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U.S. Nuclear Regulatory Commission
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DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT
REQUEST FOR EXEMPTION - 10 CFR PART 50, APPENDIX R, OIL COLLECTION SYSTEM FOR REACTOR COOLANT PUMP

Pursuant to the requirements of 10 CFR 50.12, "Specific exemptions", an exemption from certain requirements of 10 CFR Part 50, Appendix R, "Fire Protection Program For Nuclear Power Facilities Operating Prior To January 1, 1979," is hereby requested for the Palisades Plant. This request concerns the oil collection system requirements for primary coolant pump (PCP) motors. We request that the NRC use the information provided herein as the basis for issuing an exemption from the requirements to have a collection tank that can hold the entire inventory of a PCP lubrication system as imposed by 10 CFR Part 50, Appendix R, III.O. The proposed exemption and the basis for the exemption request are provided in the Attachment.

Each of the four Palisades PCP motors has its own oil collection tank. The oil collection tank collects leakage from both the upper and lower bearing lubrication systems on a PCP motor. It has been determined that the existing PCP motors' Appendix R oil collection tanks can not hold the entire PCP motors' lubrication system inventory if both the upper and lower motor bearing lubrication systems were to fail simultaneously. The exemption would allow the avoidance of unnecessary radiation dose and the expense of resources that would be needed to modify or replace the oil collection tanks to meet the 10 CFR Part 50, Appendix R, III.O requirement.

In the unlikely event that simultaneous leakage of all of the oil from both the upper and lower bearing lubrication systems were to occur, the excess oil would be drained to an area away from hot surfaces and would not present a fire hazard. Therefore, the Palisades staff and the Plant Review Committee have concluded that, within the

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provisions of 10 CFR 50.12, an approved exemption would not present undue risk to the public and that the special circumstances are present such that the underlying purpose of the rule has been met.

SUMMARY OF COMMITMENTS

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

Kurt M. Haas
Director of Engineering

CC Administrator, Region III, USNRC
Project Manager, NRR, USNRC
NRC Resident Inspector - Palisades

Attachment

CONSUMERS ENERGY COMPANY

To the best of my knowledge, the contents of this request for exemption from the requirements of 10 CFR Part 50, Appendix R, III.O, for PCP lubrication system collection, are truthful and complete.

Kurt M. Haas
Director of Engineering

Sworn and subscribed to before me this 13th day of August 1999.

Mary Ann Engle
Mary Ann Engle, Notary Public
Berrien County, Michigan
(Acting in Van Buren County, Michigan)
My commission expires February 16, 2000

SEAL

ATTACHMENT

CONSUMERS ENERGY COMPANY
PALISADES PLANT
DOCKET 50-255

REQUEST FOR EXEMPTION - 10 CFR PART 50, APPENDIX R, OIL COLLECTION SYSTEM FOR REACTOR COOLANT PUMP

6 Pages

CONSUMERS ENERGY
DOCKET 50-255, LICENSE DPR-20
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As described in the following discussion, it is requested that an exemption be granted to Facility Operating License DPR-20, Docket 50-255 to permit an alternative to primary coolant pump (PCP) oil collection system design. This alternative differs from the requirements of 10 CFR Part 50, Appendix R, Section III.O.

DESCRIPTION OF THE REQUIREMENTS

The 10 CFR Part 50, Appendix R requirements for PCP oil collection systems are contained in Section III.O. The applicable portion of the requirements is that:

> ". . . Leakage shall be collected and drained to a vented closed container that can hold the entire lube oil system inventory. . . ."

DESCRIPTION OF PRIMARY COOLANT PUMP OIL COLLECTION SYSTEM

The Palisades Plant is a two loop pressurized water reactor with two PCPs returning flow from each of the two steam generators to the reactor core. Currently each of the four PCPs is powered by a vertical shaft motor with upper and lower bearing assemblies. Each bearing assembly has its own completely separate lubrication system that consists of an oil reservoir and associated piping.

