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James L Carroll* (j1carroll@lanl.gov), Los Alamos, NM 87544. *Practical Considerations for Analysis By Synthesis, a Real World Example using DARHT Radiography*. Preliminary report.

The mathematical theory of inverse problems has been intensely explored for many years. One common solution to inverse problems involves analysis by synthesis, where a forward model produces a synthetic data set, given model inputs, and optimization is used to find model inputs that minimize the difference between the real data and the synthetic data. Some beautiful mathematical results demonstrate that under ideal situations, this procedure returns the MAP estimate for the parameters of the model. However, many practical considerations exist that make this procedure much harder to actually use and implement. In this presentation, we will evaluate some of these practical considerations, including: Hypothesis testing over confidence, overfitting systematic errors instead of overfitting noise, optimization uncertainties, and complex measurement system calibration errors. The thrust of this work will be to attempt to qualitatively and quantitatively assess the errors in density reconstructions for the Dual Axis Radiographic Hydrotest Facility (DARHT) and LANL. (Received February 11, 2013)