



**Consumers  
Power  
Company**

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Director, Nuclear Reactor Regulation  
Att Mr Dennis M Crutchfield, Chief  
Operating Reactors Branch No. 5  
US Nuclear Regulatory Commission  
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 -  
PALISADES PLANT - RESPONSE TO LOSS  
OF OFF-SITE POWER SURVEY

On January 31, 1980, Consumers Power Company responded to an NRC survey questionnaire dated September 25, 1979, identifying that between June 6, 1971 and July 22, 1978, the Palisades Plant experienced 94 partial losses of off-site power and four total losses of off-site power. These losses were then categorized into generic causes (Table 3 of June 19, 1980 letter from NRC to CP Co). Palisades was then averaged in with 48 other plants and each cause was given an industry average which is described as target failure rates. The statistical analysis then shows that Palisades had five causes in which the failure rate exceeded the target value (target violations).

The Loss of Off-Site Power - Survey Status Report dated June 19, 1980, was prepared by Raymond Scholl, Jr from the Systematic Evaluation Program Branch of the Division of Licensing. Mr R Scholl was contacted by telephone on August 20, 1980 by Mr M R Wade and Mr S R Frost of CP Co and discussed his steps in data reduction and analysis and his conclusions and recommendations. This analysis showed Palisades had five different power loss causes where the failure rate exceeded the target value.

As pointed out by Mr R Scholl, Consumers Power Company responded to the September 25, 1979 questionnaire in a more thorough manner than did most of the other respondents. Our responses were very comprehensive and, therefore, resulted in more events being reported. Inasmuch as we were compared with the other respondents, we naturally had some above-average event rates. Another cause of the high event rate was the fact that Palisades presently has six transmission circuits as opposed to only two or three for most of the other plants. This naturally results in more loss of circuit events being reported. The statistical analysis failed to give credit for extra transmission circuits. Mr R Scholl admitted that this was a major shortcoming in his results and indicated that his program required some modifications in this area.

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Before analyzing the individual target violations, we have several recommendations for improving the survey and its results:

- It would be very appropriate to base fault data on a per circuit mile per year statistic rather than total number of faults. These statistics would become much more meaningful.
- A short list of causes should be used (ie, faults - line, faults - equipment failure, protective relaying failure, construction errors, other). This list should be provided to the utilities and they should be responsible for assigning causes to their events. This would help in the comparison of events between utilities. Subsets could be assigned to the basic list to further separate type of faults or causes of faults if desired.
- Some thought should be given to establishing a minimum time threshold for reoccurring faults so that they could be combined into one long event instead of multiple short events.
- Cause 4 is entirely attributed to human error factors except circuit failures. Circuit failures should be included in a different category.

A breakdown of the number of events per specific cause shows there were 31 events resulting from Cause 4, circuit breaker trips and human errors. Several factors need to be looked at when evaluating this number:

- Twelve events resulted from a loss of carrier signal for a fault on the I&M 345 kV system. Cause 4 is human error only. Loss of carrier signal is not human error. A separate category is needed for loss of carrier signal.
- Nineteen events on six transmission circuits would be the same as only six events on two transmission circuits.

The analysis shows that eight events resulted from Cause 5, ground fault. A review of these events revealed numerous errors in the data reduction and Failure Map printout (Table 4 of the June 19, 1980 Survey Report):

- Consumers Power Company submitted the completed questionnaire showing 94 partial circuit losses. The Failure Map shows a total of 96. Other discrepancies in the Failure Map include: (a) five events in Cause 0, LOP-A printout lists only two events; (b) eight events in Cause 5, LOP-A printout (June 19, 1980 Survey Report) only has seven events; (c) eleven events in Cause 15, LOP-A printout has 12. That makes four errors in the translation of data from one table to the next by the computer. If the program is unable to simply transfer numbers from one location to another, the entire program may have errors and all of the results are void.
- As shown above, there are only seven events resulting from Cause 5. A closer examination shows two of these events (1/11/74 and 6/14/77) were reported as unknown causes (Cause 0) and one event (6/28/77) was reported as caused by lightning, Cause 22. In this case, three out of seven events were incorrectly categorized; therefore, there are only four events instead of seven.

