The Savannah River National Laboratory (SRNL) working with the University of Alabama in Huntsville has performed a statistical analyses on extreme winds, gusts and turbulence intensities collected at SRNL’s onsite Climatology Tower (CLM) on Figure 1 site map. Wind instruments at 61, 32, 18, and 4 meter heights and a temperature sensor at 2 meters have been collecting 15-minute averaged data during an extended period including the calendar years 2001-2010 (over 1,250,000 records for the wind variables). Those data are used to support research and operational activities at the Savannah River Site in accordance with Department of Energy regulations. Extreme winds and gusts are used to estimate the potential for damage to existing onsite structures, operational safety considerations, and future risks for onsite construction over extended periods.

Extreme winds, gusts and turbulence intensities are also used to help determine the vibrational wind effects on heliostats, both in operational and stowed orientations near the ground. Of interest is the fractional time at or above various threshold values. The frequencies induced by gusts and turbulence are sufficiently close to heliostat drive unit natural frequencies so that dynamic coupling could occur. Since typical heliostats have relatively low damping ratios, the resulting dynamically coupled loads can be significantly higher than the static loads. This effect can reduce service life and impact reliability through both the low cycle failures for excessively high dynamically coupled loads and the additional load cycles that could contribute to cumulative fatigue damage.

1. Data collected from the Climatology Tower (CLM) at the Savannah River Site (SRS).

2. Histograms of the wind speeds and gusts with simple statistics for the speeds, gusts, bivane angles and temperatures.

3. Height dependence and trends in the variables over 2001-10.

4. Height dependence and trends in the variables during daylight hours.

5. Height dependence and trends in the variables after sunset and before sunrise.

Acknowledgements
Prepared for the U.S. Department of Energy Under Contract Number DE-AC09-08SR22477. Thanks to D. W. Worth for providing the poster template.