Energy Probe Interrogatory #43

Interrogatory

Reference:
Exhibit D2, Tab 2, Schedule 11, Attachment 3, Page 17

Preamble: "The labour costs in the RSMeans database are premised on a 66% productivity rate typical for a non-nuclear industrial construction project. This rate is substantially higher than the achievable productivity rate on the D2O Storage Project. Based on our experience on numerous other nuclear construction projects, and our review and extrapolation of the findings in two OPG-sponsored labour productivity studies, it is our expert opinion that an average 39% productivity factor would be appropriate for the D2O Storage Project."

a) Please explain how the productivity rate is used in estimating.

b) Please explain how 39% productivity factor was determined. Please show all calculations.

c) Please discuss the sensitivity of the estimate to the productivity factor for each 1% change in productivity.

Response

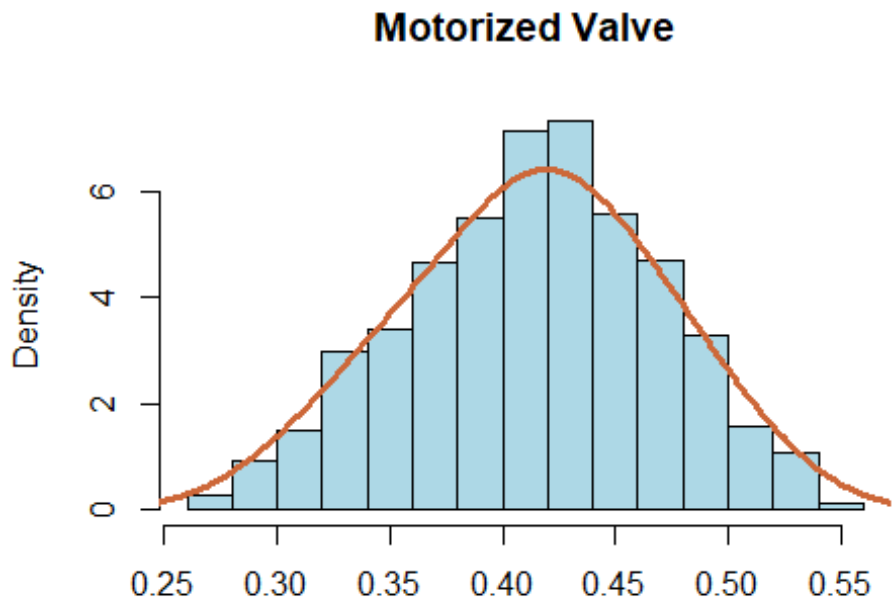
The following response was prepared by Bates White:

a) As envisioned in the Economic Modelling Working Group ("EMWG") Guidelines, which Bates White used to frame its overall approach, "site-specific productivity" estimates, such as the one developed for the Bates White D2O Storage Project cost estimate, are used to adjust site-neutral cost estimates (such as those developed using the EMWG process) to account for local conditions. In the Bates White estimate, this adjustment was applied to direct labor cost estimates on a line-item-by-line-item basis, as illustrated in Appendix D.

b) We took the raw data from the "wrench time" studies and computed productivity distributions using a Monte Carlo simulation and running 1,000 realizations using the R software package. Because the data were sparse, we modeled the data using a simplified triangular distribution. We used three parameters from the data in the "wrench time" studies: a most likely value, a lower bound, and an upper bound. An example of the results of this calculation, which was repeated for each data set, is provided below.

Figure 1: Probability Density Distribution

(Calculated for "Motorized Valve" example,
input values: median = 0.4154, spread = 0.2730 to 0.5465)



We then added the six distributions, again using a Monte Carlo simulation involving 1,000 realizations, to compute a composite productivity distribution. We used the mean value of this distribution as the point estimate for productivity in our subsequent computations.

c) Please see response to Ex. L-D2-02-Staff-172, part (c).