



## Engineering Sciences Section - 2012

### C4 Attorneys, Journalists, Environmental Forensic Scientists, and Four Words

James S. Smith, PhD\*, Trillium, Inc., 28 Graces Drive, Coatesville, PA 19320-1206

After attending this presentation, attendees will better understand the meanings of the terms theory and possibility as used by each of the experts involved in an environmental case.

This presentation will impact the forensic science community by highlighting the fact that scientific disciplines use different meanings for the same terms, which will cause confusion for the trier of fact.

In the realm of environmental forensic science, attorneys, journalists, forensic geologists, hydrogeologists, chemists, engineers, environmental scientists, and many other experts do not speak the same language. Yes, it is English; however, we define words differently which does not clarify the issue for the trier of fact. Instead it creates smoke and fosters junk science.

How often has the phrase, “it is the plaintiff’s or defendant’s theory been heard.” A theory is a formula derived by inference from scientific data that explains a principle operating in nature. A theory implies a greater range of evidence and a greater likelihood of truth than a hypothesis. A theory allows one to make a prediction with a good chance of being correct. Environmental forensic science rarely, if ever, reaches this level of predictability.

Normally, environmental forensic science begins with a hypothesis. A hypothesis is a tentative assumption made in order to draw out and test its logical or empirical consequences. Environmental “whodunits” usually have insufficient evidence to provide more than a tentative explanation. Joseph P. Bono, MA, in the President’s Message in the *Academy News*, September 2010, Volume 40, Issue 5, page 3, states “The six most questionable words used to formulate the justification for a conclusion by any forensic analyst are ‘Based on my TRAINING AND EXPERIENCE.’” Numerous attorneys have been told that when those words are spoken at a deposition or in trial, they can count on the fact that the remaining portion of the sentence is being made up at the time. In other words, they are about to hear speculation. This brings me to two additional words to be defined.

It has been asked “isn’t it possible?” more times than can be remembered. This word possible, should be eliminated from forensics. “Possible” is in the realm of expertise of a philosopher or a person of religion. As a forensic scientist, we do not have the expertise to determine the “possibility” of an explanation, hypothesis, or theory without testing to determine the probability of the hypothesis being asked.

It is the opinion “reasonable” means that the conclusion is based on logic, references, supported by and derived from a tested hypothesis, so that there is a good probability the hypothesis is correct or, at least, consistent with the facts. Instead, more often a lot of speculation is heard in the courtroom or, as some describe it, the “throw it against the wall and hope some of it sticks, and if it doesn’t stick, throw some more” approach. Yes, we are back to “In my experience....” and “possibilities.”

As a first step toward improving the situation, the deletion of the words “theory” and “possibility” in the language of environmental forensic science is recommended.

**Possibilities and Probabilities, Hypothesis, Theory**