



**Consumers
Power**

**POWERING
MICHIGAN'S PROGRESS**

Palisades Nuclear Plant: 27780 Blue Star Memorial Highway, Covert, MI 49043

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U.S. Nuclear Regulatory Commission
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**DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT
DISPOSITION OF UNRESOLVED ITEM 255/95004-05,
ADEQUACY OF FIRE AREA BARRIERS;**

On April 1, 1996, Consumers Power Company submitted a proposed resolution for Unresolved Item 255/95004-05 which is described in NRC Inspection Report 255/95004 dated May 19, 1995. Unresolved Item 255/95004-05 concerns; (1) the adequacy of the west wall of the Turbine Lube Oil Room to provide a three-hour fire barrier between the Turbine Lube Oil Room and the safety-related equipment located in the Turbine Building; and (2) the adequacy of the Component Cooling Water (CCW) Pump Room wall to provide an acceptable fire barrier between the CCW Pump Room and the Turbine Building. This letter supersedes our April 1, 1996, submittal. The revised evaluations are attached for NRC review.

The Palisades Fire Protection Program has been revised to identify and justify the as-built configurations of the Turbine Lube Oil Room and CCW Pump Room west walls.

Attachment 1 lists the issues related to Unresolved Item 255/95004-05 concerning; (1) the adequacy of the west wall of the Turbine Lube Oil Room to provide a three-hour fire barrier between the Turbine Lube Oil Room and the safety-related equipment located in the Turbine Building; and (2) the adequacy of the Component Cooling Water (CCW) Pump Room wall to provide an acceptable fire barrier between the CCW Pump Room

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and the Turbine Building. Attachment 1 also provides a description of the Consumers Power Company resolution of each issue.

Attachment 2 provides the detailed engineering evaluation which documents the adequacy of the previously existing west wall of the Turbine Lube Oil Room to provide a three-hour fire barrier between the Turbine Lube Oil Room and the safety-related equipment located in the Turbine Building.

Attachment 3 provides the detailed engineering evaluation which documents the adequacy of the Component Cooling Water (CCW) Pump Room wall and the previously existing suppression system configuration to provide an acceptable fire barrier between the CCW Pump Room and the Turbine Building.

To enhance the fire protection capabilities of the west wall of the Turbine Lube Oil Room, a two-hour fire rated block wall has been constructed between the Turbine Lube Oil Room and the Feedwater Purity Tunnel. This provides a complete fire rated barrier between the Turbine Lube Oil Room and the safety-related equipment in the Turbine Building.

To enhance the fire protection capabilities near the CCW Pump Room pressure relief opening, the existing fire suppression system in the Turbine Building has been extended to increase the fire suppression coverage on the Turbine building side of the CCW Pump Room west wall.

The enclosed engineering evaluations continue to confirm our existing determination that the CCW Pump Room and the Turbine Building are two separate fire areas; therefore, no changes to the existing post-fire safe shutdown analysis are necessary.

The existing hourly fire tours which were established as a precautionary measure will remain in effect until final NRC disposition of Unresolved Item 255/95004-05.

SUMMARY OF COMMITMENTS

This letter contains no new commitments and no revisions to existing commitments.



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CC Administrator, Region III, USNRC
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Attachment

ATTACHMENT 1

**CONSUMERS POWER COMPANY
PALISADES PLANT
DOCKET 50-255**

**Responses to Issues Raised in The NRC Letter
Dated December 5, 1995**

7 Pages

Responses to Issues Raised in the NRC Letter
dated December 5, 1995

Issue 1:

Adequacy of the west wall of the Turbine Lube Oil Room to provide three-hour separation from the safety-related equipment located in the Turbine Building.

CPCo Response:

New or updated engineering evaluations were prepared to document the combustible loading, the affect of a fire on fire area boundaries, and identify post-fire safe shutdown components in the Turbine Lube Oil Room, and adjacent areas of the Turbine Building. The ability of the west wall of the Turbine Lube Oil Room to provide fire area boundary separation has been determined adequate. The results are summarized below.

