Consumers Power Company

General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201 • Area Code 517 788-0550

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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 - SEP TOPICS III-2,
WIND AND TORNADO LOADINGS AND
III-4.A, TORNADO MISSILES

By letters dated February 27, 1981 and March 4, 1981, the NRC issued for comment draft evaluations of SEP Topics III-2 and III-4.A, respectively, for the Palisades Plant. Consumers Power Company has completed a review of these documents and provides the attached comments for your consideration.

Because these topics are closely interrelated, they are addressed together in this letter. As you will note, comments are provided which specifically address the individual topic evaluations as well as comments which are pertinent to both.

Robert A Vincent

R A Vincent
Staff Licensing Engineer

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

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PALISADES PLANT
Comments on NRC Evaluations of
SEP Topics III-2 and III-4.A

I. TOPIC III-2, NRC LETTER OF 2/27/81

a. Page 1 - It must be noted that CP Co does not agree that a 360 mph tornado wind is appropriate for a shoreline site such as Palisades'. This has been discussed in CP Co letter of March 11, 1981 in response to SEP Topic II-2.A. Since the original plant design considered a tornado with a tangential velocity of 300 mph and a translational speed of 60 mph, however, further discussion of this issue is unwarranted.

b. Page 3 - The control room was designed using 432 psf as opposed to the 922 psf stated. The stated values for the auxiliary building and auxiliary building addition have not been verified.

c. Pages 4 and 5 - Under the postulated 360 mph wind load, it is highly unlikely that the sheet metal siding on the spent fuel pool enclosure could remain attached to the steel frame. The siding sections would be expected to pull off their fasteners and, at worst, become flat, rather light weight missiles. The area of concern for these missiles would be the spent fuel pool itself. Missile effects on spent fuel have been addressed in Topic III-4.A. The wind load on the steel frame remaining would not be expected to be of significant concern.

II. TOPIC III-4.A, NRC LETTER OF 3/4/81

a. Page 3 - See Comment I.a, Topic III-2 above concerning the tornado wind speed.

b. Page 6 - The service and instrument air systems on Elevation 590' of the turbine building are not required to bring the plant to a safe, stable shutdown condition. This system has been discussed in conjunction with SEP Topic VII-3 in addition to this topic. It must also be noted that the system discussed here is independent from the high-pressure air systems used for the air operated engineered safeguards equipment.

It is highly unlikely, however, that a tornado missile could reach this equipment. Even if a missile were to miss the taller adjacent structures and hit and penetrate the small auxiliary bay roof (Elevation 625'), the air compressors and receivers are still largely protected by the mezzanine level floor framing and grating (Elevation 607.6') as well as other secondary system pipes and tanks in the vicinity. The Integrated Assessment Team members inspected this area during the team meetings at Palisades and, therefore, are

familiar with the general layout and congestion around this air equipment.

In light of the above, we do not believe that the service air compressors and receivers should be of any further concern.

III. COMMENTS PERTINENT TO BOTH TOPICS III-2 AND III-4.A

a. Main Steam Relief and Dump Valve Stacks

The outlets of the main steam line relief valves (24 total) are combined into groups of three and ducted out of the building through eight 24" diameter stacks. The outlets of the four dump valves are ducted out of the building through four independent 8" diameter stacks. These twelve relief and dump valve stacks extend approximately six to eight feet above the auxiliary building roof and are distributed over an area of approximately 300 ft^2.

This section of the auxiliary building roof is below and well protected by other structures to the north and east and is partially sheltered by the containment on the south side. To the west, the turbine building, although not completely missile proof, rises approximately 25 feet above and extends approximately 175 feet to the south of this section of roof. The only direction from which the stacks are not at least partially sheltered would be for missiles falling from above.

The relief and dump valve stacks are substantial pieces of carbon steel pipe. Calculations have shown that these stacks are all capable of withstanding the full load of a 360 mph tornado wind, even though it is difficult to postulate a wind path which could result in that load.

