

UNITED STATES OF AMERICA
NUCLEAR REGULATION COMMISSION

In the Matter of

PUBLIC SERVICE COMPANY
OF COLORADO

(Fort St. Vrain Nuclear
Generating Station)

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Docket No. 50-267

EXEMPTION

I.

Public Service Company of Colorado (PSC or the licensee) is the holder of Facility Operating License No. DPP-34 which authorizes the operation of the Fort St. Vrain Nuclear Generating Station (the facility) at a steady-state power level not in excess of 842 megawatts thermal. This license provides, among other things, that the facility is subject to all rules, regulations, and Orders of the Nuclear Regulatory Commission (the Commission or the staff) now or hereafter in effect. The facility is a high temperature gas-cooled reactor (HTGR) located at the licensee's site in Weld County, Colorado.

II.

The 10 CFR 50.48, "Fire Protection," and Appendix R to 10 CFR Part 50, "Fire Protection Program for Nuclear Facilities Operating Prior to January 1, 1979"

set forth certain fire protection features required to satisfy the General Design Criterion related to fire protection (Criterion 3, Appendix A to 10 CFR Part 50).

Section III.G of Appendix R requires fire protection for equipment important to post-fire shutdown. Such fire protection is achieved by various combinations of fire barriers, fire suppression systems, fire detectors, and separation of safety trains (III.G.2) or alternate post-fire shutdown equipment free of the fire area (III.G.3). The objective of this protection is to assure that one train of equipment needed for hot shutdown would be undamaged by fire, and that systems needed for cold shutdown could be repaired within 72 hours (III.G.1).

Section III.J of Appendix R requires emergency lighting units with at least an 8-hour battery power supply be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.

III.

By letters dated November 10 and December 17, 1984, and January 17 and April 1, 1985, the licensee provided details of their fire protection program and requested approval of a number of exemptions from the technical requirements of Sections III.G and III.J of Appendix R to 10 CFR Part 50. Additional correspondence on this subject is referenced in the Commission's concurrently issued Safety Evaluation. A description of the exemptions requested and a summary of the Commission's evaluation follow.

Exemption Requested

The licensee requested an exemption from III.G.2 for the Three Room Control Complex and Diesel Generator Rooms from having 3-hour rated fire dampers, doors, and penetration seals.

The staff's principal concern was in the event of a fire of significant magnitude, products of combustion would pass through the wall and damage redundant/alternate post-fire shutdown systems on the other side. However, the areas on both sides of these walls are protected by automatic fire detection systems. These systems alarm in the Control Room. The staff therefore expects that any potential fire would be detected in its incipient stage before significant flame spread or room temperature rise occurred. The plant fire brigade would then be dispatched and would put out the fire using manual fire fighting equipment. If rapid fire spread occurred, the automatic fire suppression systems would actuate to control the fire and reduce ambient temperature rise. Until this occurred, the existing walls which surround these areas would act to confine the effects of the fire to the area of origin. Because openings exist in the walls, the staff expects a quantity of smoke and hot gases to pass through them and enter the adjoining locations. The smoke would be so dissipated and the hot gases cooled to the point where they would not represent a significant threat to post-fire shutdown systems outside of the fire area. On this basis, the staff concludes that the licensee's alternate fire protection configuration, with the proposed modifications, will achieve an acceptable level of fire safety equivalent to that provided by Section II.G.2.

The special circumstances of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The purpose of the 3-hour barrier is to protect redundant trains of safe shutdown equipment. However, this would be achieved as discussed above. Thus, the underlying purpose of the rule would be satisfied without installing the required 3-hour rated dampers, doors and penetration seals.

Exemption Requested

The licensee requested exemption from III.G.3 for the Control Room from having a fire detection system installed throughout this fire area.

The staff's principal concern is that because of the absence of an areawide fire detection system, a fire could develop which would damage shutdown systems to the extent that the plant could not be safely shut down after the fire. However, the Control Room is continuously manned and automatic smoke detectors are located in the Control Room cabinets and consoles. There is reasonable assurance that a fire would be detected and suppressed by the Control Room operators or the plant fire brigade before significant damage occurred. If a serious fire developed, the existing halon fire suppression system would be manually actuated to put out the fire or control it until the plant fire brigade arrived. If such a fire caused the loss of redundant post-fire shutdown systems, the Alternate Cooling Method is available to bring the plant to a safe shutdown condition. Therefore, an areawide fire detection system in the Control Room is not necessary to provide reasonable assurance that a fire would be detected and post-fire shutdown capability maintained free of fire damage.

On this basis, the staff concludes that the licensee's alternate fire protection configuration provides an acceptable level of fire safety equivalent to that provided by Section III.G.3.

The special circumstances of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The purpose of the areawide fire detection is to minimize the potential for damaging all equipment within a fire area. However, this would be essentially achieved as discussed above. Thus, the underlying purpose of the rule would be satisfied without installing areawide fire detection in the control room.