The Turbine Lube Oil Room west wall was originally an exterior wall. Later, the Feedwater Purity Building was constructed and included a pipe tunnel that ran along the west wall of the Turbine Building and enclosed a portion of the Turbine Lube Oil Room wall. The lower 15 feet (approximately) of the Turbine Lube Oil Room west wall faced the new Feedwater Purity Building pipe tunnel, while the upper 6 feet (approximately) remained an exterior wall. This plant change was evaluated and documented as acceptable in the Fire Protection Program documents. These documents were submitted to the NRC as part of the information used to justify deletion of certain fire protection features from the Technical Specifications per Generic Letters 86-10 and 88-12.

New or updated engineering evaluations have now been prepared to document the combustible loading, the hydraulic capability of the automatic suppression system, the effect of a fire on fire area boundaries, and to identify post-fire safe shutdown components in the Turbine Lube Oil Room and adjacent areas of the Turbine Building. Actual sprinkler hydraulic analysis determined the Turbine Lube Oil Room spray density exceeds 0.55 gpm/ft² providing improved coverage over the extra hazard design requirement of 0.30 gpm/ft². The remaining three separate engineering evaluations have been completed and the results are summarized below.

The combustible loading in the Turbine Lube Oil Room is very high due to the amount of lube oil stored in the various tanks within the room. Using a standard method of quantifying the fire loading, it is classified as greater than a nine hour fire loading. However, this standard method is very conservative in describing the realistic fire loading. A significant fire in the room would initially be

ventilation limited due to the size of room openings and could not achieve the temperatures associated with free burning combustible liquid pool fire.

The Turbine Lube Oil Room west wall is corrugated sheet metal attached directly to the structural steel on that end of the room. The sheet metal wall would act as a radiant energy barrier during the early stages of the fire. The automatic sprinkler system installed in the Turbine Lube Oil Room is expected to actuate prior to failure of the sheet metal wall further prolonging its ability to prevent fire spread. The automatic sprinklers serve a dual function as both heat detectors and water distribution nozzles. A water flow alarm is initiated upon sprinkler actuation and indication of a fire pump start would be annunciated in the Control Room. The Control Room alarm would alert the continuously manned fire brigade to respond to the fire.

Complete failure of the west wall would be a bounding worst case scenario. This failure could occur due to warpage or due to support failure from metal expansion at the high temperatures. Such a failure would allow the ventilation limited fire size to increase due to the increased ventilation area. The Turbine Lube Oil Room west wall is exposed to the exterior for approximately the upper 6 feet. The expected failure mechanism, if failure does occur, would be for the upper wall to fail first due to higher temperatures in this region. Such a failure would vent the majority of smoke and hot gases to the outside area away from safety-related or safe shutdown equipment located in the Turbine Building.

Smoke and hot gases would vent from the Turbine Lube Oil Room west wall openings into the Feedwater Purity Building pipe tunnel. However, the minimal combustible materials located in the pipe tunnel do not extend within 20 feet of the pipe tunnel opening into the Turbine Building on the south end. The various openings of the pipe tunnel along the east side do not contain any significant combustible materials to propagate the fire into the Turbine Building. In addition, no significant combustible materials are present inside the adjacent Turbine Building areas for a distance in excess of 20 feet on the 590'-0" elevation. Although smoke and hot gases will be present in the Feedwater Purity Building pipe tunnel and Turbine Building, the separation distance to any significant quantity of combustible material minimizes the risk of fire propagation into the Turbine Building.

The Turbine Building contains post-fire safe shutdown components on the same elevation as the Turbine Lube Oil Room. No post-fire safe shutdown or safety-related equipment is located in the Turbine Lube Oil Room, Feedwater Purity Building or pipe tunnel. The smoke and hot gases leaving the openings in the Turbine Lube Oil Room west wall are not expected to adversely affect the post-fire safe shutdown components in the Turbine Building for several reasons. The

volume of the Turbine Building, which is open from the 590'-0" elevation up two levels to the operating floor, is very large and will dilute the smoke and hot gases and prevent heat buildup on the lower levels. The post-fire safe shutdown components located in the Turbine Building on the 590'-0" and 607'-6" elevations are all located greater than 20 feet away from the openings of the Feedwater Purity Building pipe tunnel into the Turbine Building. Generally, these components are located behind large metal or structural components such that any radiant energy emitted from the Feedwater Purity Building pipe tunnel openings would be shielded.

