

Update on Past, Present, and Future Ozone Levels in Tennessee

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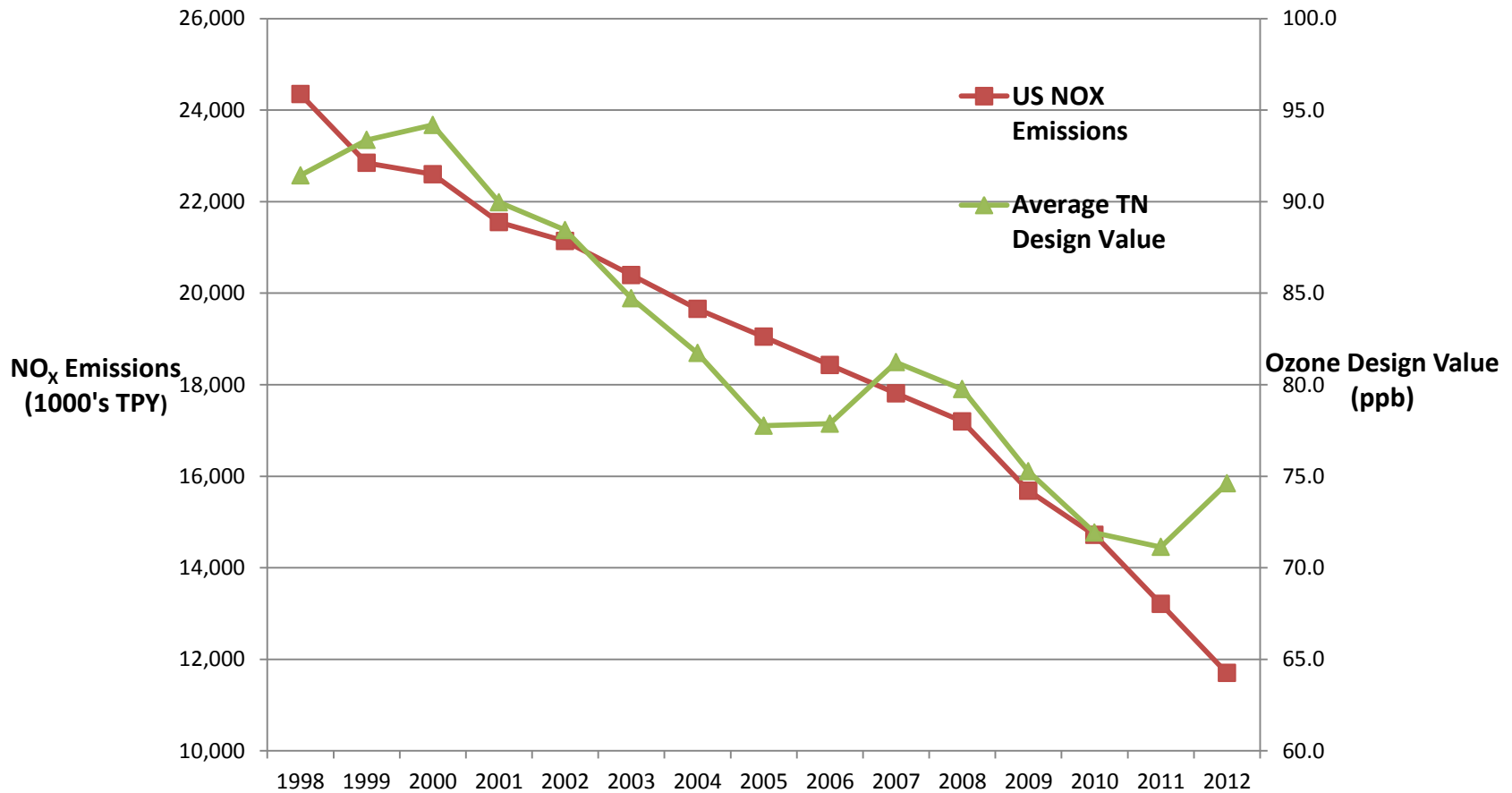
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Overview of Presentation

