

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: Surveillance Observation of the Sandia National Laboratories' Exploratory Shaft Facilities Alternatives Study (20-3702-021)

DATE/PLACE OF TRIP: September 4-7, 1990, Sandia National Laboratories, Building 821, Kirkland Air Force Base, Albuquerque, New Mexico

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PERSON PRESENT: Randal Barnes

BACKGROUND AND PURPOSE OF TRIP

The Department of Energy (DOE) conducted Quality Assurance (QA) Surveillance of the Sandia National laboratories' Exploratory Shaft Facilities (ESF) Alternatives Study on September 4-7, 1990. A NRC team consisting of J. Buckley and D. Gupta of NRC Headquarters and R. Barnes of the University of Minnesota attended to observe this QA surveillance at Albuquerque, New Mexico. Although the observed surveillance was for quality assurance, R. Barnes attended the surveillance observation to assist the NRC staff in understanding the proposed decision analysis methodology for the ESF Alternatives Study. As such, this trip report addresses primarily the technical observations on the ESF Alternatives study methodology considerations.

SUMMARY OF PERTINENT POINTS:

The observations are primarily based on the ESF Alternatives Study Tasks 3, 4, and 5. Two of the more prominent purposes of applying a formal decision analysis methodology are the separation of analyses from assumptions, and the separation of technical conclusions from policy decisions. As presented during the observed surveillance, the ESF Alternatives Study Plan apparently succeeds in the explicit identification and separation of assumptions from analyses. The DOE QA questions and comments indicated that this division is appropriately documented, as well. The clear division of technical conclusions from policy decisions, however, is not achieved with the current plan. In fact, it appears that this division was not deemed important by the formal decisions analysis facilitators. Specifically, the technical panels for the assessment of costs, benefits, and subjective probabilities are organized parallel to the 15 influence diagrams -

one panel per influence diagram. Influence diagrams are used to graphically depict the complex interactions between facts, conclusions, assumptions, and decisions. Thus, the results of each of the 15 technical panels will involve both technical analyses and policy decisions.

There are two obvious ways to modify the ESF Alternatives Study Plan so that technical conclusions are explicitly separate from policy decision. First, though not necessarily best, there could be two panels assigned to each influence diagram -- one technical panel to address the technical issues, and one managerial panel to address the policy issues. Second, the influence diagrams could be reorganized so that any particular influence diagram includes only technical issues or only managerial issues.

The use of expert panels for decision making in data pool settings is a common engineering practice. The use of expert panels for the assessment of subjective probabilities is also a common engineering practice. Experts on a panel bring their education and professional experience to bear on the questions posed. Thus, an expert's opinion is useful in direct proportion to the similarity of the questions addressed to the individual expert's background.

Multi-attribute utility analysis offers a logically-consistent method of scoring options for the ESF Study. However, there is a potential concern with the specific form suggested. Specifically, the summary of specific decisions will be calculated by the following generic formula:

$$U = \sum_{i=1}^N P(i) [B(i) - C(i)]$$

where N is the number of scenarios considered,

P (i) is the probability of scenario (i),

B (i) is the assessed benefit of scenario (i), and

C (i) is the assessed cost of scenario (i).

While the probabilities, benefits, and costs will each have objective and subjective components, the uncertainty associated with the assessment of benefits associated with particular scenarios will be significantly less certain than the probabilities or the costs. Common engineering practice in such settings is to eliminate the benefits from explicit consideration and to minimize the weighted costs rather than maximize the net benefits.

The DOE QA surveillance of the ESF alternatives Study appeared useful and effective. The surveillance team was familiar with the

pertinent requirements. While the scope of this surveillance was limited to QA procedural implementation and no explicit assessment of the technical adequacy was made during the surveillance, many of the procedural comments will certainly improve the technical results.

IMPRESSIONS/CONCLUSIONS

There is a potential concern with the current use of expert panels for the assessment of subjective probabilities in the ESF Alternatives Study Plan. The instructions to the technical panel members included in DIM 254 may be inadequate to arrive at an appropriate panel consensus. The instructions and oversight of a panel facilitator, whose expertise is in decision analysis not the various technical disciplines involved, may not provide adequate control.

PROBLEMS ENCOUNTERED: NONE

PENDING ACTIONS: NONE

RECOMMENDATIONS:

Given the concerns of the NRC, expressed in the letter of May 9, 1990 from Mr. John J. Linehan (NRC) to Mr. Ralph Stein (DOE), and the methodological concerns resulting from this brief surveillance observations (outlined above), it would be prudent for the NRC staff to consider a technical dialogue between the NRC and the DOE.

SIGNATURE

Handwritten signature of Randal Baynes

9/14/90

Date

CONCURRENCE SIGNATURES AND DATES

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Asadul H. Chowdhury
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