

8/16/84

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

DOCKETED
USNRC

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

'84 AGO 20 P12:38

In the Matter of)
COMMONWEALTH EDISON COMPANY)
(Byron Station, Units 1)
and 2))

Docket Nos. 50-454-QL
50-455-OL

AFFIDAVIT OF GEORGE T. KLOPP

George T. Klopp, being first duly sworn, deposes
and says:

1. My name is George T. Klopp. I am employed by
Commonwealth Edison Company in the Project Engineering Depart-
ment. I am currently assigned to the Byron Project. I pro-
vided testimony during the initial hearings conducted by the
Atomic Safety and Licensing Board on subjects relating to
Probabilistic Risk Assessment and plant behavior given
postulated events more severe than those which constitute the
design bases for Byron.

2. I have reviewed the proposed testimony of Dr.
Bleuel with respect to his assertions of the need for a failure
modes and effects analysis and am familiar with the Byron Re-
inspection Program Report and its supplement. Dr. Bleuel asserts
that a failure modes and effects analysis is necessary to focus
the program resources on "critical failure modes" and to permit

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the application of stricter standards to those critical failure modes. This portion of his testimony is pertinent only if one assumes that:

- (a) Commonwealth Edison has no vehicle for assessing safety significance absent a failure modes and effects analysis unique to the re-inspection program; and
- (b) such failure modes require the application of standards more severe than those applied in general to safety related work and more specifically to individual items already addressed by NRC regulatory requirements.

3. The first assumption is patently incorrect. The Byron FSAR contains many examples of "failure modes and effects analyses", albeit of a type not relying on fault tree methodology. Moreover, Commonwealth Edison contracted with Westinghouse to perform the "Byron Risk Study" which consists of a level 3 probabilistic risk assessment based on the "Zion Probabilistic Safety Study". The "Byron Risk Study" was discussed during the initial hearings on Byron and a copy was supplied to the intervenors. This study clearly identifies the failure modes of most importance for various plant systems and those of most importance, on an interactive basis, for the plant itself. This study does apply fault tree and event tree methodology to Byron. Additionally, Commonwealth Edison has a great deal of experience with

pressurized water reactor plants and is very capable of assessing the relative importance of systems and components and of their failures and failure modes.

4. The second assumption is one that would require the application of fault tree methodology to the establishment of quality standards for nuclear power plant systems and components. Both NRC requirements and industry codes and standards are already well established on a deterministic basis and no requirement currently exists to reassess those using fault tree techniques. Indeed, such an approach would lead to monumental confusion since fault tree analyses would lead to different "critical failure modes" for each plant assessed due to major and minor design differences. This is confirmed by even cursory review of existing probabilistic risk assessments. The existing standards, by contrast, are relatively insensitive to such effects.

5. There is one other assumption implicit in Dr. Bleuel's proposed testimony. That, of course, centers around the suitability of fault tree based failure modes and effects analyses for structuring programs like the reinspection program in the nuclear power business. Drawing on my background in this area, I must conclude that the current state of the art in fault tree analysis would not suggest that Dr. Bleuel's approach is sound for this application. System fault trees can be developed and carried out in sufficient detail to depict causal failure modes. Consider a simple system consisting

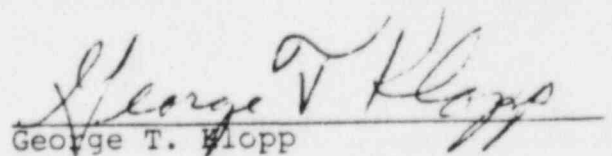
of 2 redundant pumps taking suction from a single tank and injecting water into the reactor coolant system. (See attached Figure 1). A fault tree can be developed that depicts possible disabling failures for each pump train. These failures can be depicted down to the level where one is considering tank failures due to faulty tank welds or faulty structural connections, pipe failures due to faulty hangers, faulty pipe welds, inadequate materials, etc. and pump failures due to electrical breaker failure, bearing cooling water failure, shaft failure, etc. To assess which of these is "critical" one has to depend on industry experience to identify which failures are most likely since any one of the failures can disable one of the 2 pumping trains. Moreover, only some of these possible failure mechanisms are within the scope of work of site contractors such as Hatfield and Hunter. One would therefore have to consider all possible failure modes irrespective of their relationship to the quality issue before the Board.

6. The above mentioned dependence defeats the process on an a priori basis for the specific application in question. This is because the dependence carries with it an assumed condition regarding construction quality based on existing plant experience. Clearly, construction quality and the verification thereof is the point at issue. The process has no way to assess the impact of any alleged or postulated quality problem unless that problem is built into the industry experience. The only point at which the process might be valid is in identifying the tank as a key point

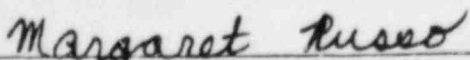
shared by both pumping trains. Therefore, the result of such an assessment would lead one to concentrate on the tank to the exclusion or diminution of efforts elsewhere. One doesn't need a fault tree analysis to "see" the tank's importance. This example demonstrates that a fault tree analysis inevitably is narrowly focused, a very different approach from the broad-scale investigation undertaken in the reinspection program.

