Data Adequacy for Permitting Decisions (Newsletter)*

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How many of us would have correctly forecast today's economic conditions two years ago? How about five years ago? Probably not too many of us. More to the point, how many of us made provisions to closely monitor the credit and investment industries so we could make timely adjustments as information came in? Probably many more of us. These questions are relevant to data adequacy for regulatory permitting decisions. Asking for answers that have high uncertainty does not make the permitting decision more robust and mis-directs the regulator's focus.

The human environment (consisting of the economic, natural, and societal categories) is highly dynamic. Detailed statistical analyses of what happened in the past are not certain to predict what might happen in the future. After all, statistics are statements of probability reflecting uncertainty about the future. Time series analyses, even when properly done, are valid for only a very few time steps into the future. They cannot be extrapolated further into the future with any confidence. When, instead of using statistical analyses, we abstract past behaviors into deterministic models to predict the future we decrease confidence in the truth of the results.

Deterministic models are built from equations and constants into which we feed variable data from past observations. Those constants are often based on Best Professional Judgment, and the equations are usually based on imperfect estimates of how highly complex systems function. The output is a estimate, and the models are very well suited for comparing various sets of input data using the same equations and constants. The value of this time and effort is allowing comparison of alternative futures based on assumptions of system dynamics (the equations), constants, and the available input data.

The relevance of statistical and deterministic model outputs to permitting is often over valued. Too much reliance is placed on the numeric outputs before a decision is made. Instead, the statistical and deterministic model results should be seen as approximations of what might be in the future when different alternatives are used to construct, operate, and (where appropriate) reclaim a project.

Accepting that modeling results are imprecise guesses about the future, we can compare alternatives based on the same set of assumptions and errors. A preferred alternative can be chosen knowing that it is not a certain outcome.

Regulators are expected to do no more than make an informed decision based on statistical analyses of past conditions or modeled estimates of future conditions. Regardless of the preferred alternative, the decision should include a pragmatic set of monitoring requirements. Examination of data collected as a project is constructed, operated, and reclaimed provides insight into potential changes. That insight can take account of changes in any environmental resource that is desired by different consumers.

Making regulatory decisions based on imperfect predictions is technically sound and legally defensible. The real regulatory oversight is compliance monitoring results.