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Director  
Office of Nuclear Reactor Regulation  
U S Nuclear Regulatory Commission  
Washington, DC 20555

PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
Docket Nos. 50-282 License Nos. DPR-42  
50-306 DPR-60

Clarification of Equivalent Protection

Reference: Fire Protection Safe Shutdown Analysis in Compliance with  
10 CFR 50, Appendix R, Section III.G and Substantive Basis  
for Exemption Request Prairie Island Nuclear Generating Plant

The referenced report was submitted to the Nuclear Regulatory Commission on  
June 30, 1982. Based on our review of the report and, specifically, the  
exemption requests, Northern States Power Company wishes to highlight  
important features related to the issue of equivalent protection in order  
to assist the NRC Staff and expedite their review of the Appendix R submittal.

As is discussed in the executive summary of the Prairie Island Report, the  
analysis submitted to the Staff was provided to satisfy the Commission's  
guidance to licensees:

...the Commission believes that the licensee should  
reexamine those previously approved configurations  
of fire protection that do not meet the require-  
ments as specified in section III.G to Appendix R.  
Based on this reexamination the licensee must either  
meet the requirements of Section III.G to Appendix R  
or apply for an exemption that justifies alternatives  
by a fire hazard analysis.

To this extent, it is clear that the Commission considered Section III.G  
to be criteria for fire protection which provide sufficient protection of  
the public health and safety. Licensees may provide such protection either  
through implementing any one of the Section III.G criteria or by seeking  
an exemption based on the results of a fire hazard analysis which demon-  
strates that alternative measures provide an equivalent level of protec-  
tion.

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It should be noted that the concept of "equivalent protection" had its origins in the series of Commission meetings held in October 1980 prior to the vote on the final version of Appendix R. At the time, concern was expressed that Staff reviews of licensee fire protection analyses lacked sufficient documentation. This concern led to the proposal to backfit certain provisions of Appendix R to all plants as a means of providing the required documentation. It was recognized that the decision to backfit might unnecessarily overturn previously approved configurations that were still acceptable.

The phrase "equivalent protection" and different variations of the phrase were introduced by Staff management in discussions regarding this issue and embraced by the Commissioners to connote that protection which is functionally equal to any of the Section III.G configurations. These discussions highlighted the view that the separation criteria of Section III.G were essentially equivalent to the requirements of Branch Technical position 9.5.1 Appendix A and that licensees could provide sufficient fire protection by meeting either standard. Licensees electing to provide fire protection through alternative methods such as Appendix A could justify the adequacy of these methods through a fire hazards analysis which demonstrated equivalent protection to that offered by the criteria of Section III.G. Under such circumstances, the analysis provided and the resulting exemption would satisfy the need for documenting the adequacy of the alternative configuration.

The concept of equivalent protection and the use of the exemption process as an alternative to the requirements of Section III.G is a matter of record and is well-known by the Commission. The Staff in the Office of the General Counsel defines "equivalent protection" to be "functionally...the same" as one of the three stipulated methods of Section III.G. This definition and the subsequent affirmation of the Commission's objectives in establishing a viable exemption process clearly establishes regulatory policy in the area of fire protection.

In the Prairie Island submittal, the recognition of and response to these objectives are discussed in the "Introduction" (Section 1) of the report. The general relationship of the fire protection program at Prairie Island to these objectives is outlined in "Station Fire Protection Features" (Section 2). Detailed technical material including definitions, assumptions, methodology, and results in support of the requested exemptions are presented in Sections 3,4,5 and 6 to the extent, manner, and format requested by the Commission in the spring of 1982. SECY 82-13, which describes the Staff's logic, process, and format for exemption requests, was closely followed in preparing the Prairie Island exemption requests. Modifications proposed for the purpose of enhancing fire protection safety and contingent upon the granting of exemptions are summarized by fire area in Section 7 of the report. As is demonstrated in the analyses, additional modifications beyond those discussed in Section 7 which would be implemented solely to comply with the configurations stipulated in Section III.G. of Appendix R would not enhance fire protection safety. Finally, a complete detailed technical description of the methodology used in the analysis including the applicable equations, necessary data, and a listing of all source materials is provided in the appendices in

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such a manner to allow the Staff not only to review the validity and conservatism of the underlying analyses, but to independently reach the appropriate and correct conclusion of the existence of equivalent protection.

It should be noted that the assumption of total burnout of all combustible material in a fire area is not necessary in developing a basis for exemption. Rather, as is discussed in the report, the focus was on unrealistically conservative fire hazards, (e.g., a large quantity acetone spill) and the relationship of the hazards in each fire area to each other and the Commission's criteria of Section III.G.2b. The rule finds the separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards to be acceptable with fire detectors and an automatic fire suppression system installed in the fire area. As is demonstrated in the Prairie Island analyses, the modifications proposed achieve equivalent protection with that provision of the rule.

The process for demonstrating the equivalency between passive fire protection features and the separation criteria of Appendix R is contained in Sections 5 and 6 of the Prairie Island Report. The process involves first analyzing the effects of radiative and convective heating from a fire on the cable and cable tray configuration with different combinations of modifications. The combined effects on existing cable and cable tray configurations of radiation and convection due to ceiling stratification are also analyzed with each analysis providing the quantity of combustible liquid (e.g., acetone) necessary to cause cable damage as defined by cable type and the associated failure criteria.

In six fire areas analyzed (i.e., fire areas 31, 32, 58, 59, 73, and 74) the quantity of acetone necessary to create thermal conditions sufficiently severe to exceed the cable criterion resulting from stratification of hot gases was found to be less than that which would cause redundant safe shutdown system failure by the direct effects of radiation from an optimally located fire and convection. These results indicate that the redundant safe shutdown cable failure criteria would be achieved irrespective of horizontal separation. It is clear that additional plant modifications implemented to comply with the specific fire protection criteria of Appendix R would not provide additional fire protection. As an example, the conclusions of the analysis for fire zone 31 are reproduced below from the Prairie Island Report:

The conservative quantitative fire hazards analysis described herein, in addition to the proposed modifications, demonstrates protection of Fire Area 31 safe shutdown cables from electrical failure resulting from any reasonable exposure fire postulated in the plant regardless of horizontal separation. The extremely light combustible loading of Fire Area 31, together with fire protection features described in this analysis, demonstrate that other additional modifications would not enhance fire protection of the safe shutdown capability in Fire Area 31.

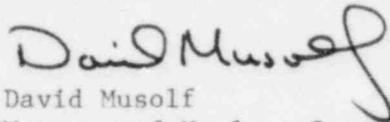
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The remaining three fire areas (37, 60, and 75) meet the horizontal separation requirements of Section III.G.2, as discussed in the report, and therefore, are not a concern with respect to protection equivalent to twenty feet of horizontal separation.

The information presented above is provided by Northern States Power Company for the purpose of highlighting important features of the Prairie Island Report. The report is structured to ensure that the information is complete in terms of addressing the Commission's concerns and in documenting the substantive technical basis of the analysis in support of the exemption requests.

Please contact us if you have any questions related to the information we have provided.



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DMM/bd

cc: Regional Administrator-III, NRC  
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