7. The foregoing is not intended to be an overall condemnation of the technique advocated by Dr. Bleuel. Fault tree analysis is a useful tool in many cases and is receiving a good deal of attention in the nuclear industry. In fact, it might play a useful role in the quality assessments similar to Edison's reinspection program of devices and systems which are more heavily interactive and less redundant than those of a nuclear power plant. Certain communications and satellite systems may be so characterized.

8. In summary, the specific application of failure modes and effects analyses to the formulation of the reinspection program at Byron would have been a mistake of the first order. It would have defeated the intent of the program by narrowing the focus of reinspection. It would have unnecessarily duplicated work already performed but deliberately not employed in our program. It would not have provided reliable information with regard to the quality of work at Byron.


George T. Klopp

Subscribed and sworn to before
me this 16th day of August, 1984.


Notary Public

My Commission Expires April 6, 1985

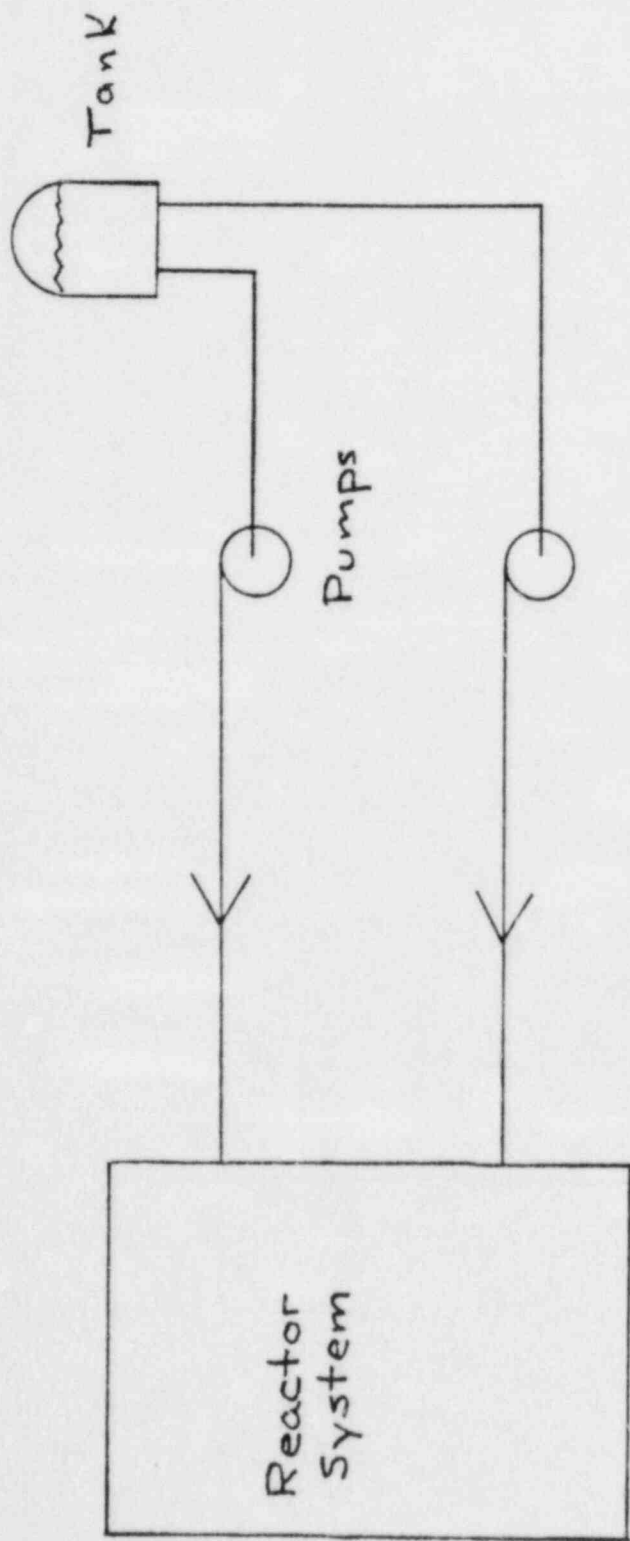


Figure 1

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
COMMONWEALTH EDISON COMPANY)
(Byron Nuclear Power Station,)
Units 1 & 2)

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DOCKETING & SERVICE
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CERTIFICATE OF SERVICE

The undersigned, one of the attorneys for Commonwealth Edison Company, certifies that he filed the original and two copies of the attached "MEMORANDUM OF COMMONWEALTH EDISON COMPANY IN OPPOSITION TO INTERVENORS' MOTION FOR LEAVE TO FILE TESTIMONY OF DR. WILLIAM H. BLUEL" with the Secretary of the Nuclear Regulatory Commission and served copies on the persons and at the addresses shown on the attached service list. Unless otherwise noted on the Service List, service on the Secretary and all parties was made by deposit in the U.S. Mail, first-class postage prepaid, this 16th day of August, 1984.

Mark S. Lunde

One of the attorneys for
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Docket Nos. 50-454 and 50-455

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