FNP Program: Flux Detector Thimble Inspection Program	Document Type: Plant-Specific Program Attribute Comparison
Version: 1	

FNP Flux Detector Thimble Inspection Program Attribute Comparison

FNP Program	Flux Detector Thimble Inspection Program; LRA Section B.5.2
Precedent Program	**Robinson** Flux Thimble Eddy Current Inspection Program; *Robinson LRA, Section B.2.8.*
Precedent Program SER Reference	**Robinson Draft SER**, Dated August 25, 2003 *Section 3.1.2.3.7.2.*

1. OBJECTIVE

This document supports application for renewal of the FNP Units 1 and 2 operating licenses.

This document compares the FNP Flux Detector Thimble Inspection Program's pertinent attributes against a previously submitted program credited by another applicant. The objective is to identify areas where similar program attributes have been previously accepted by the NRC staff in an SER.

Comparisons of plant specific programs, which are those that are different from any of the programs evaluated in NUREG-1801, require comparisons of pertinent program attributes. These will typically include the first six attributes only:

- Program Scope
- Preventive Actions
- Parameters Inspected or Monitored
- Detection of Aging Effects
- Acceptance Criteria
- Monitoring and Trending

The corrective action, confirmatory process, and administrative controls attributes are considered to be plant-specific attributes common to all aging management programs. Therefore, no comparison is made for these three attributes.

The operating experience attribute is plant-specific and cannot be directly compared to another applicant. Therefore, no comparison is made for this attribute.

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2. PROGRAM ATTRIBUTE COMPARISON:

2.1 Program Scope

2.1.1. FNP LRA

"The FNP program will include flux detector thimbles for both units which, although they form part of the reactor coolant pressure boundary, are exempted from ASME Section XI as instrumentation. It does not include the instrument guide tubes, which are covered under the ISI Program and the Reactor Vessel Internals Program."

2.1.2. Precedent LRA (Robinson) (From the Robinson LRA, Section B.2.8)

"The Flux Thimble Eddy Current Inspection Program is based upon current plant activities delineated in an existing procedure governing flux thimble eddy current inspection. The procedure was implemented to satisfy NRC Bulletin 88-09 requirements that a tube wear inspection procedure be established and maintained for Westinghouse supplied reactors which use bottom mounted flux thimble tube instrumentation."

2.1.3. Precedent SER Reference (Robinson) (From the Robinson Draft SER, Section 3.1.2.3.7.2)

"The applicant stated that the Flux Thimble Eddy Current Inspection Program is based upon current plant activities delineated in an existing procedure governing flux thimble eddy current inspection. This procedure was implemented by RNP to satisfy NRC Bulletin 88-09 requirements that a tube wear inspection procedure be established and maintained for Westinghouse-supplied reactors which use bottom mounted flux thimble tube instrumentation. The Flux Eddy Current Inspection Program addresses vibration-induced wear in Westinghouse-designed neutron flux instrumentation thimble tubes. Because the staff's discussion in Bulletin 88-09 was limited only to neutron flux thimble tubes in Westinghouse-designed light-water reactors, the staff concurs that the scope of the Flux Thimble Eddy Current Inspection Program is limited only to the monitoring of aging effects in the RNP neutron flux thimble tubes and that no other component need be added to this aging AMP. Based on this determination, the staff concludes that the Scoping program attribute for the Flux Thimble Eddy Current Inspection Program is acceptable."

2.1.4. Discussion

Note: The FNP LRA Operating experience information for the FNP Flux Detector Thimble Inspection Program specifies that the FNP program is implemented in accordance with Bulletin 88-09.

The set of components included in the FNP scope is identical to that described in the RNP program scope. Therefore, the staff evaluation and acceptance of the RNP program scope is applicable to the scope of the FNP program.

2.2 Preventive Actions

2.2.1. FNP LRA

"There are no preventive actions associated with this monitoring program."

2.2.2. Precedent LRA (Robinson) (From the Robinson LRA, Section B.2.8)

"The Flux Thimble Eddy Current Inspection Program is a condition-monitoring program; therefore, there are no preventive actions."

