

50-461

Mr. D. L. Holtzscher  
Chairman  
Licensing Review Group II  
Illinois Power Company  
500 South 27th Street  
P. O. Box 511  
Decatur, Illinois 62525-1805

JUL 16 1985

Dear Mr. Holtzscher:

Subject: Acceptability of Licensing Review Group-II Generic Position on  
Issue 9-RSB (Rev. 1), Long-Term Operability of Deep Draft Pumps

Your letter to John J. Stefano, dated September 19, 1983, submitted for NRC staff review and approval Position Paper VII, which included the Licensing Review Group (LRG)- II proposal for the generic resolution of Issue 9-RSB, Long-Term Operability of Deep Draft Pumps. The LRG-II revised position was in response to the NRC staff's request (Letter from T. M. Novak dated May 3, 1983) that the LRG-II address in greater detail its conformance to the procedures enclosed with Mr. Novak's letter.

The LRG-II position on Issue 9-RSB was discussed in meetings with the NRC staff on February 2, 1984 and June 27, 1985. The questions and responses enclosed served as the basis for those meeting discussions. On the basis of the additional detail encompassed in the enclosed responses, the NRC staff finds the LRG-II position relative to Issue 9-RSB acceptable.

Each LRG-II member should formally document, in their respective dockets, their endorsement of the Issue 9-RSB position delineated in Position Paper VII and the responses to the staff's questions (enclosed) in order for this generic issue to be considered resolved for their respective plants.

Sincerely,

ORIGINAL SIGNED BY:

B. J. Youngblood, Chief  
Licensing Branch No. 1  
Division of Licensing

Enclosure: As stated

cc: See next page

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JUL 16 1985

William J. Reed  
Gulf State Utilities  
P. O. Box 2951  
Beaumont, Texas 77704

Ms. Eileen M. Buzzelli  
Cleveland Electric Illuminating Company  
P. O. Box 84  
Perry, Ohio 44081

Dave Foreman  
General Electric Company  
175 Curtner Avenue  
San Jose, California 95125

Roger Boyde  
KMC, Inc.  
Suite 300  
801 18th Street, N. W.  
Washington, D. C. 20006

Responses to EQB Staff  
Questions on LRG-II Position Paper  
9-RSB, Rev.1 - Long Term Operability of  
Deep Draft Pumps

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Question 1 - Mr. Novak's letter of May 3, 1983 to the LRG-II asked for confirmation that the LRG-II Position Paper 9-RSB did conform, as it appeared to, to the EQB Staff suggested procedure (attached to letter) for detecting problems with deep draft pump. Can such confirmation be provided?

Response - The original LRG-II paper 9-RSB dated May 17, 1982 was very similar to the EQB Staff suggested procedure. However, in order to provide greater detail and be more responsive, a revised Position Paper, 9-RSB Revision 1, dated September 19, 1983 was issued. This paper is very consistent with the EQB suggested procedure and minor variances from the procedure are explained in it's text.

Question 2 - Which guidelines are referred to on Page 4 as not being applicable to LRG-II plants?

Response - The guidelines being referred to are the original NRC guidelines provided to LRG-II plants in November 1981 to aid in the development of a program responsive to IE Bulletin 79-15.

The revised LRG-II paper 9-RSB, Revision 1 (September 19, 1983) is responsive to the alternate set of guidelines provided to the LRG-II via the letter from T.A. Novak dated May 3, 1983.

Question 3 - Explain the use of the safety-grade service water systems. Are these emergency systems?

Response - The safety-grade service water systems are emergency systems which can be powered from the station diesel generator units and which supply the following types of service during an accident or transient:

Cooling water to the diesel generators  
Cooling water to the RHR heat exchangers  
Cooling water to area coolers for ECCS equipment

Question 4 - The EQB Staff suggested procedure calls for 100 hours of pump operation at under full system temperature and pressure conditions for startup testing of the plant. The Position Paper states that testing will be performed under full system flow and pressure conditions. Please discuss the difference.

Response - As discussed on Page 6 of the Position Paper, it is difficult/impossible to control the suction water source temperature such that the design limit can be achieved for the 100 hour test. The design temperatures for the ECCS systems are over 200°F where as the normal temperature of the Suppression Pool (a common source of water for testing) is less than 100°F. Water temperatures were varied during testing and ranged from about 100° to 150°F.

The design basis temperatures for the safety-grade ice water systems are based upon the worst possible conditions existing in natural sources such as lakes and wells. Control of temperatures for these sources is not possible.

As an alternate for testing at design temperature, the Position Paper specified testing at the design flow rate to maximize the challenge on the pump and motor.

Question 5 - Compare the EQB suggested procedure and LRG-II Position Paper list of parameters (Page 3) to be measured during the 100 hour test and discuss differences.

Response -	<u>EQB Procedure List</u>	<u>LRG-II Paper List</u>	<u>Comment No.</u>
	Bearing Temp.	Bearing Temp.	1
	Inlet Pressure	Inlet Pressure	-
	Inlet Temp.	-	2
	Differential Pressure	Discharge Pressure	3
	Flow Rate	Flow Rate	-
	Vibration	Vibration	-
	Cooling*	-	4
	Injection	-	5
	Seal Water Temp.*	-	6

\* Where applicable and available

Comments:

1. Section XI requires that centrifugal pump bearings outside the main flow path be monitored for temperature. The pumps addressed in the Position Paper do not have bearings outside the main flow path such that they would not be cooled by water flow. This parameter should not be listed. It should be noted, however, that the pump motor bearings are monitored for temperature and stabilization of such temperatures is used as an indication of equilibrium conditions. In addition, pump motor speed and winding temperature are monitored for indication of pump-motor condition.
- 2 and 3 Differential pressure is not directly measured but can be calculated by taking the difference between the inlet and discharge pressure.
- 4,5, & 6 Cooling, injection, and seal water temperatures will not be measured since they are not normally monitored by LRG-II plants for the Section XI pump program.