Exemption Requested

The licensee requested exemption from III.G.2; for the Turbine Building from having a fire detection system installed throughout this fire area.

The staff's principal concern with this exemption was that a fire of significant magnitude could develop and damage systems needed to safely shut down the plant. However, a fire detection system will be installed throughout every elevation of this fire area that does contain post-fire shutdown systems. If a fire should occur in these locations, it is expected to be detected by the system. An alarm would be transmitted automatically to the Control Room and the fire brigade would subsequently be dispatched. The brigade would put out the fire using manual fire fighting equipment. If fire should break out on the operating floor or the upper elevations of the Access Control Bay, it would be discovered, after some time delay, by plant operators or the security force. Until the arrival of the fire brigade, there are no post-fire shutdown systems that could be damaged

by fire in these locations. Therefore, an areawide fire detection system is not necessary to provide reasonable assurance that a post-fire shutdown capability will remain free of fire damage.

On this basis, the staff concludes that the licensee's alternate fire protection configuration, with the proposed modifications, will achieve an acceptable level of fire safety equivalent to that provided by Section III.G.2.

The special circumstances of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The purpose of the areawide fire detection is to minimize the potential for damaging all equipment within a fire area. However, this would be essentially achieved as discussed above. Thus, the underlying purpose of the rule would be satisfied without installing areawide fire detection in the Turbine Building.

Exemption Requested

The licensee requested exemption from III.G.2 for the Access Control Bay from having redundant post-fire shutdown systems adequately separated, and the area protected by automatic fire detection and suppression systems.

The staff's principal concern was that because of the relative proximity of the reactor plant exhaust fans, a fire of significant magnitude would damage redundant post-fire shutdown systems to such an extent that safe shutdown could not be achieved and maintained.

However, the fire load in this location is not significant, with combustible materials dispersed throughout the elevation. If a fire should occur, it would be detected by the fire detection system in its incipient stages before significant flame propagation or room temperature rise occurred. The fire brigade would then be dispatched and would put out the fire using manual fire fighting equipment. Pending arrival of the brigade, the effects of the fire would be mitigated because the smoke and hot gases would rise up into the high ceiling area, which would tend to act as a heat sink. Also, the fan motors and related cables would be shielded from the effects of a fire by the metal fan enclosures. Nevertheless, if a fire did result in damage to both reactor plant exhaust fans, the licensee will be able to recover from this damage by relying upon a chiller unit and recirculation fan that is located in a separate fire area. Therefore, the absence of a fixed fire suppression system is not necessary to provide reasonable assurance that safe shutdown can be achieved and maintained.

On this basis, the staff concludes that the licensee's alternate fire protection configuration, plus the proposed modifications, will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.3.

The special circumstances of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The purpose of the rule is to provide adequate protection for the redundant shutdown equipment. However, in this case the equipment is already adequately protected, and redundant equipment

exists in another fire area. Thus, the underlying purpose of the rule would be satisfied without requiring equipment separation and automatic fire detection and suppression.

Exemption Requested

The licensee requested exemption from III.G.2 and III.G.3 for Outside Areas-Exterior Routing and the Turbine/Reactor Building Common Wall from the requirement for a 3-hour fire barrier to separate redundant (alternate) post-fire shutdown systems.

The staff's principal concern was that a fire of significant magnitude may result in damage to components associated with the normal post-fire shutdown systems and the alternate cooling method (ACM).

If a fire were to occur in the above referenced outside locations, a potential exists for components associated with the ACM to be damaged. However, because these areas are located outside and away from the normal post-fire shutdown systems located within the Turbine Building, the products of combustion or radiant energy from such a fire should not affect the normal systems. Smoke and hot gases would tend to be dissipated in the open air. Radiant energy would be mitigated by the intervening open space and by the exterior walls of the Turbine Building. Similarly, if a fire were to occur inside the Turbine or Reactor Building, the fire should be detected by the automatic fire detection system or by plant operators or the security force. The fire would either be extinguished manually by the plant fire brigade or by the automatic fire suppression systems. Because

these locations are large open plant areas, the smoke and hot gases from such a fire might spread within each area. But it is the staff's judgment that the metal and masonry walls which bound these fire areas are capable to a significant extent of confining the effects of the fire to the immediate fire area, until the fire is extinguished. Because these walls are not all fire-rated, some products of combustion may spread beyond them. However, the smoke and hot gases would be cooled and dissipated so that there will be no threat to the redundant/alternate post-fire shutdown systems in the adjoining fire areas. Therefore, complete 3-hour rated fire walls are not necessary to provide reasonable assurance that safe shutdown conditions could be achieved and maintained with undamaged post-fire shutdown systems in the other fire areas.

