

Critique: Modeled Attainment Probability (i.e., Bob Lopez' analysis)

Background: In early December, Bob Lopez (WDNR) provided the results of an analysis which estimated the probability of attaining the ozone standard in the Lake Michigan area. The analysis projected a future year 4th high value based on the observed 4th high values (for the years 2001 – 2007) and the relative reduction factors (RRFs) from the Round 4 and Round 5 modeling¹. For 2009, the analysis showed a low attainment probability (i.e., 29%) at two sites (Sheboygan and Holland) and medium attainment probability (i.e., around 50%) at six other sites.

Discussion: There are two key assumptions in Bob's analysis: (1) RRFs for other (non-modeling) base years can be estimated by linear interpolation, and (2) 4th high values represent an appropriate metric for judging attainment. Each of these assumptions is addressed in more detail below.

- (1) Estimation of RRFs: To determine whether it is appropriate to estimate the RRFs for the non-modeled base years (i.e., 2001, 2003, 2004, 2006, and 2007) based on linear interpolation, the results of special Round 4 modeling were considered. This special modeling used 2002, as well as 2001 and 2003, meteorology to derive RRFs for a 2012 future year. The modeled and interpolated RRFs are shown in Figure 1. As can be seen, the interpolated values are generally consistent with the modeled values (for the non-modeled base years). Thus, the linear interpolation assumption is a reasonable.
- (2) Use of 4th High Values: Because attainment determinations are not made on the basis of a single 4th high value, two additional metrics should be considered – the average of 4th high values for a 3-year period (i.e., design value) and the average of the design values for three consecutive 3-year periods (i.e., baseline design value to be used in modeled attainment test according to EPA's modeling guidelines). The results for several monitoring sites for 2009 in the 5-state region for all three metrics are presented in Table 1. In general, consideration of the design value or baseline design value suggests a higher probability of attainment.

Conclusion: Bob's analysis appears to be a valid, alternative means of assessing attainment and, as such, should be incorporated into the weight-of-evidence section in the final Technical Support Document. The results of this analysis are generally consistent with the Round 5 attainment modeling (i.e., most sites are expected to meet the 8-hour ozone standard by the applicable attainment date, except for sites in western Michigan and, possibly, in eastern Wisconsin and northeastern Ohio).

¹ The RRFs for 2002 and 2005 were available from the Round 4 and Round 5 modeling, respectively. The RRFs for the other years (2001, 2003, 2004, 2006, and 2007) were derived through interpolation of the 2002 and 2005 values.

Table 1. Attainment Probability Estimates (for 2009)

Attainment Probability			
	4th High	Design Value	Baseline Value
<i>Lake Michigan Area</i>			
Chiwaukee	57	57	57
Bayside	57	85	100
Sheboygan	28	43	43
Door County	43	85	85
Whiting	50	100	100
Holland	28	57	57
Muskegon	28	57	85
<i>Indianapolis</i>			
Noblesville	71	85	100
Fortville	71	85	100
<i>Detroit</i>			
New Haven	43	71	71
<i>Cleveland</i>			
Ashtabula	43	43	85
Geauga	57	57	57
<i>Cincinnati</i>			
Sycamore	28	85	85
Lebanon	43	100	85
<i>St. Louis</i>			
W.Alton	43	57	57