- /// Trends in Tennessee ozone levels
- /// The future of the ozone NAAQS
- /// Putting the ozone NAAQS in context
- /// A quick look at the high-ozone episode of 2012

Trends in Tennessee Ozone Levels and Nationwide NO_x Emissions



The Future of the Ozone NAAQS

- In November 2012 the CASAC said EPA had provided a “strong rationale” for considering setting the ozone NAAQS between 60 and 70 ppb, and it had provided “adequate justification” for considering a standard between 50 and 60 ppb.
- Subsequently, the CASAC revised its position and stated “If EPA considers levels below 60 ppb, adequate justification should be provided.”
- Clearly EPA is considering setting the new ozone NAAQS at a level significantly below the 2008 ozone NAAQS of 75 ppb.

Future Ozone Levels based on EPA Modeling

County	Location	2009-2011 Design Value ¹ (ppb)	Preliminary ² 2010-2012 Design Value (ppb)	EPA-Projected 2013-2015 Design Value ¹ (ppb)
Shelby	Frayser Blvd	74	79	69.8
Shelby	Edmund Orgill Park	73	78	66.9
Crittenden ³	Marion	77	79	67.9
DeSoto ⁴	Hernando	72	74	67.1
Davidson	Trinity Lane	63	69	58.3
Davidson	Bell Rd	67	75	60.6
Rutherford	Eagleville	67	70	62.4
Sumner	Old Hickory Dam	75	79	69.1
Sumner	Cottontown	71	75	61.9
Williamson	Fairview	69	73	61.6
Wilson	Cedars of Lebanon	71	74	65.3
Anderson	Oak Ridge	70	73	63.0
Blount	Look Rock	77	79	70.0
Blount	Cades Cove	68	68	62.9
Jefferson	Forrester Road	73	78	67.1
Knox	Rutledge Pike	69	72	64.7
Knox	Mildred Drive	71	75	69.3
Loudon	Roberts Road	72	75	65.3
Sevier	Cove Mountain	75	75	68.9
Sevier	Clingmans Dome	75	77	69.2
Sullivan	Hill Road	70	74	65.7
Sullivan	Ketron Middle School	70	72	66.8
Hamilton	Sequoyah Road	72	76	66.1
Hamilton	Bonnie Oaks Drive	73	76	68.7
Meigs	Highway 60	71	74	64.8
Averages		71	74	65.6

1. "Design value" is the 3-year rolling average of the annual 4th highest daily 8-hour maximum ozone concentration.
2. Based on preliminary 2012 data.

The Future of the Ozone NAAQS

- A nonattainment designation of an area includes a “classification” which is based on how far the area’s design value is above the ozone NAAQS.
- The “classifications” vary from “marginal” – when the area’s design value is just above the NAAQS, to “extreme” – when the area’s design value is far above the NAAQS.
- The severity of the detrimental economic impacts resulting from a nonattainment designation increase with each higher classification.

