INSPECTION PROCEDURE 71004

POWER UPRATE

PROGRAM APPLICABILITY: 2515

71004-01 INSPECTION OBJECTIVES

01.01 To verify the most risk-significant aspects of the following when applicable:

a. That tests and experiments not described in FSAR and changes to the facility or procedures as described in the UFSAR for power uprate were evaluated in accordance with 10 CFR 50.59 as appropriate. (02.02 a. &e.)

b. That the licensee took the required actions to alleviate or prevent the affects of new or likely initiating events, in accordance with the license amendment or NRC safety evaluation (SE), that were due to changes such as higher core power densities, increased flow in primary or secondary systems including their interfacing systems, and the synergistic effects of multiple initiating events (, e.g., higher primary flow rates coupled with greater fuel burnup leading to a higher probability for irradiation-induced side affects). (02.02 g.)

c. That plant modifications for power uprate are in accordance with licensing and design bases, licensee commitments, and the FSAR. (02.02 a., b., &c.)

d. That mitigating systems can initiate and perform their safety function in accordance with the time lines in new accident analyses, acceptance tests for plant modifications for power uprate, and applicable surveillance tests.(02.02 b. & c.)

e. That individual components in mitigating systems that were altered or replaced can perform their intended safety function. (02.02 a., b., & c.)

f. That new operator actions (normal, abnormal, and emergency) for power uprate are administered procedurally and have an appropriate basis. Appropriate training should be provided to operators on the new procedures. (02.02 d.)

g. That the licensee monitors changes, in accordance with NRC SE, made on systems and their effects on those systems and interfacing systems including potential problems that are slow in developing and issues that could not be immediately tested (e.g., erosion corrosion or flow accelerated corrosion). (02.02 f.)

01.02 To perform this inspection procedure for power uprates greater than 7.5% of original plant rated output.

71004-02 INSPECTION REQUIREMENTS

02.01 Sample Selection. The samples selected should be inspected per the referenced baseline inspection procedures, except for those covered by this special inspection procedure and IP 49001, and be risk-informed through focus on items concerning new integrated plant response characteristics, new operator procedures, and plant safety during any required tests.

a. Select safety evaluations for modification or tests, related to the cornerstones, that are required for power uprate from the following:

   1. changes to facility as described in UFSAR
   2. changes to procedures as described in UFSAR
   3. tests or experiments not described in UFSAR

b. Select risk significant plant modifications from those implemented for power uprate.

c. Select mitigating systems or components modified for power uprate for which surveillance testing or startup testing will be performed.

d. Select integrated plant evolutions (e.g. power changes) being conducted by licensee at the uprated power level and observe operator actions.

e. Review the testing portion of the approved license amendment or the NRC SE and select major tests to be monitored and evaluated (e.g. turbine load reject trip, runback, MSIV closure from full power, or LOOP).

f. Choose risk-significant concerns identified by licensee's flow accelerated corrosion (FAC) and erosion corrosion programs which could be exacerbated by power uprate changes or evolutions.

g. Select licensee actions stated in license amendment, licensee commitments, or NRC SE for addressing the effects of new or likely initiating events for the power uprate.

02.02 Inspection

a. For samples selected in subsection 02.01a implement IP 71111.02 or the annual inspection requirements of IP 71111.17.

b. For samples selected in subsection 02.01b implement IP 71111.17, and perform IP 71111.07 for heat exchangers in mitigating systems included in samples selected.

c. For post-modification, post-maintenance, or surveillance tests conducted by licensee for mitigating systems or radiation barriers included in samples for subsections 02.01b. and c., implement IP 71111.17, IP 71111.19, or IP 71111.22.

d. Witness initial power ascension after implementing changes for power uprate and observe operator actions for samples selected for subsection 02.01d in accordance with IP 71111.14, or IP 71111.20. Also as appropriate use IP 71111.11 under requalification training as a means to observe plant evolutions.

e. Witness or review test results of any major plant tests including MSIV closure. A partial test may consist of verifying the operation of control and protective circuitry for either a turbine load reject or loss of offsite power test without actually putting

the plant through an actual transient or actually demonstrating excess decay heat removal. Useful inspection guidance dependent on test conditions may be found in MC 2514 and specific IPs 72580 and 72582 for PWRs and IPs 72514 and 72517 for BWRs. The inspector should evaluate the major test procedures, prior to their being performed, to ensure the test can be conducted safely in accordance with IP 71111.02. The inspector should also witness or review the results of any power ascension tests to ensure that plant response is as expected, and charge that effort to this IP (IP 71004).

f. For samples selected in subsection 02.01f., implement IP 49001 to review the licensee's erosion and FAC programs, as required, and charge that effort to this IP (IP 71004).

g. For samples selected in subsection 02.01g., verify that licensee has taken all required actions to address the effects of new or more probable initiating events as stated in license amendment, licensee commitments, or in the NRC SE, and charge that effort to the most applicable baseline IP or to this IP (IP71004) if necessary.

02.03 Identification and Resolution of Problems. Verify that the licensee is identifying problems related to plant alterations for power uprate at an appropriate threshold and entering them in the corrective action program. For a selected sample of problems associated with power uprate mainly with mitigating systems, verify that the licensee has appropriately resolved the technical concerns and regulatory requirements. See Inspection Procedure 71152, "Identification and Resolution of Problems," for additional guidance.

