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W3P86-0111

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Mr. George W. Knighton, Director
PWR Project Directorate No. 7
Division of PWR Licensing-B
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

SUBJECT: Basemat Monitoring Program

REFERENCE: Letter, W3P85-0464, K.W. Cook to G.W. Knighton,
dated February 25, 1985

Dear Mr. Knighton:

Meetings between the NRC Staff, LP&L, BNL and Ebasco were held at Waterford 3 October 23-24, 1985 to discuss the "Nuclear Plant Island Structure Common Foundation Basemat Monitoring Program" described in the reference letter. This reference was specified by Facility Operating License No. NPF-38, License Condition C-17 as the basis for defining requirements for a basemat monitoring program. The license condition also requires NRC Staff approval of significant changes to the program prior to their implementation. At the subject meetings, a detailed Waterford 3 plant procedure was reviewed and a number of changes and additions were agreed to by LP&L. Additionally, IP&L agreed to provide commitments associated with reporting requirements, etc. which were not appropriate to cover in the plant procedure.

I have reviewed the comments from the meetings, in context of the referenced letter, and determined that none of the changes are "significant" requiring NRC Staff prior approval. This determination is based upon the judgement that the changes involve clarification of the commitments, expansion of existing commitments or new areas which LP&L agrees with the NRC Staff would be beneficial to the program. None of the commitments in the reference letter are lessened, deleted or otherwise adversely impacted by the modifications and are therefore not judged to be "significant".

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Mr. G.W. Knighton

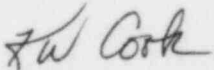
Page 2

Attachment I provides a summary of program controls, etc. which LP&L will put in place to assure the NRC Staff will be kept informed, as appropriate, as to results of the basemat monitoring program. Attachment I also provides the bases for selection of the acceptance criteria specified in the program plan in the reference letter.

Attachment II provides a summary of the changes made to the plant procedure to incorporate comments from the October 23-24, 1985 meetings.

If you have any questions regarding this information, please contact me.

Very truly yours,



K.W. Cook

Nuclear Support & Licensing Manager

KWC/ch

Enclosures (2)

cc: B.W. Churchill, W.M. Stevenson, R.D. Martin, J. Wilson, NRC Resident
Inspector's Office (W3)

ATTACHMENT I

PROGRAM CONTROLS AND ACCEPTANCE CRITERIA BASES

During the meetings held at Waterford 3 on October 23-24, 1985, the NRC Staff and BNL requested further definition in several areas associated with the basemat monitoring program. A number of the considerations were within the general category of program controls and include further definition of when reports would be made to the NRC and what would be included in the reports. The program controls which LP&L intends to implement are described below:

Reports

Reports required via the basemat monitoring program can be classified as "Special" and "Interim Special" reports.

Special reports are required approximately every eighteen months. Flexibility of the eighteen month time frame is intended to allow a short delay to include all elements of the monitoring to be performed per the specified intervals and provide coverage for each element in the report.

Special reports will include, to the extent feasible, the data sheets from each of the elements of the monitoring program as well as the results of evaluations to show compliance with the acceptance criteria. Should LP&L determine that the data indicates an undesirable trend or otherwise is deserving of further evaluation, this will be provided as part of the special report.

LP&L Nuclear Licensing will coordinate with Project Engineering in development of the special report utilizing the data gathered by plant staff in performing the elements of the program. The report will be transmitted to the NRC Project Director with sufficient copies for a distribution determined by the Project Director.

Interim Special reports are those that are associated with an engineering evaluation of the significance of observations, measurements or calculations from performance of the elements of the basemat monitoring program in which an acceptance criteria is violated or appears to have been violated.

Plant procedure PE-5-033 requires plant staff to notify LP&L Nuclear Licensing when an acceptance criteria is violated during performance of the procedure. Notification can be delayed until the next regular work day if the observation is after regular work hours. Nuclear Licensing will contact LP&L Project Engineering and the two organizations, in conjunction with Ebasco or other consultant assistance, will perform an initial assessment. The initial assessment will be limited to a one day assessment or less and may not be more than an expression of engineering judgement of the significance. The NRC Project Manager will be notified by telecon no later than the following day of the details as known and the initial assessment result.

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LP&L Nuclear Licensing, Project Engineering and other organizations, as required, will develop an engineering evaluation following the initial notification of the NRC Project Manager. A written report will be developed and submitted by Nuclear Licensing within 30 days of the initial notification. This report may, of necessity, be preliminary in nature but will provide preliminary results (or final results if available), description of remaining work, schedule for submittal of final report and justification for continued operation of the facility pending completion of the evaluation.

The final report will be submitted to the NRC Project Director as specified for special reports above.