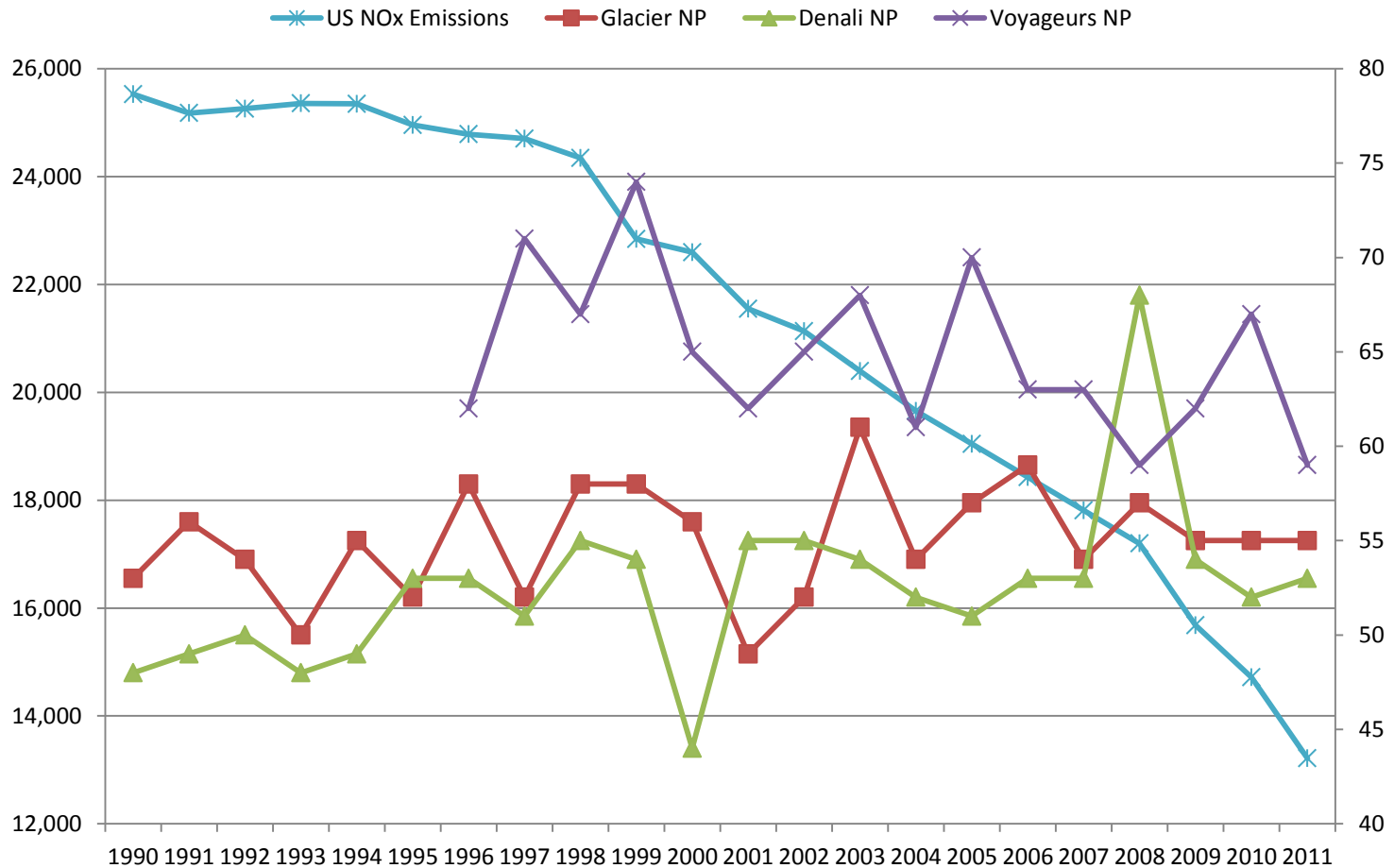
Potential Ozone NAAQS Classification Levels

	National Ambient Air Quality Standard (ppb) Set At				
	50	55	60	65	70
Marginal	51-57	56-62	61-68	66-74	71-80
Moderate	58-66	63-72	69-79	75-86	81-92
Serious	67-74	73-82	80-89	87-97	93-104
Serious-15	75-78	83-86	90-94	98-102	105-110
Serious-17	79-116	87-127	95-139	103-151	111-162
Extreme	117 and over	128 and over	140 and over	152 and over	163 and over

Putting the Ozone NAAQS in Context

- A review of ozone levels at very remote, clean locations in the US indicates that even places like Denali and Glacier National Parks could have difficulty attaining a NAAQS of 55 ppb, while similar locations like Voyageurs National Park in northern Minnesota could have difficulty attaining a NAAQS of 60 ppb.

Ozone Levels at Remote Locations



A quick look at the High-Ozone Episode of 2012

- During the week June 25, 2012, ozone concentrations across the state soared to levels not seen in over a decade.
- These levels resulted from a meteorological “perfect storm”.
- The convergence of very clear, dry, calm and hot weather produced 8-hour ozone levels well above the NAAQS on several days and in excess of 100 ppb on a couple of days.