The closest adjacent structure containing safety-related equipment is the Component Cooling Water Pump Room located on the east side of the Turbine Building. The openings in the Component Cooling Water (CCW) Pump Room wall facing the Turbine Building are over 100 feet away from the Turbine Lube Oil Room west wall and the pipe tunnel openings. A fire would have to propagate across areas with minimal combustibile loading, and also across sprinkler protected areas in the Turbine Building to reach the CCW Pump Room wall. A separate discussion is provided for the adequacy of the CCW Pump Room wall openings.

In summary, the previously existing plant configuration of the Turbine Lube Oil Room west wall would have prevented a direct fire exposure hazard to safety related or safe shutdown components in the Turbine Building or openings in safety-related area fire barriers such as the CCW Pump Room. Therefore, requirements of the approved Fire Protection Program are met by the previously existing Plant as-built condition.

The above information was prepared after extensive research and analysis subsequent to the NRC identified Unresolved Item 255/95004-05 in Inspection Report 255/95004 dated May 19, 1995. Based on this information, the previously existing configuration of the Turbine Lube Oil Room west wall is consistent with NRC guidance for defense-in-depth protection of post-fire safe shutdown and safety-related components. However, the configuration was not adequately identified or justified in the previously existing Palisades Fire Protection Program. Therefore, a revision to the appropriate documents have been completed to clearly identify and justify the existing configuration using the information gathered as a result of this inspection report item.

A two-hour fire rated concrete block wall has been constructed to replace the previously existing sheet metal wall separating the Turbine Lube Oil Room from the Feedwater Purity Pipe Tunnel. The upper 6 feet of this wall, above the roof of the Feedwater Purity pipe Tunnel, remains sheet metal to facilitate fire fighting

ventilation should the need arise. This wall has been added to enhance overall plant fire protection capabilities.

Issue 2:

Adequacy of the CCW Pump Room wall 10'x12' opening to provide fire area boundary separation from the Turbine Building.

CPCo Response:

New or updated engineering evaluations were prepared to document the combustible loading, the affect of a fire on fire area boundaries, and identify post-fire safe shutdown components in the CCW Pump Room and adjacent areas of the Turbine Building. The ability of the CCW Pump Room wall 10 feet x 12 feet opening to provided fire area separation has been determined adequate. The results are summarized below.

The CCW Pump Room wall providing separation from the Turbine Building has a pressure release opening and unsealed penetration openings around the main feedwater and main steam lines. The pressure release opening is on the 590'-0" elevation and is 7 feet wide by 9 feet high (previously incorrectly listed as a 10 feet x 12 feet opening) with a substantial metal covering over the lower 5 feet providing flood protection from the Turbine Building side of the barrier. This lower portion contains panels with breakaway supports to allow steam to vent from the CCW Pump Room side of the barrier if a main steam line break occurred in the CCW Pump Room. The upper 4 feet of the opening is protected by metal bars to prevent unauthorized personnel entry and allows free air flow between the two areas. The two main feedwater pipe penetrations are located above the 590'-0" elevation with annular gaps ranging from approximately 1-inch to 5-inches in the 24-inch thick wall. One feedwater pipe penetration is approximately 5 feet above the floor level and the other is over 10 feet above floor level. The main steam lines are both above the 607'-6" floor grating elevation. A single large opening is provided that is substantially blocked by massive pipe supports and the main steam lines. The open spaces around the main steam pipes and supports range in size from approximately 2-inches to 9-inches.

The fire loading in the CCW Pump Room is negligible and is quantified as less than a five-minute fire loading. Typical in-situ combustibles are located greater than 20 feet away from the pressure release and piping penetration openings on the 590'-0" elevation. The in-situ fire loading in the Turbine Building Main Feed Pump area outside the CCW Pump Room wall is quantified as approximately a one-hour fire loading from material located primarily on the 590'-0" elevation.

None of this fire loading is located near the CCW Pump Room wall openings. In fact, the in-situ combustibles are located greater than 30 feet away from the CCW Pump Room openings on the Turbine Building side at the 590'-0" elevation. No significant in-situ combustibles are located within 20 feet of either side of the CCW Pump Room wall at the 607'-6" elevation. Various large ceiling openings exist between the 607'-6" elevation and the upper operating floor of the Turbine Building to prevent the confinement of any smoke and hot gases produced from a fire on the 590'-0" elevation.

Based on the fire loading inside the CCW Pump Room, there is insufficient material to challenge the fire barrier openings all located above 5 feet from the floor level. Therefore, there is negligible risk of a fire spreading from the CCW Pump Room into the Turbine Building from the existing openings.