The upper bearing lubrication system provides lubrication and cooling to the upper bearing assembly and also serves as the source of oil for the lift and backstop oil systems. The upper bearing reservoir, the lift and backstop pumps, their respective oil coolers and associated piping all contribute to the overall oil capacity of the upper bearing lubrication system. The maximum operating capacity of this upper bearing lubrication system has been determined to be a nominal 87 gallons. Of the 87 gallons, approximately 76 gallons are in the oil reservoir and the remaining 11 in the associated piping systems.

The lower motor bearing is a guide bearing only and is immersed in oil within the lower bearing lubrication oil reservoir. The nominal volume of the lower bearing lubrication system is 18 gallons. The lower bearing lubrication system has only minor external piping for level indication.

Each PCP motor has a separate oil collection tank to collect oil leakage. The tanks have two intake lines that run from oil collection troughs around both the upper and lower PCP motor bearing lubrication oil reservoirs. As required by 10 CFR 50, Appendix R, there is reasonable assurance that the oil collection systems will withstand a safe shutdown earthquake (SSE). The oil collection tanks are closed and vented, and are equipped with hand pumps for oil removal through vertical suction tubes that extend into the collection tanks.

Each PCP motor and oil collection tank meets the requirements of 10 CFR Part 50, Appendix R, except the oil collection tank cannot hold the entire lubrication system inventory. The nominal capacity of the oil collection tank is 84 gallons. However, the collection tanks retain a small amount of oil (~5 gallons) in them after they are pumped down. Therefore, the usable capacity of an oil collection tank is approximately 79 gallons. The total operating capacity of both the upper and lower bearing lubrication oil reservoirs along with the volume of oil in the associated coolers and piping has been determined to be approximately 105 gallons. The oil collection system tanks, then, cannot contain the entire volume of oil from both the upper and lower bearing lubrication systems for each PCP. This condition does not meet the design of the oil collection system as required under 10 CFR Part 50, Appendix R, Section III.O. As presently sized, with the upper and lower oil reservoir systems filled to the maximum operating level, the Appendix R oil collection tanks would be undersized by approximately 26 gallons.

PROPOSED EXEMPTION

An exemption from 10 CFR Part 50, Appendix R, Section III.O, is requested to allow the continued use of the currently installed PCP oil collection systems with oil collection tanks that cannot hold the entire PCP lubrication system inventories. This exemption would apply to all of the PCPs.

However, the oil collection system for PCP P-50D will be modified when the motor is replaced during the 1999 refueling outage. The modification will include a new larger oil collection tank that will be capable of containing more than the entire oil contents of the P-50D motor, which has a oil capacity of more than twice the current PCP motors. When this modification is complete, the exemption will no longer be required for PCP P-50D.

REGULATORY BASIS FOR SPECIFIC EXEMPTION - 10 CFR 50.12

As allowed by 10 CFR Part 50.12(a)(1), an exemption (from the 10 CFR Part 50, Appendix R, Section III.O, requirement for each PCP oil collection tank to be capable of holding the entire oil system inventory) may be granted provided the exemption will not present an undue risk to the public health and safety. In addition, special circumstances must be present, pursuant to 10 CFR 50.12(a)(2). Consumers Energy has concluded, as discussed below, that an exemption will not present undue risk to the public health and safety and, in accordance with 10 CFR 50.12(a)(2)(ii), the underlying purpose of the Appendix R oil collection system requirements is still achieved with the existing oil collection tanks.

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BASIS FOR EXEMPTION

The functional requirements for the PCP oil collection system are contained in the Statements of Consideration for the Appendix R rule and in NRC guidance in Enclosure 2 to Generic Letter 86-10, Section 6.1. The Statements of Consideration for 10 CFR 50, Appendix R, Section III.O (46 FR 44734) states:

> *P. Reactor Coolant Pump Lubrication System.*
> *Technical Basis.* ". . . Therefore, an oil collection system is necessary to confine any oil discharged due to leakage or failure of the lubrication system and to prevent it from becoming a fire hazard by draining it to a safe location. . . ."