In addition to documentation of project controls, the NRC Staff and BNL requested LP&L provide an expansion of the bases for selection of the acceptance criteria contained within the basemat monitoring program as specified in the program plan in the reference letter. The acceptance criteria discussed in the program plan and/or the monitoring procedures include:

- o Differential basemat settlement of one (1.0) inch
- o Chloride content of groundwater of 250 ppm
- o Change in measured crack width of 15 mils
- o Previously unobserved cracks of width > 15 mils
- o Previously unobserved cracks of length > 10 feet

Basemat Differential Settlement

Calculations of the basemat stress condition resulting from differential settlement have been made considering the basemat as a plate and subject to uniform flexure from the differential settlement. These calculations indicate that for a differential settlement of 2.5 inches from the center of the basemat to the north and south ends will result in a tension of 3200 psi in the reinforcing steel in the case of convex bending (the most critical case for flexural stresses). This amount of tensile stress is insignificant (5%) when compared to the calculated stress levels due to the flexure of the basemat due to the loading from the structures above. To assure that the stresses at the action limit are not approaching a magnitude at which they, in combination with the stresses imposed by the structures, are near the defined stress limits for the design, an action limit of one (1.0) inch was selected since the model of the basemat is not exact and the flexure of the basemat may not be uniform nor be coincident with the center of the basemat. This provides for a conservative limiting value for the differential settlement.

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The bases for selection of the basemat settlement monitoring points and the expected accuracy of the survey loops are discussed in the program plan. A number of additional monitoring points have since been added and, as discussed in Attachment II, these points will be surveyed until an engineering evaluation determines they are no longer needed. These additional points will allow for greater flexibility in evaluating differential settlements in the event a special evaluation is required due to exceeding the one inch criteria.

Chloride Content

The discussion in the program plan provides sufficient detail on the basis for selection of the conservative criteria for chloride content of the groundwater.

Change In Basemat Crack Width

ACI 224R-80 and ACI 318 recommend a calculated tolerable crack width of 16 mils in flexure for an internal flexural member. ACI 224R-80 also states that isolated cracks in a flexural member can occur which are twice the calculated width, 32 mils. Since a 32 mil crack could be expected without any detrimental effect on the reinforcing steel, an action limit of 15 mils was selected to maintain a conservative limit.

Previously Unobserved Cracks

The program plan did not establish criteria for documenting previously unobserved cracks in the basemat or on vertical walls. It also did not establish a criteria for when discovery of a previously unobserved crack would prompt an engineering evaluation.

Since new or previously unobserved cracking would not be of potential structural significance unless the width was significant (selected as > 15 mils consistent with known cracks) or indicated a similar loading pattern as that which formed the original cracks (selected as > 10 feet in length and essentially continuous) a single set of criteria was defined for documentation and engineering evaluation.

ATTACHMENT II

PROCEDURE MODIFICATIONS

The following summarizes the modifications to Waterford 3 plant procedure PE-5-033 as a result of comment by NRC/BNL at the October 23-24, 1985 meeting reviewing the basemat monitoring program. References to page numbers or section numbers are consistent with the Draft Revision 1 to the procedure reviewed at the meetings.

1. Page 7, Section 7 - Added new section 7.2

"7.2 No new cracks are visible which are essentially continuous and ten (10) feet or more in length. (The cracks should be continuous along the entire length or should exhibit only small interruptions such that it is apparent that a single crack is involved.)"

2. Page 7, Section 7 - Revised previous section 7.2 to new section 7.3 specifying baseline to be used

"7.3 The calculated differential settlement of the common foundation basemat, does not exceed one (1) inch from the baseline differential of Attachment 10.6. (See Attachment 10.8)."

3. Page 8 & succeeding pages - Revised notes throughout the procedure to specify Nuclear Licensing as the organization to be notified if any inspection criteria are violated and limited notifications to normal working hours.

4. Page 8 - Note allowing cleaning, buffing or grinding of the concrete surface "at the discretion of" Plant Engineering change to read "with the approval of".

5. Page 9, Section 8.1.2.2 - Requirement for recording of new cracks modified to include ones whose length exceeds ten feet as well as those whose width exceeds 15 mils.

6. Page 10, 2nd note - Modified note to require use of secondary monitoring locations pending engineer evaluation. The additional and optional monitoring points previously included on Attachment 10.4 Sht. 2 and Sht. 3 have been retitled as secondary points and consolidated in the revised Sht. 2. The new note reads:

"The secondary basemat monitoring points shown on Attachment 10.4, Sht. 2, are non-mandatory; but they are highly desired for evaluation purposes. These secondary basemat monitoring point elevations shall be obtained until an engineering evaluation has been completed which concludes that they are no longer required."

ATTACHMENT II

7. Page 14, 1st Note - Added Attachment to specify temperature correction of strain gage readings.
8. Page 14, 2nd Note - Removed dependency of need for engineering evaluation on results of crack width observations and differential settlement measurements. Requires engineering evaluation if measurements exceed crack width criteria.
9. Page 15, Section 8.4 - Removed two notes on page 15 and modified 8.4.1 to require both wall inspection and a photographic survey of walls.
10. Page 16, 2nd Note - Modified to require engineering evaluation if acceptance criteria is exceeded.
11. Attachment 10.9 - Modify to designate slots on one end of protective cover plate.
12. General - Note added to require notification of plant chemistry to obtain ground water level measurements concurrent with the basemat settlement measurements.