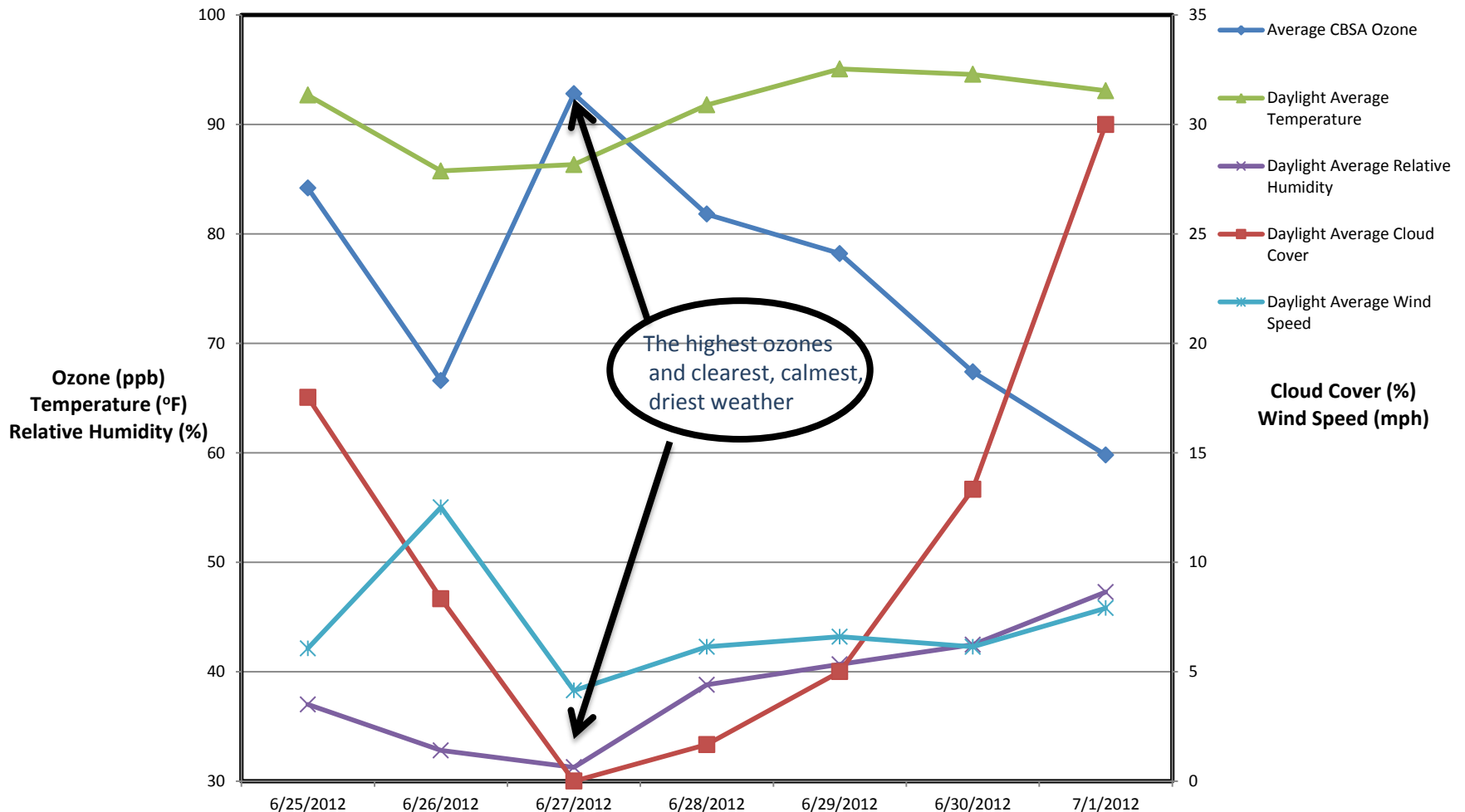
Ozone Concentrations across Tennessee during the week of June 25, 2012