It is considered highly unlikely that the relief and dump valve stacks, in their protected locations, could be exposed to tornado missiles. Even if they were exposed to missiles, it is not considered credible that all twelve stacks (representing approximately 2800 in^2 of flow area) could be broken or crimped to the point that all were completely sealed. It must be noted that, within the first few minutes following a reactor trip from full power operation, one relief or dump valve has sufficient capacity to remove all decay heat from the core. To match the outlet area of one of the twenty-eight valves available, only about 50 in^2 of area would have to remain open in one or a combination of the twelve stacks. We must conclude, therefore, that tornado wind or missiles do not represent a significant hazard to the plant's ability to remove decay heat through the main steam relief or dump valves.

b. Boration Systems

The staff's topic evaluations identified the safety injection and refueling water tank (SIRWT) as being vulnerable to potential failure from tornado wind or missile effects. Loss of this tank, however, would not prevent safe plant shutdown.

Following a reactor trip (will occur if tornado is assumed to damage transmission lines), the plant would be in a stable, hot shutdown condition almost immediately. The plant can then be maintained in a hot shutdown condition for long periods of time by borating from the concentrated boric acid tanks to account for xenon decay and by bleeding steam from and making up water to the steam generators to remove decay heat. Steam generator makeup water is always available from Lake Michigan regardless of the status of onsite tanks. All equipment necessary to maintain the plant in this condition is adequately protected from tornado effects.

From this condition, there would be no need to begin a plant cooldown until the total extent of site damage had been determined and detailed plans made to compensate for any lost equipment or tanks. For the cooldown, the primary concern would be the source of makeup water to compensate for the shrink of primary coolant. This water source would not have to be borated since the concentrated boric acid tanks have sufficient boric acid to bring the PCS to a cold shutdown boron concentration.

Several tanks on site could be a source of makeup water to the PCS. The SIRW tank is, of course, one of the tanks but other site tanks, including T-81, T-90, T-91 and T-939 are likely to remain available. In addition, it may be possible to operate one or both 300 gpm trains of the pure water makeup system to provide this water. Since significant quantities of water are typically present in the four 50,000-gallon clean waste receiver tanks located inside containment, these may also provide a usable source of water. The spent fuel pool would be a good source of water for PCS makeup during cooldown. The 27,000 gallons needed for complete PCS cooldown would lower the pool level by approximately six feet, which would still leave approximately fifteen feet of water above the fuel. Makeup for the spent fuel pool or the PCS could also come from Lake Michigan.

Transfer of water between any of the sources and the spent fuel pool or the PCS also would not present significant problems. Installed piping provides a great deal of flexibility for transferring water around the plant. Even if installed systems were not available, however, the transfers can easily be accomplished by using portable pumps and hoses to add water directly to the fuel pool or the boric acid batching tank in the CVCS System for PCS makeup.

In summary, it can be seen that great flexibility is available for providing sources of PCS makeup water during plant cooldown without

reliance on the SIRW tank. Since the plant can be maintained in a stable shutdown condition for long periods following a tornado-caused trip, and since immediate cooldown is not required, ample time is available to make deliberate considered choices of water sources for cooldown. Loss of the SIRW tank due to tornado wind or missiles, therefore, is not considered to be of significant concern.

c. Diesel Generators

The diesel intake and exhaust lines are enclosed on three of four sides and overhead by reinforced concrete walls and concrete roof. These enclosures will withstand the wind loading from a 360 mph tornado wind as well as missiles including the 4" x 12" x 12' wood plank considered in its original design. Only the north side of these enclosures, where the diesel exhaust lines terminate, might be exposed to missiles.

As observed by the Integrated Assessment Team during the site team meetings, these enclosures are generally shadowed by other structures to the north, including the service building, storage tank T-939, the feedwater purity building and the turbine building. These shadowing structures are not missile proof but they will certainly affect missile energies, paths and acceleration distances available in their respective directions.

Even if these buildings do not shadow the diesel exhaust enclosures from some missiles, the small areas represented by the enclosure openings and the even smaller areas represented by the potential targets within the enclosures make tornado missile damage improbable. Since the exhaust and intake lines from the diesels are separated by both distance and a concrete wall, it is even more improbable that both diesels could be affected by any missile damage which might occur.

In a practical sense, components such as diesel generator intake lines, exhaust lines and relief valve outlet lines must communicate with the plant exterior at some location. Therefore, some small amount of residual risk is always present that some degree of damage might be sustained at some of these building penetrations. In view of the above discussion, we believe that the very small risk associated with tornado missile damage to both diesel intake and exhaust lines is insignificant and that there are no practical measures which could substantially reduce this risk even further.