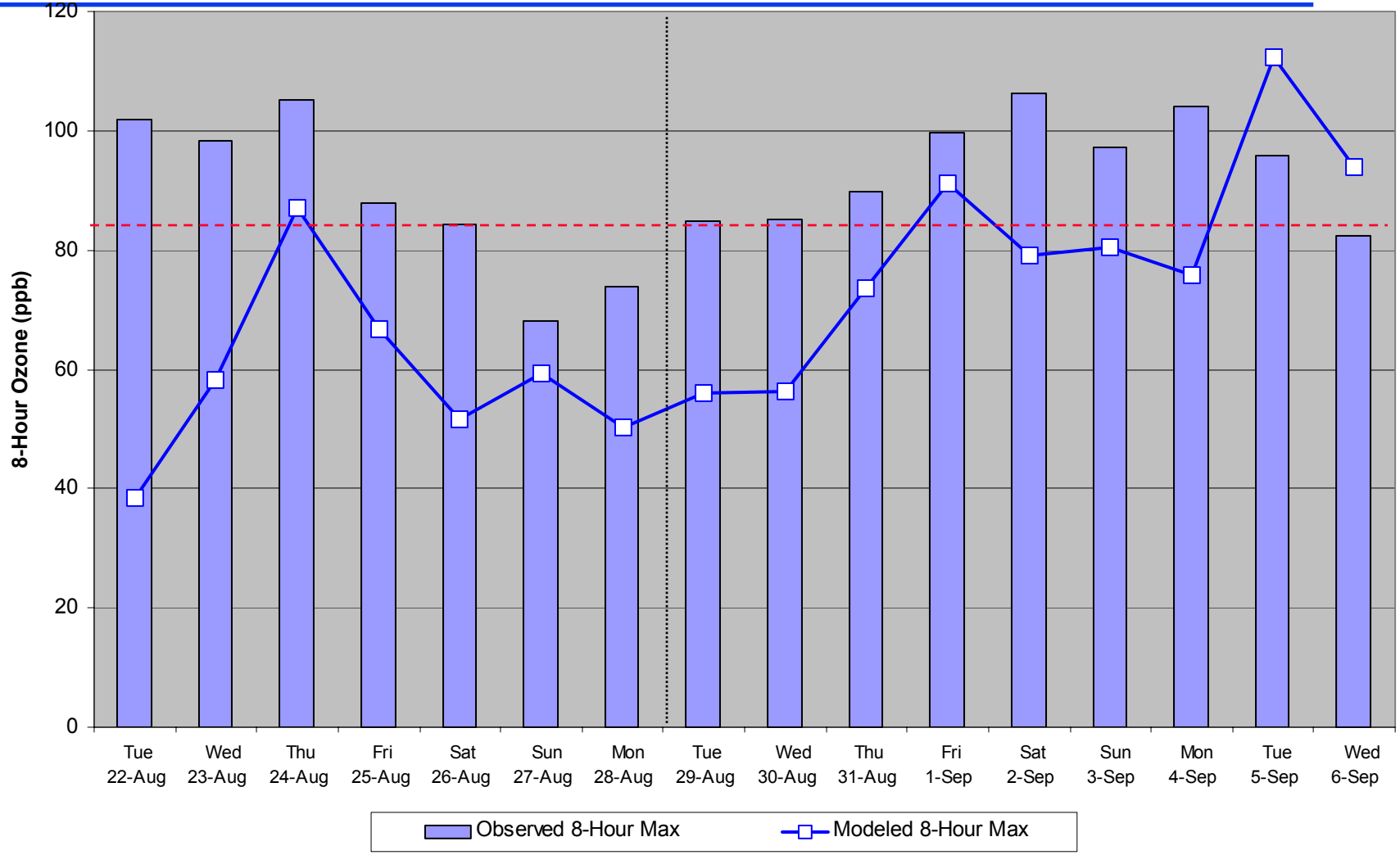
August 22 – September 6, 2000

2000 TNRCC Daily Maximum 8-Hour Ozone Average (ppb)

Area	Dallas-Fort Worth																		Tyler-Longview				
Site	Parker County C76	Granbury C73	Cleburne C77	Midlothian Tower C94	Redbird C402	Arlington Office C57	Fort Worth NW C13	Eagle Mountain C75	Keller C17	Denton Airport S C56	Grapevine C70	Hinton C401	Dallas North C63	Frisco C31	Anna C68	Rockwall C69	Sunnyvale C74	Kaufman C71	Tyler C86	Tyler C82	Big Woods C605	Longview C19	Cypress River C50
08/22 Tue	70	72	72	82	76	77	83	90	87	100	NO	77	83	102	85	82	NO	NO	NO	84	NA	99	82
08/23 Wed	64	63	65	76	70	70	80	84	81	93	NV	75	81	98	85	83	NO	NO	NO	80	NA	86	82
08/24 Thu	64	56	60	74	72	78	95	89	95	92	105	92	100	95	81	79	NO	NO	NO	77	NA	76	82
08/25 Fri	62	63	65	75	66	67	75	75	79	85	83	68	75	87	72	72	NO	NO	NO	69	NA	72	76
08/26 Sat	56	55	56	63	54	58	73	66	70	74	75	61	67	84	79	59	NO	NO	NO	62	NA	66	76
