Consumers Power
POWERING MICHIGAN'S PROGRESS
Palisades Nuclear Plant: 27780 Blue Star Memorial Highway, Covert, MI 49043

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Nuclear Regulatory Commission
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DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT
TECHNICAL SPECIFICATIONS CHANGE REQUEST - IODINE REMOVAL SYSTEM

A request for a change to the Palisades Technical Specifications is enclosed. This proposed change affects the method of controlling the pH of the post-LOCA containment sump solution. It will allow the replacement of the existing operator actuated Iodine Removal System, which provides NaOH for injection into the containment spray, with a passive system of baskets of Trisodium Phosphate (TSP) in the lower regions of the containment.

The replacement of NaOH requirements with TSP requirements will assure continued control of post-LOCA containment sump pH, while providing the following advantages:

1) The potential hazards of stored chemicals will be reduced;
2) The dependance on operator action for sump pH control will be avoided; and
3) Sump pH control will be effective immediately upon recirculation actuation.

The following Attachments are included:

1) Proposed Technical Specifications pages,
2) Existing Technical Specifications pages, marked to show the changes.
3) Engineering Analysis, EA-FC-949-01; Containment Sump pH Control Using Trisodium Phosphate.

Conversion from NaOH to TSP for sump pH control is currently planned for the next refueling outage. If that is to be accomplished, the Technical Specifications Amendment approving that change must become effective during that outage which is currently planned to start on May 20, 1995 and to be of

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approximately 90 days duration. It is requested that this Technical Specifications change request be approved prior to the start of the 1995 refueling outage and become effective during that outage. We will keep the NRR Project Manager aware of any changes in the planned refueling outage schedule.

Kurt M. Haas
Director, Plant Safety & Licensing

CC Administrator, Region III, USNRC
Resident Inspector, Palisades

Attachments

CONSUMERS POWER COMPANY
Docket 50-255
Request for Change to the Technical Specifications
License DPR-20

It is requested that the Technical Specifications contained in the Facility Operating License DPR-20, Docket 50-255, issued to Consumers Power Company on February 21, 1991, for the Palisades Plant be changed as described below:

I. Discussion of Proposed Changes

The proposed Trisodium Phosphate (TSP) specifications and surveillance requirements are essentially the same as those in NUREG 1432, Standard Technical Specifications for Combustion Engineering Plants (STS). Unlike the STS, the proposed LCO does not refer to "MODES," which are not used in Palisades Technical Specifications and uses a format like that of other recently issued Palisades Technical Specifications.

Two proposed changes support replacing the existing Iodine Removal System with baskets of TSP in the lower region of the containment:

A. The existing Iodine Removal System specification, 3.19, which requires 4200 gallons of NaOH to be available for addition to the containment spray during power operation, will be revised to require between 8,300 and 11,000 pounds of TSP to be available in the TSP baskets whenever the Primary Coolant System (PCS) temperature is greater than 300°F.

B. Existing Iodine Removal System surveillance requirements, items 12a and b of Table 4.2.2, will be revised to require verification of the quantity and quality of TSP in the baskets each 18 months.

Bases, derived from those of the STS, are supplied in Attachment 1.

II. Benefits of TSP over NaOH:

While either the proposed TSP baskets or the existing NaOH injection system which they will replace provide a means to control the pH of the containment sump following a Large Break LOCA, the use of TSP is preferable for several reasons: buffering of sump pH will no longer be reliant on operator action, sump pH will be within the required range at the initiation of the recirculation phase, the potential for environmental and health hazards associated with potential spills of NaOH will be eliminated, and maintenance requirements necessary to support pH buffering will be reduced.

Sump pH control is required to:
1) reduce evolution of dissolved iodine into the containment atmosphere,
2) reduce the amount of hydrogen generated within the containment, and
3) reduce the potential for post-LOCA stress corrosion cracking.

The Palisades MHA analysis assumes a pH of 7.0 or greater; Palisades hydrogen generation analysis assumes a containment sump pH below 8.0.

Standard Review Plan Section 6.5.2 states that long term iodine retention may be assumed only when the equilibrium sump pH is above 7. It also states that this pH value should be achieved by the onset of the spray recirculation mode. The currently installed system controls containment sump pH by manual addition of sodium hydroxide (NaOH) from tank T-103. This could result in a delay after RAS before a containment sump pH of 7.0 to 8.0 is reached. The TSP, stored in baskets located in the lower level of the containment (the 590 ft. elevation), will be available to dissolve during the spray injection period, prior to recirculation.

Proposed Arrangement:

The proposed system will store the TSP in wire mesh baskets placed inside the containment at the 590 ft. elevation. Any quantity between 8,300 and 11,000 pounds of TSP will result in a pH in the desired range.

