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001-17 (164)  
"Pomeroy Briefing"

**MEMORANDUM**

To: Richard Major

From: Paul W. Pomeroy 

Subject: **Additional Materials for March 26, 1993 Meeting with  
Commissioner Curtiss**

Date: March 4, 1993

As you suggested, it would be useful to send along to Commissioner Curtiss' office the portion of the transcript of our last meeting which contains the discussion with Mr. Jose regarding expert judgment. In addition, I am enclosing several other short documents which you might wish to send along.

1. Paul W. Pomeroy's letter to Warner North, NWTRB dated 11 Nov. 1992
2. Letter from Warner North to Paul W. Pomeroy dated 3 Dec. 1992
3. Science article "Supreme Court to Weigh Science" 29 Jan. 1993
4. NRC Memo Treby (OGC) to Youngblood, "U.S. District Court Ruling on Expert Judgment" 29 Jan. 1993
5. DOE Summary Report on the Workshop on the Use of Expert Judgment held 18-20 Nov. 1992 entitled "The Use of Expert Judgment in Decision Making" received 10 Dec. 1992

All of these might serve as useful background for Commissioner Curtiss' staff but they may have seen at least some of them.

Thanks for your ongoing help.

P.S. Are Bill and Marty going to visit Commissioner Rogers?

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November 11, 1992

Prof. Warner North  
Decision Focus Inc.  
4984 El Camino Real  
Los Altos, CA 94022

Dear Warner:

I deeply regret that I will be unable to attend the upcoming DOE conference on Expert Judgment in Albuquerque. As we discussed by phone, I do have a few thoughts that I would like to share with you. Needless to say, most of these ideas have not been discussed with the other members of the ACNW so they represent only my opinions at this point. There are four broad areas that I would like to cover:

**1. Achievement of consensus within the technical, political and public communities on an acceptable methodology for the formal elicitation and use of expert judgment in the repository licensing process.**

I believe that it would be highly useful if all of the interested parties could be brought together and consensus achieved at least regarding the methodologies to be used. Now, we have the time to clarify and possibly agree on methodologies. With agreement in hand, discussion and litigation during the licensing process can focus on the judgments, their bases and the uncertainties, rather than on the methods. This does not imply, of course, that any party, by adhering to the consensus methodology, will receive any special credit but it will insure that there are no major surprises, e.g., a possible lack of acceptability of aggregation.

Factors to be considered in the development of this consensus include:

- Identification and selection of experts
- Design and conduct of elicitations
- Treatment of uncertainty
- Biases of experts and /or elicitors
- Dependency among experts

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- Criteria and protocols for weighting the judgments of experts (and other inputs)
- Aggregation of judgments
- The influence of the normative experts

The ACNW has recommended that the NRC Staff attempt to reach such a consensus but all interested parties should be encouraged to participate.

**2. An in-depth investigation of the use of expert judgment in one particular area of the repository problem.**

The ACNW has recommended that the NRC Staff select one area of the repository problem and pursue the use of expert judgment in that area in great detail. Pursuing this study to the bottom line conclusions required for licensing will not only illuminate all the corners where expert judgment will be used but more importantly, it will provide the practitioner the opportunity to evaluate the uncertainty at each step of the process. I believe that each of the interested parties should undertake such an analysis. My concern is that, if we wait until the licensing process is underway, we may discover major deficiencies involving the use of expert judgment that could significantly and detrimentally impact the repository licensing process. I am not certain which area the NRC Staff has chosen to investigate in detail, but I like your idea regarding the topic of Level of Infiltration including changes in climate, vegetation etc. Perhaps this might be an appropriate topic for the DOE to pursue in depth.

**3. Legal aspects regarding the admissibility and use of expert judgment in the adjudicatory process.**

From a legal standpoint, the licensing of the repository may pose unique problems in the area of the acceptability of expert judgment. I recently read the judgment of one court (U.S. District Court - Central District of Illinois, Case #88-1272, O'Connor vs Commonwealth Edison et al., July 23, 1992) involving the use of expert judgment in a medical case. The case is itself interesting and I am taking the liberty of sending you a copy together with a summary statement on the expert judgment questions it addresses by one of our ACNW Staff. It makes good late night reading. I want to excerpt several quotes from the decision because they relate directly to the acceptability, in a legal framework, of expert judgment.