2.2.3. Precedent SER Reference (Robinson) (From the Robinson Draft SER, Section 3.1.2.3.7.2)

"The applicant stated that the Flux Thimble Eddy Current Inspection Program is a condition monitoring program; therefore, there are no preventive actions. The staff concurs that the Flux Thimble Eddy Current Inspection is an inspection-based condition monitoring program and that, as such, the program does not include preventive or mitigative actions to preclude the occurrence of an aging effect."

2.2.4. Discussion

No preventive actions are credited for either the FNP program or the RNP program. Therefore, the staff evaluation and acceptance of the RNP program preventive actions is applicable to the FNP program preventive actions.

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2.3 Parameters Inspected or Monitored

2.3.1. FNP LRA

"Wall thickness measurements will be conducted to detect loss of material from the flux detector thimbles."

2.3.2. Precedent LRA (Robinson) (From the Robinson LRA, Section B.2.8)

"The aging effect to be managed by the Flux Thimble Eddy Current Inspection Program is loss of material due to wear in the double-walled, incore flux thimble tubes. This program is designed specifically to detect and manage that aging effect."

2.3.3. Precedent SER Reference (Robinson) (From the Robinson Draft SER, Section 3.1.2.3.7.2)

"The applicant stated that the aging effect to be managed by the Flux Thimble Eddy Current Inspection Program is loss of material due to wear in the double-walled, incore flux thimble tubes. This is consistent with NRC Bulletin 88-09. Therefore, the staff concurs that the Flux Thimble Eddy Current Inspection Program is limited only to the monitoring of wear in the RNP neutron flux thimble tubes."

2.3.4. Discussion

The FNP program parameters inspected or monitored are consistent with Bulletin 88-09 and with the RNP program parameters inspected or monitored.

Therefore, the staff evaluation and acceptance of the RNP program parameters inspected or monitored is applicable to the FNP program parameters monitored or inspected.

2.4 Detection of Aging Effects

2.4.1. FNP LRA

"Eddy Current Testing (ECT) or other suitable examination methods will be used to detect loss of material from flux detector thimbles."

2.4.2. Precedent LRA (Robinson) (From the Robinson LRA, Section B.2.8)

"The Flux Thimble Eddy Current Inspection Program is a periodic volumetric examination that allows a projection of the rate of wear of the double-walled, incore flux thimble tubes. It is performed at a variable frequency dependent on extrapolation of wear rates determined from previous inspections. This ensures

that timely corrective action will be performed well before the projected failure of any of the tubes due to wear could occur."

2.4.3. Precedent SER Reference (Robinson) (From the Robinson Draft SER, Section 3.1.2.3.7.2)

"The applicant stated that the Flux Thimble Eddy Current Inspection Program is a periodic volumetric eddy current examination of the double-walled, incore flux thimble tubes. The inspections of the thimble tubes are performed at a variable frequency dependent on extrapolation of wear rates determined from previous inspections.

In NRC Bulletin 88-09, the staff requested that each licensee owning a Westinghouse-designed PWR establish an inspection program to monitor for thimble tube performance and to include in the program the establishment of an inspection methodology that is capable of adequately detecting wear in the thimble tubes (such as eddy current testing [ECT]). The applicant's description of the Flux Eddy Current Inspection Program implied that the applicant might use alternative volumetric inspection methods to monitor for wear in the tubes in lieu of using ECT for the examinations. Therefore, in RAI B.2.8-1, the staff asked the applicant to clarify which additional volumetric inspection methods, if any, might be used as alternatives to ECT and how these alternative inspection techniques would be qualified to monitor for vibration-induced wear of the incore neutron flux thimble tubes.

In its response to RAI B.2.8-1, dated April 28, 2003, the applicant clarified that ECT is the method credited for the incore neutron flux thimble tube examinations and that the applicant does not currently credit any other volumetric inspection methods as alternative methods for flux thimbles examinations. Since the applicant's response clarifies that only ECT will be credited for the examinations of the incore neutron flux thimble tubes, the staff considers RAI B.2.8-1 to be resolved."

2.4.4. Discussion

The FNP program detects aging effects in a manner consistent with that described in the RNP program. Eddy current testing in accordance with Bulletin 88-09 is credited.

Therefore, the staff evaluation and acceptance of the RNP program's detection of aging effects is applicable to the FNP program's detection of aging effects.