The TSP system is passive and performs its design function only after an accident. It will not affect normal operation of the plant because the baskets and TSP have no interface with plant equipment or processes unless the containment floods. The TSP baskets will be installed in the containment building at elevation 590 ft.. The baskets will be raised about 6 inches from the floor to avoid loss of TSP due to any liquid spillage or leakage on the containment floor. The location and construction of the TSP baskets precludes their interaction with any safety equipment in the event of a seismic event.

The TSP will dissolve as a result of any event which would cause significant flooding inside the containment. The water with dissolved TSP will flow into the containment sump through the five 16 inch and one 24 inch drain lines. Some of the baskets will be located in close proximity to these drain lines to aid in rapid dispersion.

Flooding of the containment floor due to leakage from a system other than the PCS could cause dissolving of TSP but, since the resulting solution would not be corrosive and would not be recirculated, no adverse effects would be expected. Quoting from the Nalco Water Chemistry Handbook:

> *Controlling pH by sodium phosphate hydrolysis, water chemistry could never increase to levels aggressive to steel. The hydrolysis reaction of trisodium phosphate is self-limiting; as pH rises above 10.0, generation of hydroxide ions by hydrolysis decreases. It is theoretically impossible for a solution of trisodium phosphate to reach a pH much above 12.0 If the trisodium phosphate solution were to concentrate to 10,000 ppm, the pH would be 12.0.*

The specified quantity of TSP was chosen to assure that the sump pH would not exceed 8.0. Therefore, the resulting concentration of TSP would not contribute to the deterioration of steel components or containment sump screens during an accident.

Existing System:

The existing iodine removal system was not included in the initial plant design. It was added early in plant life for the sole purpose of injecting NaOH into the suction of the containment spray pumps for post-LOCA sump pH control. Upon installation of the TSP baskets, the sodium hydroxide tank and associated equipment will be isolated from the plant systems (by cutting and capping the interconnecting piping), and retired in place. The equipment may be completely removed at a later time. Elimination of the iodine removal system will not affect operation of the containment spray system.

Effects of Proposed Change on Safety Analyses:

Flood Level: The containment post accident flood level is calculated to assure that sufficient NPSH would exist for the ECCS pumps and that the flooding will not prevent safety equipment from performing its design function.

The minimum flood level calculation, which assures adequate NPSH for the ECCS pumps, does not assume any NaOH addition. Any change due to the presence of TSP and TSP baskets would increase the minimum level and thereby be in the non-limiting direction.

The maximum flood level calculation, which assures that the water level will not prevent any safety equipment from providing its design safety function, assumes a total flood volume of 56,297 ft^3, of which 67 ft^3 are from NaOH to be eliminated when TSP is added. It is expected that dissolving 11,000 pounds (about 205 ft^3) of TSP in 56,230 ft^3 of water (56,297 ft^3 total, less 67 ft^3 of NaOH) will cause no discernable increase in its volume. Even if the volume increase equaled the total undissolved volume of TSP minus the volume of deleted spray additives, the corresponding level increase would be less than 1/4 inch and would have no adverse effect on safety equipment.

Containment Pressure: The 205 ft^3 of TSP would occupy less than 0.01% of the containment air space and, therefore, has no effect in the containment pressure analysis.

Flow Blockage: The substitution of TSP for NaOH will not significantly affect the precipitation point of boric acid and will therefore not affect the requirements for Hot Leg Injection used to prevent flow blockage in the core following a LOCA.

The design of the TSP baskets precludes release of any lumps of undissolved TSP. A very fine screen is provided to retain the undissolved TSP. The fine screen is supported by a strong, coarse screen.

FSAR Chapter 14 Events: There are three events discussed in Chapter 14 of the FSAR which could cause flooding inside containment. The effect of TSP on each of the three cases is discussed below. For the other accidents in the FSAR, which do not cause flooding, the TSP baskets will have no effect.

Case I. Loss of Coolant Accident (LOCA).

A large break LOCA causes initiation of the Safety Injection System. Borated water is pumped from the Safety Injection Refueling Water Tank (SIRWT) to the primary coolant system to provide core cooling. This SIRWT water, water from the Safety Injection Tanks, and the initial PCS inventory exit the PCS through the break and collect in the lower regions of the containment. Borated water from the SIRW tank is also pumped through two heat exchangers to a dual set of spray headers in the containment to limit the containment building pressure and reduce the potential for release of airborne radioactivity. The borated water will collect on the containment floor and will dissolve the TSP as it drains into the containment sump. The dissolved TSP will adjust the containment sump pH level to between 7.0 and 8.0 before the Recirculation Actuation Signal (RAS). This meets the requirements set forth in the Standard Review Plan Section 6.5.2.