On this basis, the staff concludes that the licensee's alternate fire protection configuration will achieve an acceptable level of fire safety equivalent to that achieved by compliance with Sections III.G.2 and III.G.3.

The special circumstances of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The purpose of the rule is to provide adequate protection and separation for alternate/redundant post-fire shutdown equipment. However, in this case the equipment is already adequately separated. Thus, the underlying purpose of the rule would be satisfied without installing 3-hour rated fire barriers.

Exemption Requested

The licensee requested exemption from III.G.2 for Alternate Cooling Method/ Congested Cable Area Interface from having redundant post-fire shutdown systems adequately separated and the area protected by automatic fire detection and suppression systems.

The staff's principal concern with the level of fire safety in these locations was that a fire of significant magnitude might damage systems associated with both the normal post-fire shutdown capability and the alternate cooling method. There is no major unmitigated fire hazard in these locations. The only significant hazard which would represent a threat to post-fire shutdown systems is the concentration of combustible insulation on the cables. However, these cable concentration areas are protected by automatic sprinkler systems. The suppression systems along the "G" and "J" walls were originally designed for manual actuation. However, at the staff's request, the licensee converted these systems to automatic actuation. Additionally, the interface areas will be protected by an automatic fire detection system. As a result, any potential fire should be detected early, before significant fire propagation or room temperature rise occurs. The fire would then be extinguished by the plant fire brigade using manual fire fighting equipment. If rapid fire spread occurred, the automatic wet pipe sprinkler systems should actuate and limit fire spread, moderate room temperature rise, and protect the post-fire shutdown cables along the "G" and "J" walls. Until the arrival of the brigade, the spatial separation between post-fire shutdown systems provides passive protection to prevent damage to redundant/alternate post-fire

shutdown systems. For those systems which are not sufficiently separated, the licensee has identified alternate means of achieving and maintaining safe shutdown that would not be affected by a fire.

On this basis, the staff concludes that the licensee's alternate fire protection configuration, with proposed modifications, will achieve an acceptable level of fire safety equivalent to that achieved by compliance with Section III.G.2.

The special circumstances of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The purpose of the rule is to provide adequate protection for the redundant shutdown equipment. However, in this case, the equipment is already adequately protected. Thus, the underlying purpose of the rule would be satisfied without requiring equipment separation and automatic fire detection and suppression.

Exemption Requested

The licensee requested exemption from the III.J requirement that emergency light be powered by individual 8-hour batteries packs.

The staff had two concerns with the proposed emergency lighting system in these buildings. The first was that a sufficient number of lights would not be installed so as to provide an adequate level of illumination. However, all essential valves and equipment components requiring manual operator actions, and access and egress routes thereto, will be covered by the local zone lighting plus spot beams from adjacent zones. In addition, the licensee committed to verify the adequacy of the illumination by conducting a field

walkdown with plant operators to confirm the adequacy of the number, locations, and positioning of the lights.

The second concern was that a fire could damage the power supply to the emergency lighting. However, the new system is designed in such a manner that fire in any one zone would not affect the emergency lighting in adjacent zones. Therefore, individual 8-hour batteries for each emergency light are not necessary to provide reasonable assurance that sufficient emergency lighting would be available to complete safe shutdown functions after a fire.

On this basis, the staff concludes that the licensee's alternate configuration will achieve an acceptable level of safety equivalent to that achieved by compliance with Section III.J.

The special circumstance of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The proposed emergency lighting system provides an adequate level of illumination and is adequately protected against fire damage. Thus, the underlying purpose of the rule would be satisfied without installing 8-hour battery packs.

Exemption Requested

The licensee requested exemption from III.G.2 for the Reactor Building from having redundant post-fire shutdown systems adequately separated and the area protected by automatic fire detection and suppression systems.

The staff's principal concern was that a fire of significant magnitude would damage systems associated with redundant post-fire shutdown methods. However, the major fire hazards in this area are covered by an automatic

fire suppression system. Consequently, a fire involving these hazards would be mitigated by the system. Remaining combustible materials are generally dispersed throughout the remainder of the area. As a result, a fire involving these materials would be of limited magnitude and extent and characterized initially by low flame propagation and ambient temperature rise.

If a fire did occur, it would be detected early by the fire detection systems. Where no detectors have been provided above the refueling floor, no shutdown systems exist. Upon actuation of the detection system or discovery of the fire by plant personnel, the Control Room would be notified and the fire brigade dispatched. The fire would then be either suppressed manually using portable fire fighting equipment, or automatically if the fire originated in the sprinkler area. Until the fire is controlled, the spatial separation between post-fire shutdown systems which in part extends over more than one floor elevation, will provide reasonable assurance that a post-fire shutdown capability will remain free of fire damage.