The Turbine Building in-situ combustibles that could realistically propagate near the CCW Pump Room openings is primarily composed of Main Feedwater Pump (MFP) lube oil that is located over 30 feet away from the feed water pipe penetration and over 60 feet away from the pressure release opening. Floor drains are provided around the MFP lube oil areas and in the intervening area between the MFP lube oil and the CCW Pump Room wall. Drainage near the CCW Pump Room is away from the CCW Pump Room wall back toward the MFP lube oil areas. In addition, a wet-pipe sprinkler system is provided over the MFP lube oil and cable tray raceway areas. Potential fires that could occur would be floor based and the openings that are susceptible to fire propagation are above 5 feet from the floor. The wall/barrier below the 5 feet opening areas maintains either a 3-hour barrier rating or a radiant energy barrier. Also, with no significant combustible material located within 20 feet on the CCW Pump Room side of the barrier, there is negligible risk of fire propagation into the CCW Pump Room from a Turbine Building fire. The volume of the Turbine Building, which is open from the 590'-0" elevation up two levels to the operating floor, is very large and will dilute smoke and hot gases and prevent heat buildup on the lower levels. All turbine lube oil piping located in this area is a double pipe arrangement that would require failure of two pipes before leakage could occur.

The pressure release opening has limited areas with an unobstructed line of sight path between the MFP area and components behind the opening. These areas, at a distance greater than 50 feet from the postulated fire, should not receive sufficient radiant energy to damage equipment. Radiant energy from a fire decreases exponentially as a square of the distance increase. The 30 foot separation to the feedwater line penetration was not considered the worst case because it does not provide a line of sight target from a floor based fire to components inside the CCW Pump Room. This is due to the elevation of the pipe penetration above the floor, the thickness of the wall, and the small size of

the annular gap. No intervening in-situ combustibles are located between the Main Feedwater Pumps and the CCW Pump Room west wall.

Transient combustibles are controlled by plant procedures for the areas described here. The area adjacent to the CCW Pump Room pressure release opening on the Turbine Building side is blocked by the stairway leading up to the 607'-6" elevation. The remaining area is congested with piping, heat exchangers and tanks except for the narrow walkway to the stairs. These factors ensure that any significant storage of transient combustibles on the Turbine Building side is impractical. Similarly, on the CCW Pump Room side of the barrier the area adjacent to the openings on the 590'-0" elevation are essentially blocked by piping, heat exchangers and valves such that it is impractical to store transient combustibles in this area. No additional administrative controls are deemed necessary to control transient combustibles.

The ventilation air flow is designed to be neutral between the Turbine Building and the CCW Pump Room. The design air flow with all ventilation operating is from the CCW Pump Room into the Turbine Building. There is a low probability that the independent fan cycling of various ventilation units in the Turbine Building would lead to positive pressure and air flow back into the CCW Pump Room. However, this is a low probability event of short duration and the 20 feet of separation from the CCW Pump Room wall to the nearest combustible material would continue to ensure negligible risk of fire damage or spreading from the Turbine Building into the CCW Pump Room.

Due to the pressure release requirements on the CCW Pump Room wall, no barrier type enclosures were considered reasonable. Any material used for a fire or radiant energy barrier would become a potential missile concern without massive supports to retain the barrier that must retain blow-out capability during a postulated steam line break. The use of water curtains for the openings were also considered unlikely to perform adequately due to the lack of credible hot gas buildup in the area to activate the water flow. This is due to the large vent area in the Turbine Building and lack of a ceiling near the openings to retain the heat near the openings. The lack of potential fire spread across the CCW Pump Room openings described above shows that no modification is required to meet the defense-in-depth design basis for fire protection features associated with this wall. However, the existing sprinkler protection over the Turbine Building 590'-0" elevation adjacent to the CCW Pump Room pressure release opening has been extended to enhance overall plant fire protection capabilities by providing additional defense in depth for this area. In addition, a review of the adequacy of the existing sprinkler protection over the main feedwater pumps and cable trays on the east side of the Turbine Building was performed and determined acceptable.

The above information was prepared after extensive research and analysis subsequent to the NRC identified Unresolved Item 255/95004-05 in Inspection Report 255/95004 dated May 19, 1995. Revision to the appropriate documents have been completed to clearly identify and justify the existing configuration using the information gathered as a result of this inspection report item.