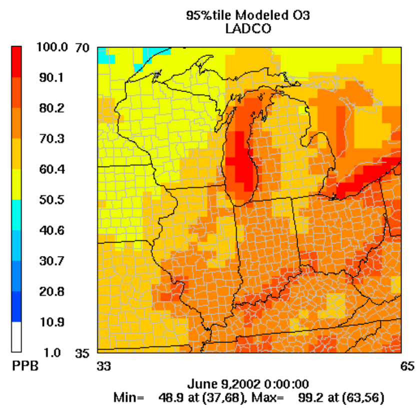
HOT SPOT TEST – DRAFT – MARCH 23, 2005

The hot spot analysis is designed to determine if any unmonitored grid cells consistently have high 8-hour ozone predictions and may be candidates for future monitor placement. The biggest challenge is to develop estimates of observed design values in places where there is no ozone monitor. This test uses the spatial field predicted by the photochemical model and relationship between high predicted ozone concentrations and the mean predicted concentration over the entire grid to estimate observed 8-hour ozone estimates. Peak 8-hour ozone model predictions are the cell specific 95th percentile value over the duration of the modeling episode. The mean model predicted 8-hour ozone value is the mean of the 95th percentile estimates over all grid cells in the domain. The 95th percentile is chosen to approximate the observed design value distribution which is a 3 year average of the 98th percentile.

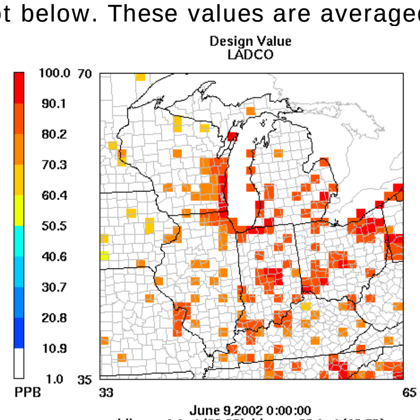
Since this test is for unmonitored hot spots, no cell that has an observed design value is included in the test. The appropriate attainment test as outlined in the Guidance document is appropriate for those grid cells with valid observed design values. Additionally, due to monitor site placement issues and since people do not live in oceans or in the Great Lakes, cells with 100% water land use are not included in the hot spot test. The steps to apply the hot spot test are outlined below.

1. Determine the 95th percentile 8hr ozone model predicted value over the length of the modeling episode in each grid cell; referred to as O3PRED(I,J) in this document.



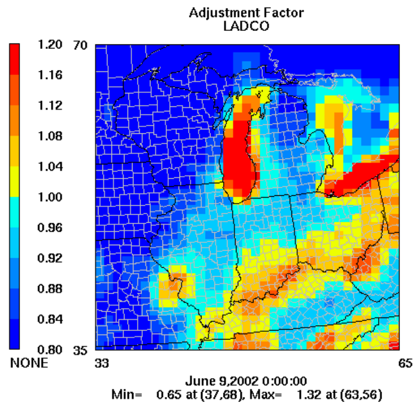
2. Average the predicted 8hr ozone values over the entire domain (AVGPRED). All grid cell values are averaged to estimate AVGPRED.

3. Average the observed design values of all monitors located in the same modeling domain as the average model predicted value (AVGOBS). Monitor design values in this example grid domain are shown in the plot below. These values are averaged together to estimate AVGOBS.



4. Estimate an adjustment factor using modeled ozone estimates from step 1 and the model prediction domain average from step 2 for each grid cell.

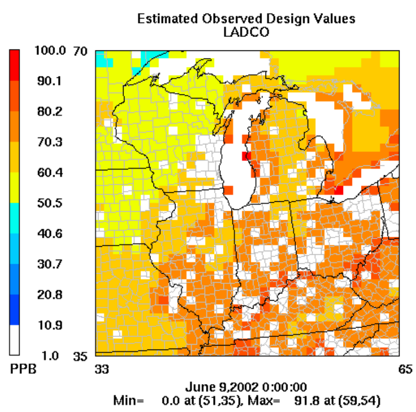
$$O3ADJFACTOR(I,J) = O3PRED(I,J) / AVGPRED$$



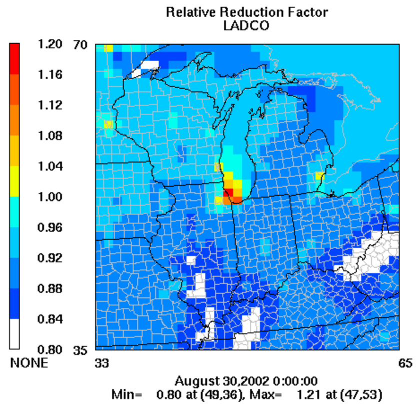
5. Estimate a new "observed design value" in each grid cell using the relationship from step 4. Grid cells over water are not included in this estimate. Grid cells containing a valid observed design value are also excluded. The adjustment factor from step 4 is multiplied by the average observed design value from step 3.

$$NEWDV(I,J) = O3ADJFACTOR(I,J) * AVGOBS$$

*If cell contains an observed design value or 100% water land use then NEWDV(I,J)=0.0

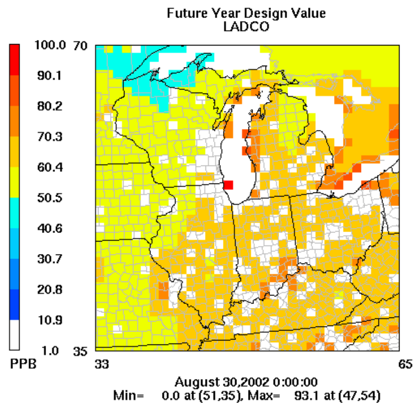


6. Use the base and future year model 8-hour ozone estimates to calculate cell specific relative reduction factors (RRF).



7. Estimate the future 8-hour ozone concentration using the RRF from step 6 and estimated design value from step 5.

Hot Spot future estimate (I,J) = NEWDV(I,J) * RRF(I,J)



8. Determine if any cells in the appropriate State or region exceed the 8-hour ozone Standard in the future scenario. If all cells have a future hot spot estimate less than the 8hr O3 Standard, then new monitor placement is not required. States are encouraged to place new monitors in cells where the future hot spot estimate is > 80 ppb and strongly encouraged to place new monitors in cells > 85 ppb.

In the fictitious above example there are several grid cells that suggest the presence of a potential hot spot. In this scenario, several counties on the eastern short of Lake Michigan and one county on the Illinois-Wisconsin border may be candidates for additional monitors.