There are two Federal Rules of Evidence Nos. 702 and 703. No. 702 says

A court may admit expert testimony if the subject of such testimony is beyond the knowledge of the average layman and it "will assist the trier of fact to understand the evidence or to determine a fact in

issue." ... An expert witness must be qualified by specialized "knowledge, skill, experience, training or education."

No. 703 says

An expert's opinion must have a sufficient verifiable scientific basis; the scientific data underlying his opinion must be of the type that is reasonably relied upon by experts in the field.

Other case law that relates:

An expert witness is not permitted to guess or base his opinion on surmise or conjecture.

A court is not bound by the mere assertions of an expert. ... and must "look behind the expert's ultimate conclusion ... and analyze the adequacy of its foundation." ... Otherwise any case in which an expert was willing ... to [testify] "to a reasonable degree of scientific certainty" and [say] "the basis of my opinion is X, on which experts in my field reasonably rely," every case requiring expert testimony would get to the jury. If a court is not permitted to examine the basis of an expert opinion in order to rule on the admissibility of that opinion, then Rule 703 should read "An expert may cite as the basis of his opinion anything he likes."

As the Seventh Circuit has warned, "there is not much difficulty in finding a medical expert witness to testify to virtually any theory of medical causation short of the fantastic."

(This may be true not only for medicine but in every field we deal with in repository selection.)

Federal Rules of Evidence 702 and 703 provide courts with the means to screen carefully the qualifications, and factual and scientific bases of an expert's opinion. ... A court has broad discretion to exclude an expert's opinion if it cannot withstand the requirements of Rules 702 and 703. The Federal Rules of Evidence allow a court to intercede and to limit expert testimony where a witness attempts to give an opinion on a subject for which he is not qualified, when there is no factual basis for that proffered opinion, when that opinion is based upon an error of logic, and when the expert cannot supply the court with any verifiable scientific support for the opinion. The Rules recognize that there is some limit to every expert's expertise and that he can not be allowed to go beyond it. For example, no medical doctor is automatically an expert in every medical issue merely because he or she has graduated from medical school or has achieved certification in a medical specialty. ... Scientific truths must be verifiable or they are not scientific truths at all. An expert's opinion must also be verifiable or it is not expert at all. Rules of both science and evidence require a scientist or an expert to have a verifiable basis for his opinion. Such controls are important in both fields to minimize error due to "junk" science.

However, an "expert's opinion is helpful only to the extent that expert draws on some special skill, knowledge, or experience to formulate that opinion." ... District courts must ensure that expert opinion testimony is in fact expert opinion, "(that is, an opinion informed by the witness' expertise) rather than simply an opinion broached by a purported expert." ... Whether a witness is qualified as an expert can only be determined by comparing the area in which the witness has superior knowledge, skill, experience, or education with the subject matter of the witness's testimony."

...(where expert's opinion is not supported by scientific evidence his opinion "that it is so" is not admissible); ... "Courts are particularly wary of unfounded expert opinion when causation is the issue." ... This is especially true in cases such as this where the plaintiff claims that exposure to a toxic substance caused his injury. The court is concerned that the jury may blindly accept an expert's opinion that conforms with their underlying fears of toxic substances without carefully understanding or examining the basis for that opinion.

Whether an expert's opinion has a sufficiently verifiable scientific basis is an issue of law for the court to decide. ... Although an expert opinion is indispensable to a case, "that is not to say that the court's hands are inexorably tied, or that it must accept uncritically any sort of opinion exposed by an expert merely because his credentials render him qualified to testify." ... A court has a duty "to examine the reliability of an expert's sources to determine whether they satisfy the threshold established by [Rule 703]." ... If the basis of the expert opinion is unsound, his conclusion is inaccurate, and the jury does not have sufficient evidence on which to decide the case. ... Courts must reject opinions "founded on critical facts that are plainly untrustworthy, principally because such an opinion cannot be helpful to the jury."

"The mere recitation of a list of studies is not a magical incantation paving the way to the witness stand unless it is accompanied by reasoned and scientifically accepted analysis."