- Four events on six transmission lines would be the same as those plants that have only one event on two transmission lines.

The analysis shows 13 events resulting from Cause 11, lightning, with redundant lines out of service.

- Here is another obvious error in data reduction. LOP-A printout lists Palisades as having six transmission circuits throughout the entire reporting period. In reality, only four circuits existed prior to the summer of 1973. Our questionnaire response lists only four circuits in service. This data was mistakenly translated to mean that two circuits were out of service. These 13 events should be transferred to Cause 22, lightning.
- Adding the two categories together results in 28 lightning related events. Again, having multiple lines tend to reduce the magnitude of this number. The transmission system is also in a very lightning prone location. Storms traveling east over Lake Michigan do not have any points to discharge on until they reach the shore where many of our lines are located.

The analysis shows two events resulting from Cause 14, overload.

- In this case of data reduction, Mr R Scholl assumed that when an instantaneous element overreached, the circuit was overloaded. These events were actually caused by a type of relay which measures the current in a transmission line to detect ground faults. On March 29, 1974, several lines were out of service which caused the relay to overreach for this multiple contingency condition and trip the circuit breaker. These events should be transferred to Cause 5.
- Consumers Power reported that on March 29, 1974, this overreach trip occurred three times. The descriptions in our submittals were identical but one of these events was credited to Cause 15, winter storm, instead of Cause 14.
- It is important to note that at no time has any transmission line tripped due to overload.

Finally, the analysis shows eight events resulting from Cause 29, construction.

- It should be pointed out that our submittal described six of these events as having unknown causes and stated that construction work was being performed in the switchyard. One event occurred on January 13, 1972 and the other five occurred on January 14, 1972.
- No construction related outages have occurred since August 11, 1973. Looking at the dates of these events, we do not believe that any detectable trends exist.
- Again, it should be noted that Palisades had four transmission lines in service at the time compared to only two lines for many of the other plants.

Mr D M Crutchfield, Chief  
Palisades Plant  
October 28, 1980

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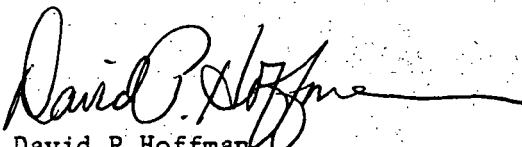
- It is statistically correct to include construction as a cause but it is not correct to compare a plant which has experienced extensive construction to plants without any construction.

In summary, during our phone conversation, August 20, 1980, it was revealed that this survey is intended to produce two basic results: (a) validation of the Rasmussen Report (WASH-1400) with regard to probabilistic failure rates and (b) identification of activities or equipment which need to be modified. The first attempt to validate the Rasmussen Report shows the report to be incorrect by a factor of 10. Based on the errors made for Palisades and the NRC staff's inability to correctly program the computer to transfer numbers properly, we suggest that a real good look be taken at what was done and then have an independent reviewer check the work before submitting any results about the Rasmussen Report.

We do not feel that Palisades exhibits any abnormal trends for any of the causes that were identified. The fact that Palisades and a few other plants have more than two or three transmission circuits should be factored into the analysis. If this is done, the number of target violations will be reduced considerably or at least distributed more evenly among the plants.

To evaluate the need for Palisades to make modifications, two factors are important. First, there are no correctable trends to modify unless a method of subduing lightning can be found. Second, our submittal shows that the event rate has steadily decreased in recent years (except lightning); therefore, the analysis should include a means of weighing the importance of an event by its date of occurrence. If these were done, our construction related outages would become relatively insignificant.

We also discussed with Mr R Scholl the choice of words in the survey results and conclusions. We pointed out that the use of the words "violations" and "failures" are totally inappropriate. None of our reported partial losses of off-site power violates any NRC regulations or our Technical Specifications. It is also incorrect to use the word "failure" to describe an event. The proper operation of a relay or protective circuit breaker does not constitute a failure.

  
David P Hoffman  
Nuclear Licensing Administrator

CC Director, Region III, USNRC  
NRC Resident Inspector-Palisades