

Problem Set 6: Individual Work Required, Submit by the end of day April 8, 2020

A number of years ago, the United States incinerated its VX nerve agent stockpile at Anniston Army Depot which is located approximately 10 miles from Talladega Speedway.



Provided in your spreadsheet is a worksheet containing six months of Anniston daily laboratory quality control VX found masses for each daily set of four separate quality challenge injections of automated GC/FPD instrumentation designed to provide workers with updated readings every five minutes at hundreds of locations across this plant! Found masses are in units of Time-Weighted Average (TWA) exposure levels and all challenges were made at 1.0 VX TWA concentrations.

- 1. Mean Control Chart Limit Calculations:** Use the VX data from the months of July-September 2008 to establish VX analysis warning and control limits for a target (mean) control chart. Clearly show how these were calculated. For the months of July-September, determine whether the VX method had an overall bias and calculate the overall average percent recovery for these three months (a mean Found Mass of 1.0 TWA would be 100.0% recovery).
- 2. Range Control Chart Limit Calculations:** Use the VX data from the months of July-September 2008 to establish VX analysis target (overall average daily range) as well as upper range warning limits and upper range control limits for a range control chart. Clearly show in the worksheet how these were calculated.
- 3. Mean Control Chart:** Generate a Shewhart mean control chart for the entire six months of quality control data provided in the spreadsheet (using the limits calculated earlier for the first three months). Clearly label your six series: overall average reading series, daily mean series, upper control limit series, upper warning limit series, lower warning limit series, and lower control limit series.
- 4. Range Control Chart:** Generate a Shewhart range control chart for the entire six months of quality control data provided in the spreadsheet (using the limits calculated earlier for the first three months). Clearly label your four series: overall average range series, daily range series, upper range control limit series, and upper range warning limit series
- 5.** Use your control chart data to comment on how well the VX analytical method performed during the last quarter of 2008 using the third quarter's limits. Comment on any specific issues you find with this analytical method.