On this basis, the staff concludes that the licensee's alternate fire protection configuration, with the committed modifications, will provide an acceptable level of fire safety, equivalent to that achieved by compliance with Section III.G.2.

The special circumstances of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The purpose of the rule is to provide adequate protection for the redundant shutdown equipment. However, in this

case, the equipment is already adequately protected. Thus, the underlying purpose of the rule would be satisfied without requiring equipment separation and automatic fire detection and suppression.

Exemption Requested

The licensee requested exemption from III.G.2 for the Turbine Building from having redundant post-fire shutdown systems adequately separated and the area protected by automatic fire detection and suppression systems.

The staff's principal concern was that a fire of significant magnitude would damage systems associated with redundant post-fire shutdown methods. However, the major fire hazards in this area are covered by an automatic fire suppression system, or are separated by fire walls, or both. Consequently, a fire involving these hazards would be mitigated by the protection systems. Remaining combustible materials are generally dispersed throughout the remainder of the area. As a result, a fire involving these materials would be of limited magnitude and extent. It would be initially characterized by low flame propagation and ambient temperature rise.

If a fire did occur, it would be detected early by the fire detection system. Where no detectors have been provided, no shutdown systems exist. Upon actuation of the detection system or discovery of the fire by plant personnel, the Control Room would be notified and the fire brigade dispatched. The fire would then be either suppressed manually using portable fire fighting equipment, or automatically if the fire originated in a sprinkler area. Until the fire is controlled, the spatial separation between

post-fire shutdown systems, which in part extends over more than one floor elevation, will provide reasonable assurance that a post-fire shutdown capability will remain free of fire damage.

On this basis, the staff concludes that the licensee's alternate fire protection configuration with the committed modifications will provide an acceptable level of fire safety equivalent to that achieved by compliance with Section III.G.2.

The special circumstances of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The purpose of the rule is to provide adequate protection for the redundant shutdown equipment. However, in this case, the equipment will be adequately protected. Thus, the underlying purpose of the rule would be satisfied without requiring equipment separation and automatic fire detection and suppression.

Exemption Requested

The licensee requested exemption from III.G.2 for Building 10 from the requirement that structural steel which is part of a fire boundary be protected to achieve a 3-hour fire barrier rating.

The staff's principal concern is that the steel wall separates two rooms which contain redundant post-fire shutdown systems. The rooms on both sides of this wall are equipped with an automatic fire detection system. If a fire should occur, it would be detected in its formative stages before significant temperature rise occurs. The fire would then be put out manually using portable fire extinguishers. If rapid fire spread occurred, the automatic fire suppression system should actuate to control the fire. The system has sufficient

extinguishing agent for a manually initiated second discharge if the fire was not completely extinguished after the first discharge. Until the fire is extinguished, and considering the low fire loading (equivalent to a 15-minute duration on the ASTM E-119 time temperature curve), it is the staff's judgment that the unprotected steel will remain undamaged and the integrity of the fire wall will be maintained. On this basis, the staff concludes that the licensee's fire protection configuration will provide an equivalent level of fire safety to that achieved by compliance with Section III.G.2.

The special circumstances of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. In this case, the low fire loading and the presence of manual and automatic fire suppression equipment minimize the threat to the steel fire barrier. Thus, the underlying purpose of the rule would be satisfied without upgrading the steel wall to a 3-hour fire rating.

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, this exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. The Commission has further determined that special circumstances, as set forth in 10 CFR 50.12(a)(2)(ii), are present justifying the exemption, namely that the application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. Specifics are discussed in each exemption request, but in general the underlying purpose of

the rule is to accomplish safe shutdown in the event of a single fire and maintain the plant in a safe condition. This is accomplished by assuring that sufficient undamaged equipment is available to support safe shutdown, assuming a fire within the area of concern. In the areas for which an exemption is being requested, passive as well as active fire protection features assure that any single fire will not result in the loss of safe shutdown capability. These features include separation distance, fire barriers, sealed penetrations, water spray or halon systems to preclude propagation, and manual actions. The fire protection features, in conjunction with low combustible loadings, provide a high degree of assurance that a single fire will not result in loss of post-fire shutdown capability. At this time, the licensee has not completed all of the modifications upon which these exemptions are based. However, the licensee has in place acceptable compensatory measures and is committed to the timely completion of the committed modifications.

Accordingly, the Commission hereby grants the exemptions from the requirements of 10 CFR Part 50, Appendix R as described in Section III above.


Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this Exemption will have no significant impact on the environment (52 FR 36319).

The Safety Evaluation concurrently issued and related to this action and the above referenced submittals by the licensee are available for public

inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C., and at the Greeley Public Library, City Complex Building, Greeley, Colorado.

This Exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION


Dennis M. Crutchfield, Director
Division of Reactor Projects - III, IV,
V and Special Projects
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Dated at Rockville, Maryland
this 10th day of May, 1988.