08/27 Sun	46	45	47	59	49	48	55	53	55	60	60	55	58	68	65	56	NO	NO	NO	52	NA	54	67
08/28 Mon	48	48	53	62	55	55	64	61	62	70	70	59	63	73	63	57	NO	NO	NO	50	NA	57	67
08/29 Tue	NV	48	56	68	60	63	68	68	68	77	76	65	71	84	71	70	NO	NO	NO	70	NA	80	81
08/30 Wed	51	49	52	69	60	55	63	60	64	NA	NA	65	72	85	84	73	NO	NO	NO	74	NV	91	74
08/31 Thu	53	53	59	75	65	62	66	62	68	NA	NA	71	75	87	88	89	NO	NO	NO	78	88	95	84
09/01 Fri	67	64	69	84	75	70	82	76	82	NA	NA	77	88	93	71	99	NO	NA	NO	84	89	103	91
09/02 Sat	72	71	78	96	101	103	102	85	99	NA	NA	106	96	96	80	80	NO	NA	NO	90	101	103	93
09/03 Sun	73	71	79	96	85	91	92	80	91	NA	NA	97	91	89	76	92	NO	NA	NO	89	96	93	88
09/04 Mon	72	77	85	104	88	85	88	79	82	NV	NA	94	85	89	81	91	NO	NA	NO	NV	90	96	81
09/05 Tue	97	95	90	90	70	72	93	NV	82	75	NA	68	68	70	58	70	NO	NA	NO	NA	67	NA	70
09/06 Wed	72	82	76	78	66	67	76	69	69	66	NV	70	65	67	57	74	NO	NA	NO	77	61	NV	64