2.5 Monitoring and Trending

2.5.1. FNP LRA

"ECT results will be trended and wear rates will be calculated. Examination frequency will be based upon wear predictions."

2.5.2. Precedent LRA (Robinson)

(From the Robinson LRA, Section B.2.8)

"The Flux Thimble Eddy Current Inspection Program projects the rate of wear of the double-walled, incore flux thimble tubes ensuring that timely corrective action will be performed well before failure of any of the tubes due to wear could occur."

2.5.3. Precedent SER Reference (Robinson) (From the Robinson Draft SER, Section 3.1.2.3.7.2)

"The applicant states that the Flux Thimble Eddy Current Inspection Program projects the rate of wear of the double-walled, incore flux thimble tubes ensuring that timely corrective action will be performed well before failure of any of the tubes due to wear could occur. Additional details of the Flux Thimble Eddy Current Inspection Program are provided in the applicant's response to NRC Bulletin 88-09, dated February 8, 1991. In this response, the applicant provided an acceptable technical basis for supporting ECT of incore flux thimble tubes every other RFO. Based on the technical basis provided in the applicant's response to NRC Bulletin 88-09, the staff concludes that the applicant has provided an acceptable regulatory basis for supporting ECT examinations of the thimble tubes every other RFO."

2.5.4. Discussion

Consistent with the RNP program, the FNP program is implemented based upon the FNP response to NRC Bulletin 88-09. Inspection schedules are based upon measured and projected wear rates.

Therefore, the staff evaluation and acceptance of the RNP program monitoring and trending attributes is applicable to the FNP program monitoring and trending attributes.

2.6 Acceptance Criteria

2.6.1. FNP LRA

(From the Robinson LRA, Section B.2.8)

"Results of the flux thimble inspections will be evaluated using a wear rate formula to determine the earliest projected date that a detector flux thimble can be anticipated to exceed the wall thickness limit."

2.6.2. Precedent LRA (Robinson)

"The administrative controls for the Flux Thimble Eddy Current Inspection Procedure provide specific, objective acceptance criteria that ensure that any thimble tube that is expected to experience through wall wear greater than the ASME criteria specified for the examination prior to the next inspection is removed from service. No subjective analysis that might permit a marginal tube to be returned to service is permitted by the procedure."

2.6.3. Precedent SER Reference (Robinson) (From the Robinson Draft SER, Section 3.1.2.3.7.2)

"The applicant stated that the administrative controls for the Flux Thimble Eddy Current Inspection Procedure provide specific, objective acceptance criteria that ensure that any thimble tube that is expected to experience throughwall wear greater than the ASME criteria specified for the examination prior to the next inspection is removed from service. No subjective analysis that might permit a marginal tube to be returned to service is permitted by the procedure.

In NRC Bulletin 88-09, the staff requested that each licensee owning a Westinghouse-designed PWR establish an inspection program to monitor for thimble tube performance and to include as part of the program the establishment of an appropriate thimble tube wear acceptance criterion (for example, percent throughwall loss). The applicant's response to NRC Bulletin 88-09, dated February 8, 1991, provides additional details regarding the acceptance criterion for the incore flux thimble tube eddy current inspections. In this response, the applicant provides a technically acceptable basis for supporting 65 percent throughwall degradation as the amount of acceptable wear that can occur over two operating cycles for RNP. Based on the information in the applicant's response to NRC Bulletin 88-09, the staff concludes that the applicant's acceptance criterion (i.e., 65 percent throughwall degradation) is acceptable."

2.6.4. Discussion

Consistent with the RNP program, the FNP program's wall thickness limits are based upon ASME limits and acceptance criteria are implemented consistent with the utility response regarding Bulletin 88-09. Therefore, the staff evaluation and acceptance of the RNP program acceptance criteria is applicable to the FNP program acceptance criteria.

3. ATTRIBUTE COMPARISON SUMMARY

The FNP Flux Detector Thimble Inspection Program attributes as described in the FNP LRA are generally consistent with the RNP program attributes described in the RNP LRA. Both programs are based upon a response to Bulletin 88-09 and the associated commitments to manage loss of material due to wear in thimble tubes.

Based on this consistency, the staff evaluation and acceptance of the RNP program is applicable to the FNP program.