



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
ONE-TIME EXEMPTION FROM 10 CFR PART 50, APPENDIX R, SUBSECTION III.0

SURRY POWER STATION UNIT 1

DOCKET NO. 50-280

1.0 INTRODUCTION

By letter dated November 14, 1990, Virginia Electric and Power Company (licensee) requested a one-time exemption to 10 CFR Part 50, Appendix R, Subsection III.0 for the Surry Power Station Unit 1. The licensee, as part of their preventative maintenance program, requires that the reactor coolant pump (RCP) motors be refurbished on a 5-year cycle. The Unit 1 "C" pump was scheduled to be refurbished at the end of this current operating cycle (Cycle 10 operations ceased on October 8, 1990). The schedule for completion of the refurbishment process exceeded the current refueling outage schedule (unit startup scheduled for December 5, 1990) and, therefore, could not support the planned return of Unit 1 to power operations. Based on the known scheduler conflicts, the licensee, in preparation for this task, purchased a spare RCP motor. The licensee expected the spare motor to be physically identical to the old motor. However, upon delivery, physical differences were noted. The differences between the two motors would require extensive modifications to the existing "C" pump motor oil collection system. The only portion of the existing RCP "C" motor oil collection system which was found to be interchangeable was the lower bearing drip pan oil collection assembly. The licensee has installed this portion of the system on the spare RCP motor. Upon discovery of the motor differences, the licensee initiated a design modification to fabricate an oil collection system for the spare motor. The schedule to complete the design, fabricate, and install an oil collection system for the spare RCP motor could not be accomplished within the time frame to support the unit's return to power operations. Therefore, in order to support the unit's startup from the current refueling outage, the licensee, for Cycle 11 operation only, has requested permission to operate the Unit 1 "C" pump without an oil collection system which fully complies with the technical requirements of Appendix R. The licensee, in their exemption request, has proposed an interim oil collection configuration. This proposed configuration includes instituting additional fire protection and compensatory measures which will assure that the consequences of a fire associated with an oil leak on the "C" pump motor are mitigated.

2.0 EVALUATION

Each Surry Unit 1 RCP motor is equipped with its own oil collection system that meets the technical requirements of 10 CFR Part 50, Appendix R, Subsection III.0, Reactor Coolant Pump Oil Collection System. The oil collection system provided for each RCP consists of leak-proof pans installed under the bearings and enclosures around all potential oil leakage sites (i.e., lube oil piping,

pumps, coolers). These oil collection devices are connected to an oil drain header which drains the oil to an enclosed tank. Each RCP oil collection tank has been adequately sized (tank capacity 265 gallons) to hold the entire oil contents of the RCP (RCP oil capacity 250 gallons) and is equipped with a flame arrester on the tank vent.

The licensee, for this cycle of operation, has proposed an interim oil collection method for the "C" pump motor which consists of implementing certain fire protection modifications and compensatory measures. Through implementation of this method, the licensee will detect potential lube oil system leakage in the spare RCP motor by an increase in motor temperature and any leakage which does occur will be confined and contained in the "C" RCP/steam generator cubicle.

The "C" cubicle is located southeast of the reactor vessel. The cubicle has a concrete base at the minus 3 ft. 6 in. elevation with the concrete walls extending up to the 47 ft. 4 in. elevation. The access doors to this cubicle are located at the minus 3 ft. 6 in. and the 18 ft. 6 in. elevations. In addition, there are penetrations in the walls and the floor of the cubicle. This cubicle is located adjacent to the cable penetrations from the cable vault. The licensee, in order to contain any potential oil leakage from the "C" RCP motor or a fire condition in the "C" cubicle, has implemented the following additional fire protection modifications:

- Four-inch oil-tight dikes have been installed at the door openings;
- Pipes which penetrate the cubicle floor are sleeved. The piping sleeves extend 4 in. above the floor of the cubicle. The pipes which extend from the sleeves are provided with either a spray cover or the penetration is filled with a liquid tight fire-rated penetration sealant material;
- A heat detector has been installed above the "C" RCP motor. This detector is annunciated in the control room;
- The "C" cubicle is separated from the cable penetration area by the crane wall. The open penetrations in the crane wall will be sealed with fire-rated penetrations sealant material; and
- Spray shields will be installed as necessary to prevent high pressure oil spray from impinging on hot reactor coolant system (RCS) piping.

In addition to the above fire protection modifications, the licensee will maintain the following compensatory measures during the operation phase of Cycle 11:

- RCP motor bearing temperature increase is an indication of an oil leak. Therefore, the licensee will conduct more frequent surveillance of the "C" RCP motor temperature related parameters;
- Plant procedures will be revised prior to startup to address operator actions and their expected response to adverse motor temperature conditions (e.g., containment entry to assess the reason of the temperature condition, shutdown of the pump, response of the fire brigade);

- Additional fire brigade briefings will be held on the potential for a fire in the "C" cubicle and on the means to mitigate a fire in this area; and
- Additional foam fire suppression equipment will be maintained outside the containment. This equipment, to be used by the fire brigade in the event of the lube oil fire, will be located near the containment access hatch.

Based on our evaluation of the licensee's proposed interim oil collection method, if a lube oil system failure, leading to a leak and a subsequent fire, were to occur in the "C" (spare) RCP motor, the consequences of the fire would be mitigated and the plant's ability to achieve safe shutdown conditions would not be affected. The primary fire hazard associated with each RCP consists of 250 gallons of lube oil. Motor problems that could result in a loss of oil can be detected by several existing plant means: bearing temperature, motor vibration, and motor running current. In the event an oil leak were to occur, a lube oil high/low level alarm would be annunciated in the control room. With the partial oil collection system in place on the lower bearing of the "C" motor, an estimated maximum of 175 gallons of oil would be released to the cubicle. The spray shields installed on the RCS piping in the cubicle are expected to prevent lube oil from coming in contact with hot RCS piping surfaces. In addition, the modifications to preclude leakage will contain the oil spill within the cubicle. If the oil were to ignite, the RCP cubicle heat detection equipment, the ambient air temperature monitors, and RCP stator temperature alarms would give control room operators warning of the fire. If the fire were to continue to burn and the manual fire suppression efforts of the fire brigade were not successful, the fire in the "C" RCP cubicle could disable the cabling associated with the "C" RCS instrumentation loop. Even if this were to occur, hot standby can be achieved by utilizing either redundant instrumentation loops "A" or "B". Indication in the control room and at the remote monitoring panel for these loops would be available to assure that safe shutdown conditions can be achieved.

In addition to the above interim measures, the licensee has committed to design and fabricate an oil collection system for the spare RCP motor. This oil collection system will be installed on the motor during the refueling outage following Cycle 11 operation.

3.0 CONCLUSION

Based on our evaluation, the staff concludes that the licensee's interim oil collection method, consisting of temporary fire protection modifications, compensatory measures, and the partially installed oil collection system as described in Section 2.0 above, results in an acceptable fire hazard level which is essentially equivalent to that which existed with the permanent oil collection system. The staff also concludes that this method provides reasonable assurance that any potential lube oil leakage from the "C" RCP motor will be adequately controlled and contained within the "C" RCP/steam generator cubicle. In addition, if a fire were to occur in the "C" cubicle, the staff concludes

that the licensee's interim oil collection method would limit fire damage and assure that safe shutdown can be achieved and maintained. The staff finds the licensee's request to operate the "C" RCP, with an interim oil collection method in place for Cycle 11 to be acceptable and, therefore, the licensee's request for exemption is granted.

Dated: December 6, 1990

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