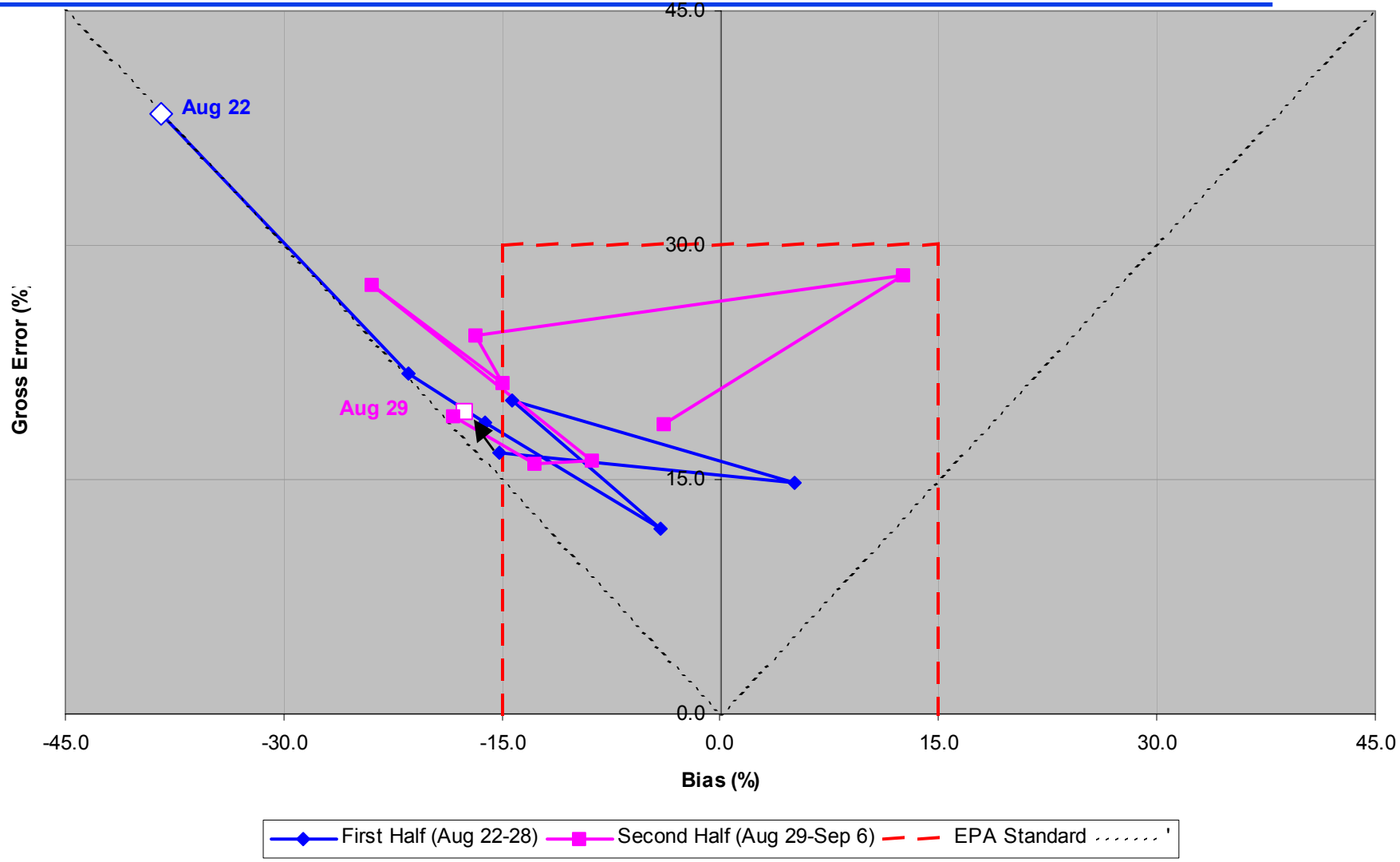
TexAQS 12k Performance in Dallas

8-Hour Daily Peaks



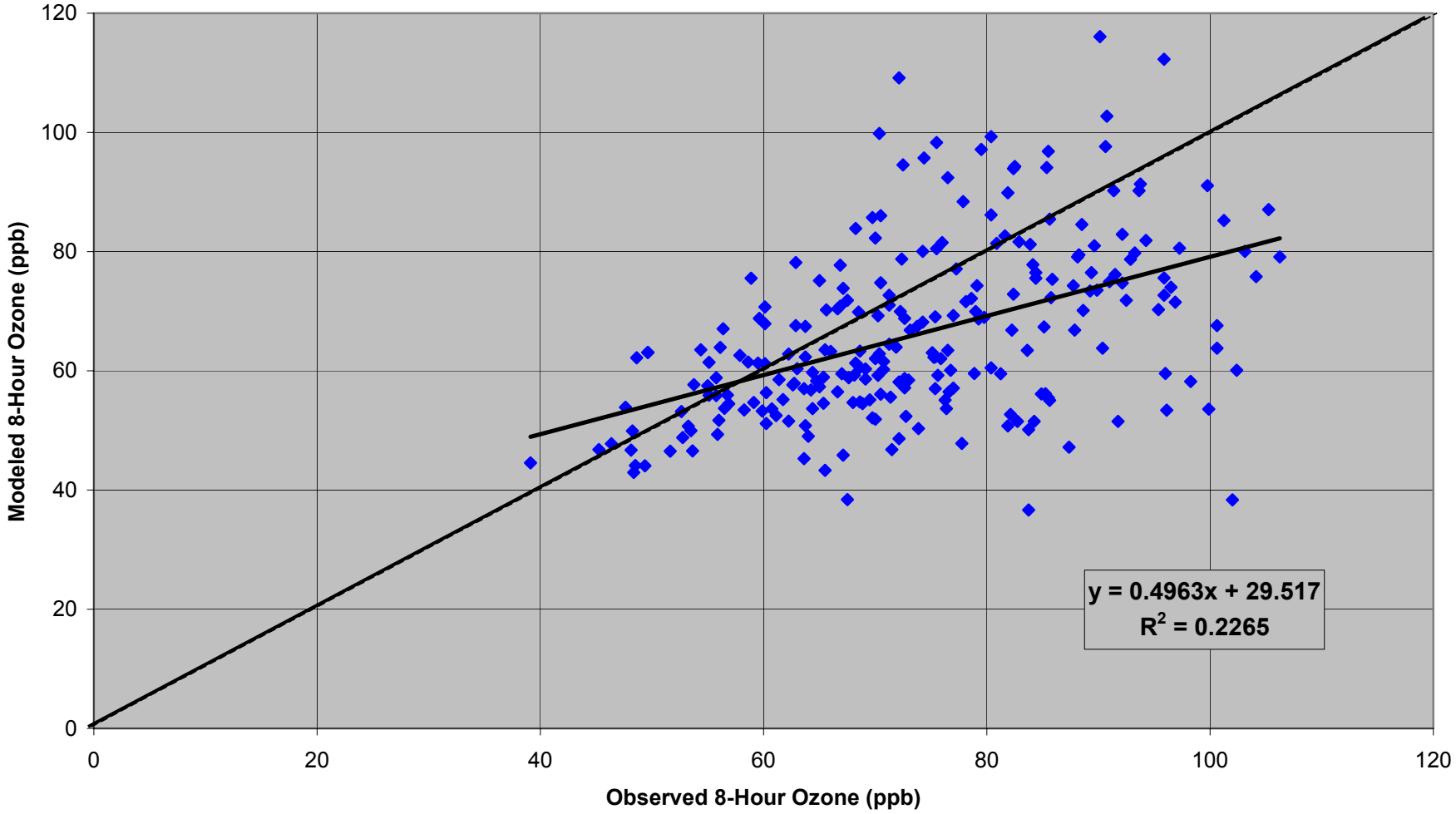
TexAQS 12k Performance in Dallas

Bias and Gross Error Plot



TexAQS 12k Performance in Dallas

8-Hour Maxima at All Sites



Comparing the Options

Dates	# Exc	# Sat	# Marg	# Unsat	Slope	R^2
Oklahoma 12k Modeling (1999)						
Aug 15-Aug 22	7	7	1	---	.476	.499
Aug 23-Sept 1	7	6	2	---	.475	.235
TexAQS Modeling (2000)						
Aug 28- Sept 6	7	4	2	1	.496	.226

Comparing the Options

- Not much difference in 12k performance between the Oklahoma and TexAQS Options, so select based on data availability

Oklahoma Episode Recommended

- Extensive Met optimization already done
  - Rerun Met @ 4k grid to improve resolution
- 1999 fine grid (4k) EI already available
  - Substitute on Day for Day basis
- 1999 regional EI data already developed

Let’s Move On