The TSP baskets will have no effect on containment spray system or containment air cooler operation, and will therefore not affect containment pressure following a LOCA. The TSP, once dissolved, will prevent iodine re-evolution from the sump solution by maintaining a pH $\geq$ 7.0 as assumed in the MHA analysis. Thus, TSP will not increase the radiological consequences of a LOCA. The TSP baskets are designed to maintain the sump solution pH $\leq$ 8.0 following recirculation. This is within the pH level used in the Hydrogen generation analysis. Thus, the TSP baskets will not increase hydrogen generation following a LOCA. By controlling sump pH, the TSP system serves the same function as, and replaces the only need for, the injection of NaOH through the Containment Spray system.

In case of a small break LOCA the recirculation phase may not occur at all or may occur hours after the LOCA. If RAS does not occur, the sump pH may exceed 8.0, but this will not be a problem because the water will not be recirculated. If recirculation phase does occur, the effect of TSP would be bounded by the large break LOCA effect, described above.

Case II. Main Steam Line Break inside containment (MSLB)

Following a postulated Main Steam Line Break inside the containment, the contents of the ruptured steam generator will be released to the containment. To limit the containment building pressure and the temperature rise the Containment Spray System will be activated and borated water will be sprayed inside the containment. The borated water from the containment spray and the water from the main steam line break will dissolve the TSP and drain into the containment sump potentially making the sump water caustic. Per FSAR Section 6.1.2.1 there is no recirculation phase following a main steam line break, hence the caustic water will not be recirculated into the Primary Coolant System or Engineered Safeguards System. The caustic solution will remain in the sump and cause no adverse consequences. The TSP baskets will not affect containment pressure following a MSLB.

Case III. Control Rod Ejection

In the event of a Control Rod Ejection, a Loss of Coolant Accident could be induced (Refer FSAR Section 14.16.3.1) resulting in the situation discussed in Case I above. If a LOCA is not induced, the TSP will remain undissolved and cause no adverse consequences.

III. Analysis of No Significant Hazards Consideration

Consumers Power Company finds the activities associated with this proposed Technical Specifications change involve no significant hazards and accordingly, a no significant hazards determination per 10CFR50.92(c) is justified.

The following evaluation supports the finding that operation of the facility in accordance with the proposed change from NaOH to TSP requirements would not:

A. Involve a significant increase in the probability or consequences of an accident previously evaluated.

The substitution of TSP baskets for the NaOH addition equipment would not cause any changes to the capability, settings, or operation of plant systems (other than the Iodine Removal System itself) and would not, therefore, have any effect on the probability of occurrence of an accident.

The substitution of TSP baskets for the NaOH addition equipment has the effect of providing more immediate control of post-LOCA sump pH, thereby increasing the assurance that iodine will remain in solution throughout a postulated event. The consequences of accidents evaluated in the FSAR will not be increased by this increased assurance.

B. Create the possibility of a new or different kind of accident from any previously evaluated.

The TSP baskets are passive components which have no interaction with plant equipment unless flooding occurs in the containment. They are designed and located such that they will not interact with any plant safety equipment during a seismic event. The NaOH equipment, which will be replaced by the TSP baskets, has no function or effect on other equipment except during accident conditions. Therefore, the substitution of TSP baskets for NaOH addition equipment cannot create the possibility of a new or different kind of accident from any previously evaluated.

C. Involve a significant reduction in a margin of safety.

The substitution of TSP baskets for the NaOH addition equipment would assure that the sump pH at the initiation of RAS is between 7.0 and 8.0 as assumed in the MHA analysis. Therefore, this change would not involve a significant reduction in a margin of safety.

The Palisades Plant Review Committee has reviewed this Technical Specifications Change Request and has determined that proposing this change does not involve an unreviewed safety question. Further, the change involves no significant hazards consideration. This change has been reviewed by the Nuclear Performance Assessment Department. A copy of this Technical Specifications Change Request has been sent to the State of Michigan.

CONSUMERS POWER COMPANY

To the best of my knowledge, the contents of this Technical Specifications change request, replacing the requirements for Sodium Hydroxide spray additive with requirements for Trisodium Phosphate stored in the containment, are truthful and complete.

By Robert A. Fenech
Robert A. Fenech, Vice President
Nuclear Operations

Sworn and subscribed to before me this 29th day of December 1994.

Alora M. Davis

Alora M. Davis, Notary Public
Berrien County, Michigan
(Acting in Van Buren County, Michigan)
My commission expires August 26, 1999

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