Question 6 - On Page 9 of the Position Paper a statement is made that the pumps will be manually turned following disassembly and reassembly to assure there is no major misalignments. Is manual turning the same as hand turning?

Response - Yes.

Question 7 - Why was the reference to in-service testing every 31 days in accordance with Section XI of the ASME Code deleted?

Response - All LRG-II plants commit to the ASME Code but may adopt different editions, as specified in their license application. The frequency of testing prescribed by Section XI of the ASME Code is different for various editions of the Code. The exact periodicity for in-service testing was deleted from the revised Position Paper and a general reference to the Code as the governing document for frequency was made.



Question 8 - The EQB Staff suggested procedure states that the pump should be run continuously for at least 6 hours and stable conditions are reached prior to performing in-service tests. The LRG-II paper on Page 10 indicates that the pump should be run continuously until stable conditions are reached (as defined in Section XI.) Discuss the difference between these two positions.

Response - The ASME Code Section XI, Article 1WP-3500 states that stable pump conditions are defined as follows:

- a. when bearing measurement is not required, the pump shall be run at least 5 minutes under conditions as stable as the system permits.
- b. When bearing measurement is required, then the pump shall be run until the bearing temperature stabilizes. A bearing temperature shall be considered stable when three successive readings taken at 10 minute intervals do not vary by more than 3%.

Since the pumps in question have bearings inside the main flow path and subsequently will quickly reach a stable temperature associated with the water being pumped, the need for long running periods is not required. In addition, extending the running time lengthens the duration of the test sequence for each pump. The shorter test sequence is preferred to ensure that radiation exposure to test personnel is ALARA. The LRG-II position is to utilize the Section XI guidance.

Question 9 - The EQB Staff suggested procedure states that vibration levels measured during in-service testing should be plotted and extrapolated to predict pump bearing life. This approach is not utilized in the LRG-II Position Paper as indicated on page 10. Discuss the approach used in the paper.

Response - The position paper states that test results are compared to baseline data for signs of degradation. Corrective action will be taken when threshold or "Required Action" values are exceeded.

The concept of the "Required Action" values is contained in Section XI of the ASME Code. A typical guide for establishing "Alert" values and "Required Action" values with regard to baseline data is presented below.

<u>Baseline Vibration</u> <u>Value in mils (Vave)</u>	<u>Alert Value</u> <u>or Range in mils</u>	<u>Required Action</u> <u>Value in mils</u>
0 to .5	1.0 to 1.5	1.5
.5 to 2.0	2xVave to 3xVave	3xVave
2.0 to 5.0	2+Vave to 4+Vave	4+Vave

The above guidance for determining when corrective action is needed is used by LRG-II plants for all pumps covered by the Section XI in-service testing program. It is believed this guidance is adequate. In addition, the use of two methodologies (i.e. Required Action Values and Extrapolation) for pumps covered by the Section XI program disrupts the uniformity of the in-service testing program when some pumps are judged by one criterion and the remaining pumps judged by another criterion.

Question 10 - It is stated on page 9 of the Position Paper that following pump disassembly and reassembly, vibration measurements will be performed either prior to return to operation or within [ASME] Section XI time limit after returning to operation. What is this time limit and how does it compare to the 10 hour limit contained in the suggested procedure transmitted via Mr. Novak's May 3, 1983 letter?

Response - Paragraph IWP-3111 of Section XI 198 (Edition) states that testing of repaired pumps shall be conducted prior to, or within 96 hours after return of the pump to normal service.

This Section XI Standard was referenced because it forms the basis for the pump in-service testing programs utilized by the LRG-II plants. For the particular question asked, reference to the Code does not give a precise answer to the question asked and clarification is needed.

The objective of the NRC suggested procedure in establishing a 10 hour time limit for pump testing after reassembly and return to operation is to minimize pump damage due to extended operation with misalignment present.

The objective of the Code is similar except that it allows a 96 hour time limit for testing after return of the pump to normal service. For HPCS, LPCS and safety grade service water pumps, normal service is a standby mode for these pumps and are used to respond to transients or accidents only. For the three RHR pumps, normal service during plant operation is a standby mode and normal service during plant shutdown is a standby mode for two pumps and operation for one pump.

Use of the code time limit allows the Plant Management more opportunity to repair and return a pump to normal service and avoid plant shutdown due to a violation of the system technical specification limiting condition of operation which would require plant shutdown if pump repair and return to normal service is not achieved in a specified time (typically 7 days). It is not our intent to return a pump to operation for over 90 hours before performing testing. Our intent is to test the above listed pumps with the absolute minimum operating time in order to minimize damage if misalignment from repair is present.

Question 11 - Do the seismic supports, discussed on Page 3, attached to the pump column provide lateral restraint? Do all pumps have such supports?

Response - All pumps have seismic supports. The seismic supports provide lateral restraint which prevents undesirable lateral deflection while in rotary motion.

All pumps are equipped with such supports.