

License Condition 03.09-03: Steam Dryer Monitoring Plan

1. The licensee shall prepare a Steam Dryer Monitoring Plan (SDMP) and submit the SDMP to the NRC no later than 90 days before the scheduled date for initial fuel loading.

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2. The licensee shall provide Power Ascension Test (PAT) procedures for steam dryer monitoring to the NRC resident inspectors at least 10 days before the scheduled date for initial fuel loading. The PAT procedures must include the following:

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- Level 1 and Level 2 acceptance limits, as defined in Report NEDE-33313P (Revision 5, December 2013), for on-dryer strain gage and on-dryer accelerometer measurements to be used up to 100 percent power;
- The power levels at which the steam dryer will be monitored (subject to Conditions 3 and 4) during power ascension, and the duration of monitoring at each power level;
- A description of activities to be accomplished during monitoring at each power level;
- Plant parameters to be monitored;
- A description of the actions to be taken if acceptance criteria are not satisfied; and
- A description of the process for verification of the completion of commitments and planned actions specified in the PAT procedures.

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3. The licensee shall complete the actions specified in Item 2 of the model license condition specified in paragraph (c) of Section 10.2, "Comprehensive Vibration Program Elements for a COL Applicant," in NEDE-33313P (Revision 5) between 65 and 75 percent thermal power.

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4.. DTE shall measure, record, and evaluate pressures, strains, and accelerations from the steam dryer instrumentation at power levels approximately 5 percent higher than the previous power level at which DTE measured, recorded, and evaluated such parameters until 100 percent thermal power is reached. DTE shall generate data trending and a projection of strain levels for each successive power level, including full power. DTE shall use data trending analysis to assess whether the Level 1 or Level 2 acceptance limits would be exceeded at the next higher power level for which the PAT specifies monitoring. DTE shall provide the data trending results and revised limit curves to the NRC project manager by facsimile or electronic transmission.

5. At each power level for which Conditions 3 and 4 require steam dryer monitoring, DTE shall measure and record pressure, strain, and acceleration responses over a range of plant conditions sufficient to confirm that loading and fatigue effects from normal variations in plant conditions at power levels up to and including 100 percent thermal power will not adversely affect the life of the dryer. DTE shall include its evaluation of steam dryer performance during such variations in plant conditions,

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including during Power Maneuvering in the Feedwater Temperature Operating Domain testing, in the dryer structural response as part of the full stress analysis report described in Condition 9 below.

6. If a flow-induced resonance is identified at any power level at which Conditions 3 and 4 require steam dryer monitoring, and the strains or vibrations exceed the pre-determined Level 1 or Level 2 limit curve, DTE shall cease power ascension until completing the actions specified in Item 5 of the model license condition specified in paragraph (c) of Section 10.2 in NEDE-33313P (Revision 5) and the following:

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a. If a Level 1 limit curve is exceeded, DTE shall reduce power to the last power level at which DTE performed steam dryer monitoring pursuant to Conditions 3 and 4 and at which the Level 1 limit curve was not exceeded. DTE shall perform a stress analysis to develop a new Level 1 limit curve before increasing power to the next level at which Conditions 4 requires steam dryer monitoring.

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b. If a Level 2 limit curve is exceeded, or if data trending indicates that a Level 1 limit curve may be challenged before the next power level at which Conditions 4 requires steam dryer monitoring is reached, DTE shall evaluate the Level 1 and Level 2 limit curves and perform a stress analysis that demonstrates that the stress acceptance limits are satisfied at the higher power level before power is increased.

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7. DTE shall determine end-to-end bias and uncertainties by comparing the predicted and measured strain or acceleration on the steam dryer at each power level at which DTE performs steam dryer monitoring pursuant to Conditions 3 and 4 and confirm the conservatism of the predicted dryer stress field. At each such power level, DTE shall adjust the predicted strain and acceleration responses using the frequency-dependent end-to-end bias errors and uncertainty values. If any of the measured sensor data at that power level exceeds the adjusted predictions, DTE shall either (A) modify the bias errors and uncertainty values and limit curves and ensure measured sensor responses do not exceed the adjusted predictions, or (B) quantitatively evaluate the effect on fatigue life.

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8. At the initial power level at which Condition 3 requires steam dryer monitoring and at approximately 85 and 95 percent power, DTE shall provide the steam dryer data analysis and results to the NRC project manager by facsimile or electronic transmission; and shall not exceed the power level at which it performed the steam dryer monitoring for at least 72 hours after the NRC project manager has confirmed receipt of the transmission.

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9.. DTE shall provide data collected from the steam dryer monitoring required by Condition 4 at 100 percent power to the NRC project manager by facsimile or electronic transmission within 72 hours of completing the collection of that data, with receipt confirmation from the NRC project manager. DTE shall submit a full stress analysis report and evaluation to the NRC document control desk in accordance with 10 CFR 52.4 within 90 days of first reaching 100 percent thermal power. The report must include the minimum stress ratio and the final dryer load definition using steam dryer data, and associated bias errors and uncertainties, and must demonstrate that the steam dryer will maintain its structural integrity over its design life considering variations in plant parameters, including, but not limited to, reactor pressure and core flow rate. If the structural integrity of the steam dryer for the full

plant life is not demonstrated by the stress analysis, DTE shall describe its compensatory actions, such as future dryer replacement, in the stress analysis report.

10. The licensee shall implement a periodic steam dryer inspection program as follows:

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- a. During the first two refueling outages after first reaching 100 percent thermal power, DTE shall perform a visual inspection of all accessible areas and susceptible locations of the steam dryer in accordance with industry guidance on steam dryer inspections in the latest NRC staff-approved version of BWRVIP-139-A, "BWR Vessel and Internals Project, Steam Dryer Inspection and Flaw Evaluation Guidelines," with any conditions or limitations specified in the NRC staff approval. The results of these baseline inspections shall be submitted to the NRC within 60 days following startup after each outage.
- b. At the end of the second refueling outage after reaching 100 percent thermal power, DTE shall update the Steam Dryer Monitoring Program to include a long-term inspection plan based on plant-specific and industry operating experience, and shall submit the updated program to the NRC within 180 days following startup from the second refueling outage.