The NRC guidance in GL 86-10 states:

> "Where the RCP [Reactor Coolant Pump] lube oil system is capable of withstanding the safe shutdown earthquake (SSE), the analysis should assume that only random oil leaks from the joints could occur during the lifetime of the plant. The oil collection system, therefore, should be designed to safely channel the quantity of oil from one pump to a vented closed container. . . . "

The requirement in 10 CFR 50, Appendix R, Section III.O states:

> ". . . The oil collection system shall be so designed, engineered, and installed that failure will not lead to fire during normal or design basis accident conditions and that there is reasonable assurance that the system will withstand the Safe Shutdown Earthquake."

In accordance with FSAR requirements, the Palisades PCPs, including their associated oil collection systems, are capable of withstanding the SSE. Furthermore, the oil collection system meets the intent of the 10 CFR 50, Appendix R, III.O requirement, as expressed by GL 86-10 and the Statements of Consideration. The oil collection systems are designed to collect PCP motor oil leakage, route it to the collection tanks and prevent it from becoming a fire hazard. Even though the oil collection tanks are not large enough to contain the entire contents of a PCP motor, the underlying purpose of the rule to collect oil leakage and prevent it from becoming a fire hazard is met.

The PCP motor upper and lower bearing lubrication systems are separate. It is not considered credible that both systems would catastrophically fail simultaneously. Should one of the larger upper bearing lubrication systems fail, such that its entire contents (~87 gallons) leaked into the oil collection system and tank, some oil would not be contained in

the tank. As noted above, an oil collection tank, when pumped out with its hand pump, has a usable capacity of about 79 gallons. This difference of eight gallons and any leakage that was also collected from the lower bearing lubrication oil reservoir (total capacity of ~18 gallons), would overflow the oil collection tank onto the floor beneath the collection tanks. From that location the oil would migrate to lower floor areas and into the containment sump. There would be no interaction with hot pipe or equipment surfaces. The oil would not become a fire hazard as it would drain to a safe location. The motor oil has a flash point of over 400°F. The containment atmosphere, in the areas where the collection tanks are located, is nominally 80 to 100°F when the PCPs are in operation.

It is extremely unlikely that operational leakage would, at any time, result in the oil from the oil collection tanks overflowing onto the floor. Historically, leakage from the motors has occurred over a period of many months before the leakage has caused concerns over operating the motors with a low lubrication oil inventory. The upper bearing lubrication systems have been the source of most leakage historically. The lower bearing lubrication oil reservoirs have not had a history of leakage. The quantity of oil in the upper bearing lubrication oil reservoir between the fill level and the low level alarm is approximately 20 gallons, based on previous measurements. Likewise, the quantity of oil in the lower bearing lubrication oil reservoir between the fill level and the low level alarm is approximately 5 gallons. Given the potential economic consequences of operating the pumps with a low oil level, lubrication oil levels below the normal operating range would result in a PCP and reactor shut down. This would, in turn, be followed by an inspection of the pump, motor, and areas surrounding the pump to determine the location and cause of the leak. Follow up actions necessary to correct the oil loss would be identified.

Refilling a PCP motor oil reservoir is and will continue to be accompanied by action to pump out its respective oil collection tank. Therefore, the oil collection tank will always be restored to the maximum available volume.

Based on the above considerations, the Palisades staff and the Plant Review Committee has concluded that the underlying purpose of the rule has been met, in accordance with the provisions in 10 CFR 50.12(a)(2)(ii). It is also concluded that an exemption, if approved by the NRC staff, will not create any significant risk to the public health and safety, in accordance with 10 CFR 50.12(a)(1).