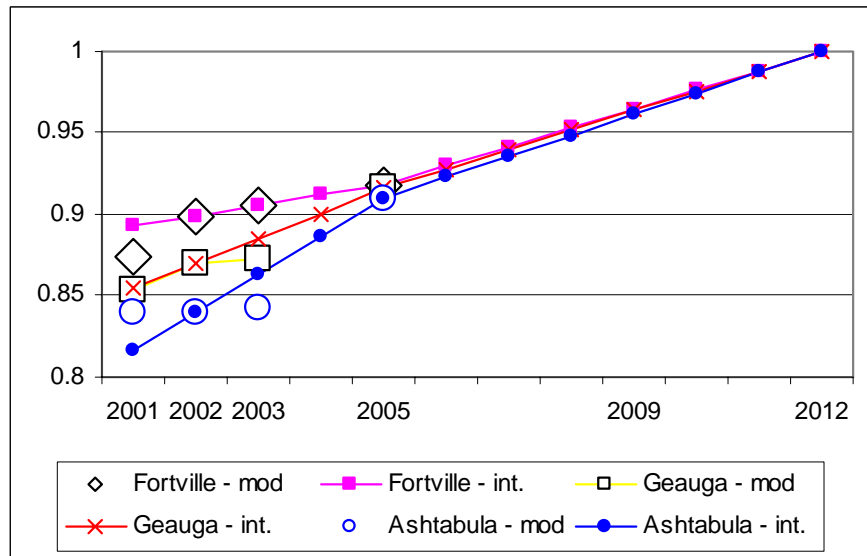
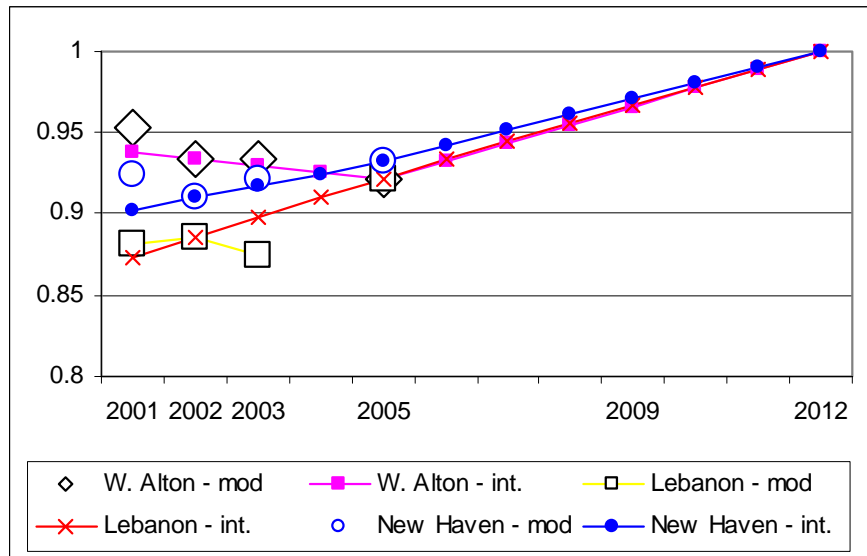
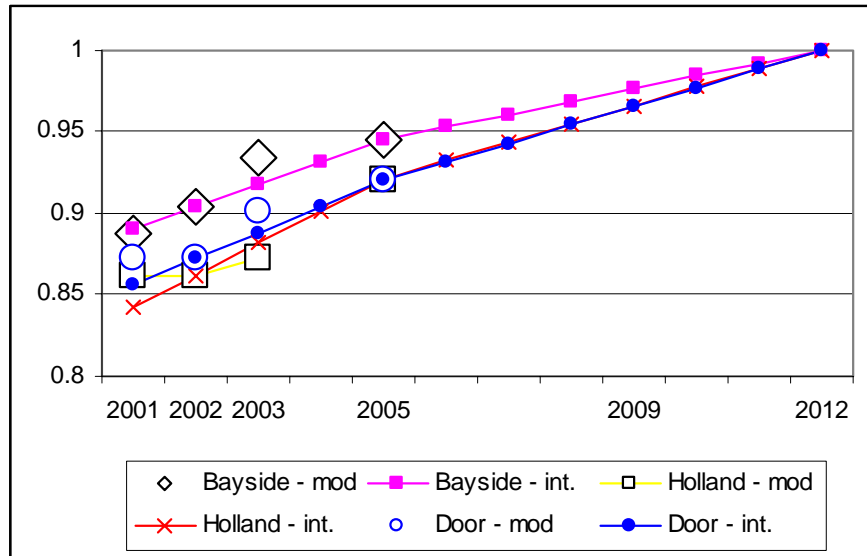
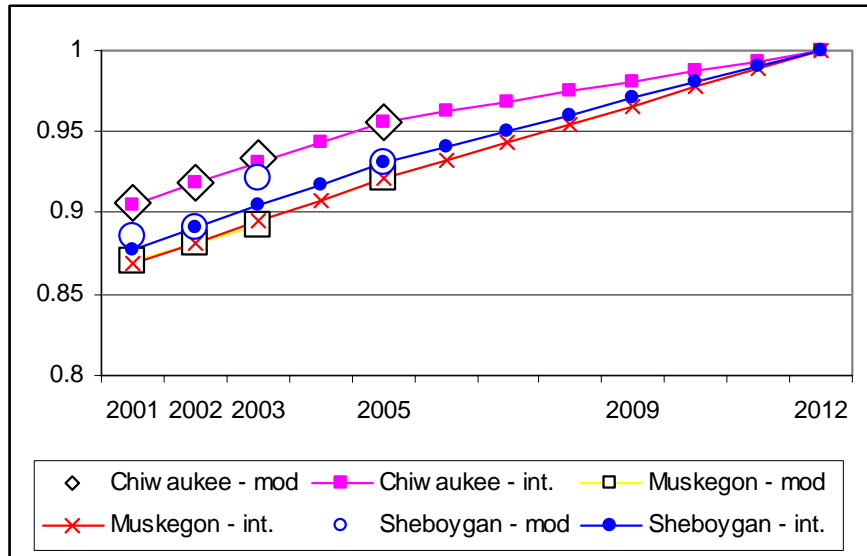


Figure 1. RRFs based on Round 4 modeling (for 2012) for sites in the Lake Michigan area (top) and other areas – St. Louis, Cincinnati, Detroit, Indianapolis, and Cleveland (bottom)