Date	Memphis		Nashville		Chattanooga		Knoxville		Tri-Cities	
	Max 8-hour Ozone (ppb)	Average 8-hour Ozone (ppb)	Max 8-hour Ozone (ppb)	Average 8-hour Ozone (ppb)	Max 8-hour Ozone (ppb)	Average 8-hour Ozone (ppb)	Max 8-hour Ozone (ppb)	Average 8-hour Ozone (ppb)	Max 8-hour Ozone (ppb)	Average 8-hour Ozone (ppb)
6/25/12	86	84.2	81	74.6	63	61.3	67	63.1	70	69.5
6/26/12	70	66.6	62	56.9	68	66.0	77	62.8	57	57.0
6/27/12	124	92.8	81	71.3	72	68.3	76	64.1	52	51.5
6/28/12	91	81.8	94	81.3	84	81.7	96	80.8	83	81.5
6/29/12	84	78.2	100	85.7	90	83.3	121	92.7	100	98.5
6/30/12	73	67.4	81	71.6	86	83.3	96	80.5	85	85.0
7/1/12	66	59.8	69	60.3	77	75.7	75	68.1	74	73.0

Average Weather Conditions across Tennessee during the week of June 25, 2012

CBSA	Averages Observed On Days When Ozone Exceeded 75 ppb				
	Max Temp	Mean Temp	Daytime Wind Speed	Daytime Relative Humidity	Daytime Cloud Cover
	(°F)	(°F)	(mph)	(%)	(%)
Memphis	100.5	85.3	5.7	36.9	6.1
Nashville	101.6	87.0	5.6	33.7	27.2
Chattanooga	105.3	87.8	4.3	38.8	37.1
Knoxville	96.6	81.3	5.7	35.5	12.3
Tri-Cities	100.3	81.6	5.2	37.9	22.8
Averages	100.9	84.6	5.3	36.6	21.1

Example of the Convergence of Weather Conditions — Memphis



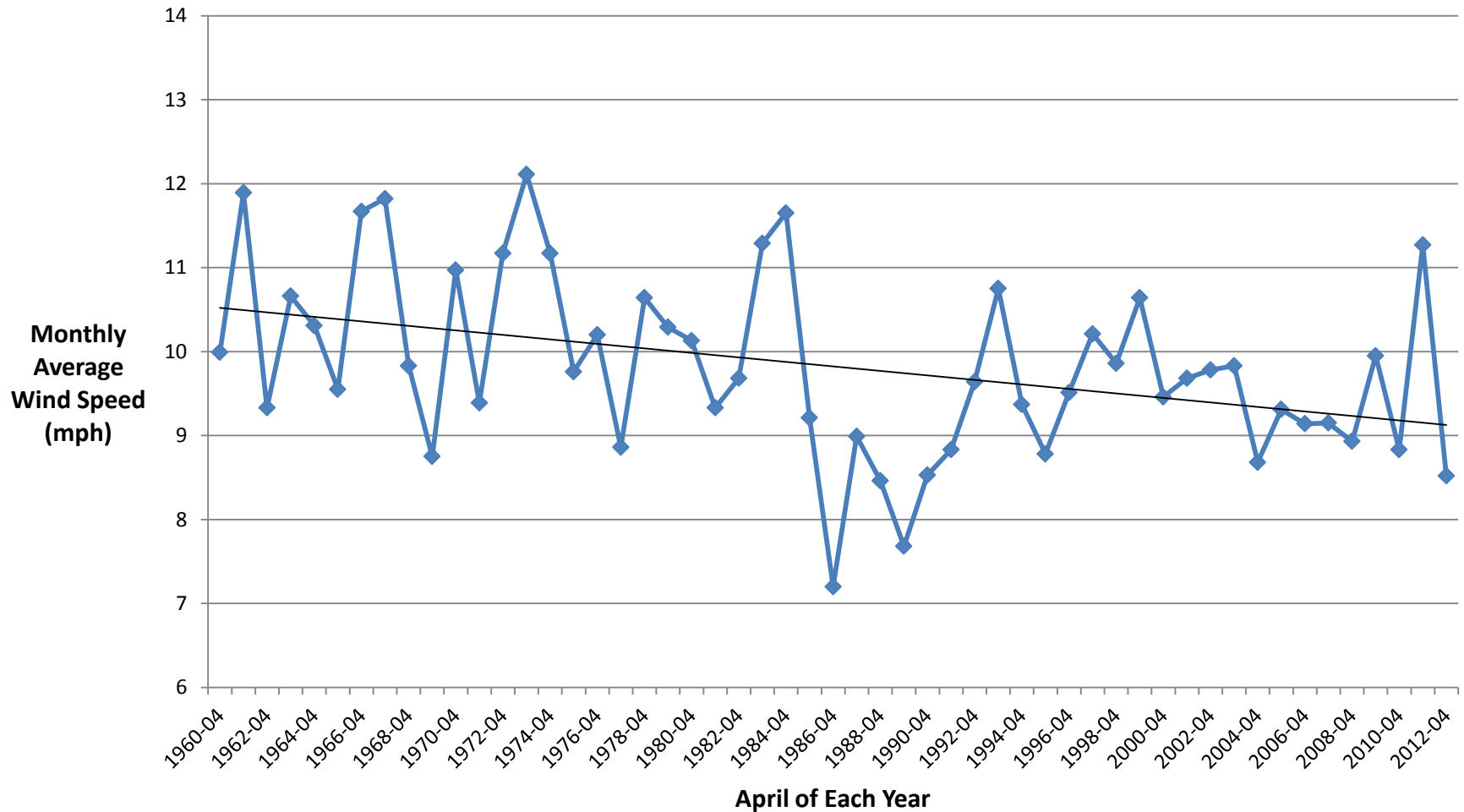
Comparison of the week of June 25, 2012 with Historical Averages and other days during 2010-2012 when the Maximum 8-Hour Ozone exceeded 75 ppb