..."courts must critically evaluate the reasoning process by which the expert connect data to their conclusions in order for courts to consistently and rationally resolve the disputes before them."

"In order to create a genuine issue of material fact, an expert's testimony must include a process of reasoning based on a firm foundation. 'An expert who supplies nothing but a bottom line supplies nothing of value to the judicial process.'"

A court that is untrained in science may not feel well suited to determine whether an expert's opinion has a valid and verifiable scientific reasoning process. But the Federal Rules of Evidence provide a helpful yardstick with which to measure and judge expert opinion testimony: would a reasonable expert in the field rely on the data and reasoning used?

"An expert is a person who, because of education, training or experience, possesses knowledge of a specialized nature beyond that of the average person on a factual matter material to a claim or defense in pending litigation and who may be expected to render an opinion within his expertise at trial." ... The burden of establishing the expert's qualifications rests on the proponent of his testimony. ... The qualification of an expert is within the sound discretion of the trial court. ... an expert must be qualified as an expert before giving expert opinion.

... defendant sought to introduce the expert testimony of an actuary on future economic trends. ... Although the expert had training and experience as an actuary, thereby qualifying as an expert in that field, she had no education, training or experience in the particular subject on which she was to offer her opinion, e.g., long-term future economic trends. ... This court determined that the expert did not have a sufficient basis to render such an opinion. The court reasoned: "While personal experience may well act as a basis for a witness qualified as an expert ... personal experience alone is simply not enough, in the court's opinion, where the experience does not include some theoretical foundation." ... Just as a medical opinion without a verifiable scientific basis is inadmissible, an

expert opinion that actually contradicts directly the scientific consensus is inadmissible. ... "[A]n opinion refuting ... scientific consensus is inadmissible for lack of an adequate foundation."

#### The Frye doctrine also bears on our problem

Under *Frye*, the methodology and reasoning used by an expert to reach his conclusion must be generally accepted within the relevant scientific community. ... Although generally an expert's conclusion may be admissible even when it is controversial or unique, it is not admissible when scientific truth has "so completely hardened as to prevent legitimate difference of true expert opinion in a particular concrete field."

All of this is, of course, open to different interpretations. In the repository licensing process, I believe that we will have groups of experts (each group from one of the interested parties) testifying knowledgeably but quite differently on the same basis of fact, i.e., all the data gathered during site characterization. Presumably, each member of all of these groups will be legally qualified as an expert. This may provide a unique problem for the adjudicatory system to handle.

It seems to me that there is, (and will be after site characterization) a range of expert opinion in the most difficult areas. I think of that range as a spectrum.. There will be, at one end of the spectrum, issues where data are plentiful and expert opinion may be used to weight data, e.g., an acceptable range of values for the porosity of tuff. At the other end of the spectrum, issues such as future states of society where there are little or no data will be discussed (and how do we determine the experts here!). Many of our most difficult problems will lie somewhere in the middle of this spectrum, i.e., we will have some data but may not understand the causative mechanisms and "experts" may or may not be experts. All of this convinces me of the need for pursuing the steps outlined below without neglecting site characterization, total system performance assessment etc. etc. etc.

**4. The Next Step** -- In addition to developing a consensus on methodology (Item 1 above) and conducting in-depth analyses in one or more difficult areas, a meeting should be arranged between representatives of all interested parties and legal specialists in the area of expert judgment to understand and plan for the use of expert judgment in the legal framework of the licensing process. I believe it would be appropriate to include political representatives and representatives of public interest groups in such a meeting. As I indicated above, the repository may pose unique problems regarding the legal acceptability of expert judgment, implicit and explicit. If you wish, we can discuss this suggestion in greater detail following the Albuquerque meeting.

In an overall sense, I am concerned that, prior to reaching the repository license application stage, all parties have fully investigated and, to the extent possible, agreed on at least

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methodology for the use of expert judgment. Let's not try 'a first of its kind' experiment at that late date!

It would be extremely useful to talk further, after I have had the opportunity to digest the output of the Albuquerque meeting, to decide which future course of action might be most fruitful.

Best regards,

A handwritten signature in cursive script that reads "Paul".

Paul W. Pomeroy

PWP:kmd