ALTERNATIVE OPTIONS CONSIDERED

We have investigated the following options concerning the existing PCP oil collection systems in an attempt to identify other methods of complying with the Appendix R requirements:

1. Limit the Amount of Oil in the PCP Lubrication Systems

   The amount of oil that is initially placed in either the upper or lower bearing lubrication systems, or both, could be limited to a total consistent with the capacity of the oil collection tank. This option is not desirable due to its potential impact on motor operation.

   The upper bearing lubrication oil reservoir is filled with as much oil as possible at the beginning of a cycle. This allows for incidental leakage during the operating period. The reservoir is considered to be full and at the maximum operating capacity when the oil covers the top of the motor upper guide bearing, which is the optimal operating condition. Overfilling the reservoir would allow oil to splash above the oil retainer tube and run down the pump shaft. The operating range of allowable oil level is approximately 3.9 inches which accounts for approximately 20 gallons of the capacity of the upper bearing lubrication system. Once the oil level is determined to approach the bottom of the upper guide bearing, the reactor is shutdown and the PCP removed from service to allow remediation of the oil leakage problem. At this point only approximately 20 gallons of oil would have been lost from the upper bearing lubrication oil reservoir and captured by the oil collection system.

   Since the lower bearing lubrication oil reservoir provides lubrication for a similarly sized guide bearing, the same kind of leakage monitoring and plant shutdown decisions would be applied for an indicated loss of oil from the lower bearing lubrication oil reservoir. However, the operating range for the lower bearing lubrication oil reservoir is approximately 5 gallons. Dropping below this range would also require the shutdown of the plant to allow the remediation of the oil leakage problem.

   Limiting the amount of oil in the motor bearing lubrication oil reservoirs to a level where the Appendix R rule would be met would require removal of a total of 21 gallons of oil from both the upper and the lower bearing lubrication oil reservoirs (assuming all the oil in the PCP oil collection tank were removed). Removal of that oil would result in a significant operational concern for the PCPs and a high probability of requiring the addition of oil to the motor reservoirs during the operating cycle to account for leakage. We believe this would be a very imprudent action to

take since it would create a significant additional risk to the PCP operation. Limiting the oil contained in the PCP lubrication systems to the total capacity of the oil collection tanks (84 gallons) would result in the reduction of the PCP motor oil operating range capacity from approximately 25 gallons (for both upper and lower bearing lubrication oil reservoirs) to approximately four gallons.

This option would also require the additional effort and personnel exposure required to remove all of the oil from the oil collection tank and to add oil during the operating cycle more frequently. The current usable oil collection tank capacity of 79 gallons would not support the option of limiting the amount of oil in the PCP lubrication system.

2. Modify the Oil Collection Tank Capacity

A design change to expand the collection tank capacity to hold the total volume of oil from both upper and lower motor bearing lubrication systems has been evaluated. For PCPs P-50A, P-50B, and P-50C, this modification would cause an unnecessary radiation exposure and an expense of resources which is not warranted because no increase in plant or public safety would be realized.

The collection tanks are located on the 607' elevation of containment in the vicinity of many elevated radiation areas. An unnecessary amount of radiation dose of 2.2 to 3.6 REM would be received by personnel making the modification to the oil collection tanks. The estimated cost of replacing the three oil collection tanks, in their present locations, is at least $50,000. Replacing the tanks with larger tanks in a lower dose rate area inside containment is estimated to cost approximately $150,000.

During the 1999 refueling outage, the P-50D PCP motor will be replaced. The new motor will include an oil collection system and collection tank sized to collect the entire inventory of the new motor. The new tank will be much larger since the oil capacity of the new motor is approximately 230 gallons. The new oil system collection tank will be placed in a lower radiation dose rate area than the existing tank to help maintain dose ALARA.

Our conclusion is that the alternative options that were considered in order to achieve compliance with 10 CFR Part 50, Appendix R, Section III.O, would not be prudent either for plant operation and reliability or from a radiation exposure and cost perspective.