CBSA	Hi Temp	Mean Temp	Wind Speed	Humidity	Cloud Cover
	(%)	(%)	(%)	(%)	(%)
Memphis					
Historical	13.4	43.2	-30.2	-36.9	-91.7
2010-2012	7.0	2.5	5.7	-22.9	-87.7
Nashville					
Historical	17.3	14.7	-28.1	-43.1	-58.5
2010-2012	10.8	10.4	36.0	-31.4	-29.7
Chattanooga					
Historical	21.1	15.8	-39.4	-33.3	-66.7
2010-2012	14.4	10.7	22.5	-18.3	-54.6
Knoxville					
Historical	13.1	9.1	-13.4	-41.4	-84.2
2010-2012	6.9	4.4	33.2	-29.8	-53.9
Tri-Cities					
Historical	21.1	14.0	-20.3	-32.9	-49.9
2010-2012	11.7	9.4	77.7	-22.6	-18.6

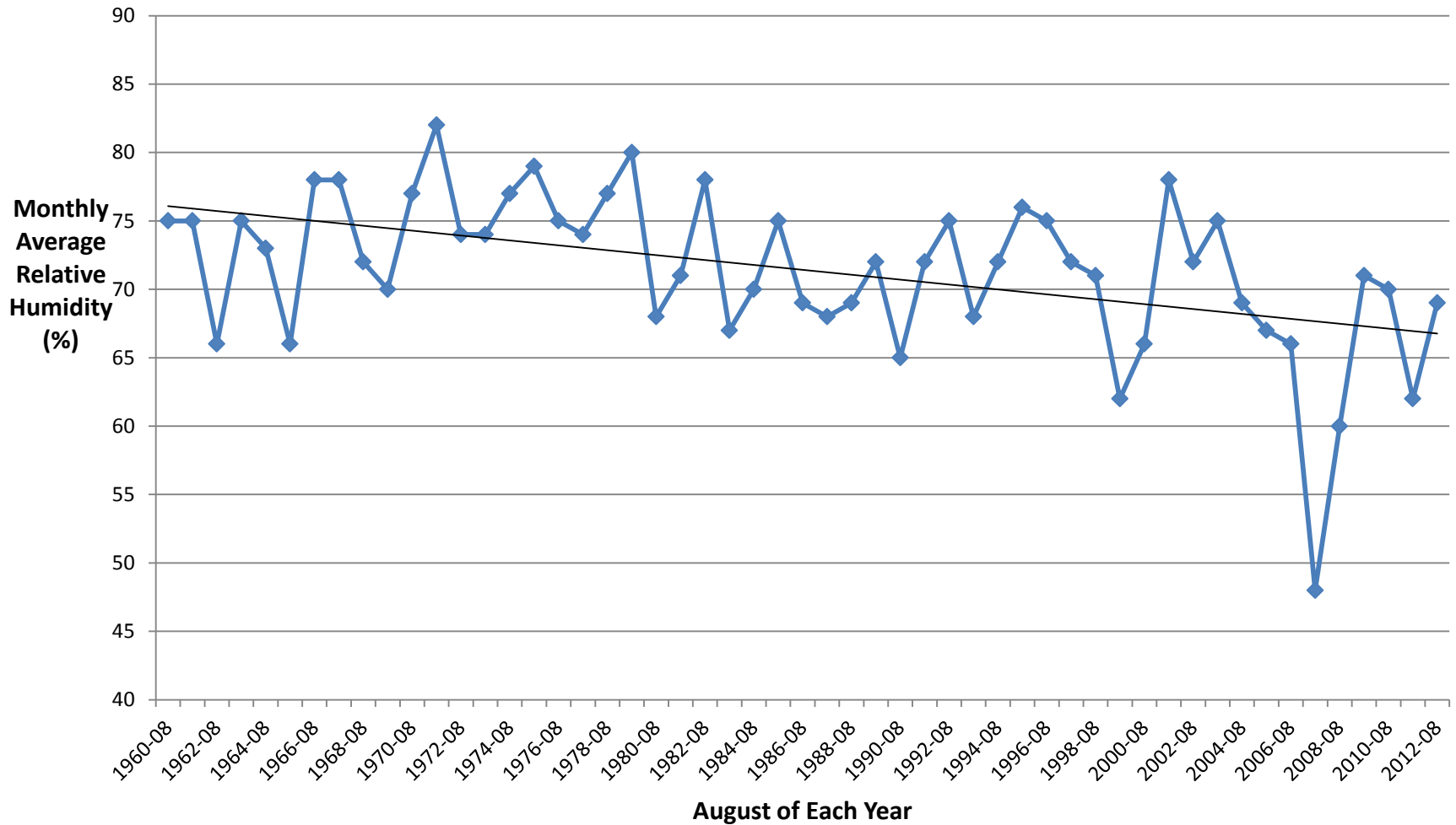
Tennessee Weather Trends during Ozone Season 1960-2012

CBSA	Hi Temp	Mean Temp	Wind Speed	Cloud Cover	Relative Humidity
	(°F/yr)	(°F/yr)	(mph/yr)	(%/yr)	(%/yr)
Memphis	0.05	0.05	-0.02	0.12	-0.06
Nashville	0.02	0.04	-0.04	0.12	-0.11
Chattanooga	0.06	0.07	-0.04	-0.38	-0.09
Knoxville	0.04	0.04	-0.03	-0.29	-0.02
Tri-Cities	0.03	0.02	-0.04	-0.11	0.02
Averages	0.04	0.04	-0.03	-0.11	-0.05

Example of 1960-2012 Weather Trends



Example of 1960-2012 Weather Trends



Summary

- // Tennessee ozone levels have steadily declined over the past 15 years due to local, regional and national emission reductions.
- // EPA is poised to reset the NAAQS well below the current level.
- // Depending on the level at which EPA sets the NAAQS large portions of Tennessee may be designated nonattainment.
- // During the week of June 25, 2012, the convergence of weather conditions produced ozone levels across the state well in excess of the current NAAQS.

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