



# BPI

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August 14, 1984

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USNRC

Ivan W. Smith, Esq.  
Administrative Judge and  
Chairman  
Atomic Safety and Licensing  
Board  
U.S. Nuclear Regulatory  
Commission  
Washington, D. C. 20555

Dr. Richard F. Cole '84 AGO 16 P1:13  
Administrate Judge  
Atomic Safety and  
Licensing Board  
U.S. Nuclear Regulatory  
Commission  
Washington, D. C. 20555

OFFICE OF SECRETARY  
DOCKETING & SERVICE  
BRANCH

Dr. A. Dixon Callihan  
Administrative Judge  
Atomic Safety and Licensing Board  
c/o Union Carbide Corporation  
P. O. Box Y  
Oak Ridge, Tennessee 37830

Re: In the Matter of Commonwealth Edison Company  
(Byron Nuclear Power Station, Units 1 and 2)  
Docket Nos. 50-454 and 50-455 oc

Gentlemen:

The written testimony of Dr. Eugene P. Ericksen that was sent to you yesterday contained typos on pages 6, 11 and 17. Please substitute the enclosed corrected pages.

Very truly yours,

*Victoria A. Judson*  
Victoria A. Judson

VAJ:mam  
encls.  
cc: Service List

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want to be assured that sample sizes were sufficiently large to be confident of the results. This would have enabled the Reinspection Program to establish acceptable confidence levels and reliabilities based on the importance of the element. Confidence levels indicate how certain a statistician is that his or her results are correct. Reliabilities reflect the percentage of inspections which are correct. For inspection elements where the risks caused by a poor quality are great, we might want to be certain that all were correct and, therefore, reinspect all elements. For inspection elements where the risks are not as great, but still substantial, we might want to be quite sure that 99.9 percent were correct. For other inspection elements which are less safety significant, we might be satisfied if we were reasonably certain that 99 percent were correct. In order to determine the amount of certainty and perfection required for each element, choices should have been made using engineering judgments. These judgments, along with their rationales, should have been determined when establishing the program and clearly stated in the reinspection report. A reasonable reinspection program might have required the following reliabilities and confidence levels for the following types of elements.

<u>Type of Element</u>	<u>Reliability</u>	<u>Confidence Level</u>
Critical to safety	100%	100%
Very important to safety	99.9%	99%
Somewhat important to safety	99%	95%
Least important to safety	90%	95%

Assumption (2) was violated because inspectors were not homogeneous; different inspectors had different probabilities of success. Assumption (4) was violated because inspections were not randomly chosen; the selections of inspections were not independent from each other.

Q16: What is the basis for your conclusion that inspectors were not homogeneous?

A16: Where inspectors are not homogeneous there will be similarities between inspections made by the same inspector. This creates a commonality within the cluster which can be measured by the "intraclass correlation." The intraclass correlation can range from a value slightly less than zero to +1.0. If the intraclass correlation is equal to zero, it means that inspectors are homogeneous and there is no increase in variance associated with cluster sampling. If the interclass correlation is greater than zero, then inspectors are not homogeneous.

We can use data from Appendix B of the Reinspection Report to compute intraclass correlations. The computations show that for Hatfield, Hunter and Pittsburgh Testing Laboratory, each contractor's overall intraclass correlation was greater than zero. These positive intraclass correlations indicate that inspectors were not homogeneous.

Another indication of the lack of homogeneity among inspectors is seen from the results of "F tests." The F test is a common statistical tool that can be used to

Third, Edison used an inappropriate formula in calculating reliabilities. Two assumptions of the formula were violated: inspections were not randomly selected and inspectors were not homogeneous.

Fourth, Edison did not account for the added uncertainty created by clustering of inspections by inspector.

For these reasons, the sampling design of the Reinspection Program and the statistical analysis of the Reinspection Report are inadequate to support Edison's general conclusions about work quality and inspector qualifications.