71004-03 INSPECTION GUIDANCE

General Guidance

Cornerstone	Inspection Objective	Risk Priority	Example
Initiating Events	Evaluate issues, or conditions involving reactor scrams, trips, activation of ECCS, and degradation of safety-related equipment attributed to power uprate changes.	Changes for power uprate which introduce new initiators or increase likelihood of initiating events for which the NRC SE outlined methods to alleviate or prevent their occurrence.	Higher reactor power which increases irradiation of control rods and their guide tubes so that there is increased likelihood that the movement of the control rods is inhibited. Less excess capacity in feedwater system so that there is increased likelihood of challenges to the plant and its protection systems.
Mitigating Systems	Evaluate any potential degraded performance of mitigation systems due to power uprate changes.	Changes for power uprate which affect the ability to mitigate an initiating event.	Not obtaining desired flow rate of a residual heat removal pump for analyzed conditions for power uprate.

Barrier Integrity	Verify that integrity of barriers prevent radionuclide releases after facility changes for power uprate.	Changes for power uprate which affect barrier integrity.	Stroke time of a containment isolation valve greater than that analyzed in safety evaluation report for the uprate

Specific Guidance

03.01 Guidance for Sample Selection

a. No specific guidance

b. Risk significant modifications may include by the following:

1. Modifications which impact ECCS initiation or the ability of an ECCS system to mitigate an event.
2. Modifications which could contribute to the initiation of an event following installation.
3. Modifications which implement new equipment set points on risk significant equipment.
4. Modifications which caused unexpected problems when installed at another plant.

c. No specific guidance
d. No specific guidance
e. No specific guidance
f. No specific guidance
g. No specific guidance

03.02 Guidance for Inspection

a. Some inspection for this procedure will take place before power increases above the previously licensed power setpoint whereas testing of some modifications, power ascension testing, and integrated system testing will not be conducted until the original licensing limit for rated power output is exceeded and the new licensing limit for rated power output approached and even reached.

b. Concentrate on changes to systems within the identified cornerstones for this IP, e.g., RHR system, ECCS systems, or secondary systems with changes that may adversely impact primary systems plant safety. The following list is provided to focus the inspector on changes within specific risk significant areas:

1. Changes that impact ability of an emergency core cooling system (ECCS) to initiate or perform its mitigating function.

2. Changes that introduce a new initiator, e.g. higher core power densities; increased flow in primary, secondary, or their interfacing systems, and synergistic effects.

3. Risk-significant set point changes on equipment

4. Higher flow rates in primary systems, ECCS, or also secondary systems which challenge risk-significant systems. Focus on verifying the flow rates

and whether licensee is analyzing the long term effects and adopting a means to monitor those effects in accordance with NRC SE.. Preferably the inspector should witness an actual flow test when verifying flow rates but the review of flow test results is acceptable.

5. Changes that impact the integrity of barriers, e.g. higher flow rates in a primary or secondary system which increases flow-accelerated corrosion on internal piping surfaces and vibration at specific support points which then results in increased likelihood of leaks.

6. This inspection effort is also relevant to those heat exchangers which pose a significant risk if they possibly cannot achieve rated design heat transfer conditions.

c. Focus on those surveillance tests that affect core or containment cooling, higher flow rates in primary system or an ECCS, etc.

d. The inspector should be very selective and focus on those operator actions that affect risk-significant mitigating systems or radiation barriers. The inspector may also observe any modified operator actions, for BOP systems, that may initiate plant transient events.

e. The NRC SE will provide guidance on major test details like installation of sensors, requisite plant conditions, and prescribed actions. Additional guidance may be obtained from MC 2514.

f. The concerns selected can be from BOP systems if they are risk significant. The hours charged for IP 49001 should be under this inspection procedure for power uprate. If there are concerns from multiple systems, then select the one that is the most risk significant so that estimated resources for this sample will be approximately 25 hours.

g. The inspector merely confirms for the items in sample that the licensee has performed the required actions and does not repeat initial analysis or the evaluation of the NRC staff.

03.03 Identification and Resolution of Problems. No specific guidance.

71004-04 RESOURCES ESTIMATE

The estimated resource expenditure for this inspection procedure is 32 to 64 hours, without regard to the number of units at a site. This does not include the baseline inspection effort referenced by this procedure. This inspection procedure integrates the results of several baseline inspection procedures being performed under the established risk-informed baseline inspection program and that are related to plant modifications and testing associated with an approved increase in licensed reactor power. Most inspection activities for a power uprate should be conducted within the normal resource constraints of the baseline procedures being implemented. The types of samples selected for those baseline procedures should be as stated in this inspection procedure. The sample size per inspection and the frequency of each baseline procedure can be modified to accommodate the licensee's power uprate schedule. However, the sample size stated in that particular procedure on an annualized basis should be adhered to. In unusual circumstances, departure from baseline program resource estimates may be made with the approval of the Branch Chief of IIPB in accordance with IMC 2515.

This inspection should be performed by inspectors (e.g., engineering specialists) knowledgeable in the affected subject areas.

71004-05 COMPLETION STATUS

Inspection of the minimum number of samples required to demonstrate that power uprate can be achieved in a safe manner will constitute completion of this procedure in the RPS. That minimum sample size consists of at least one sample, if available, of each of the following: licensee safety evaluations; plant modifications; post-modification, post-maintenance, or surveillance tests; integrated plant evolutions; risk-significant concerns for FAC and erosion corrosion programs; licensee actions for addressing new or likely initiating events for power uprate; and any of the major integrated tests conducted by licensee to verify the safety functions of systems affected by power uprate.

71004-06 REFERENCES

NRC Inspection Manual Part 9900, “10 CFR 50.59 Changes, Tests, and Experiments”

71111.02, “Evaluations of Changes, Tests, or Experiments”

IP 71111.07, “Heat Sink Performance”

IP 71111.14, “Personnel Performance Related to Non-routine Plant Evolutions and Events”

IP 71111.17, “Permanent Plant Modifications”

IP 71111.22, “Surveillance Testing”

MC 2514, “Light Water Reactor Inspection Program Startup Testing Phase”

MC 2514, Appendix A, “ Startup Test Program Inspection Procedures”

END