October 8, 2008

MEMORANDUM TO: Mike Case, Director
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

FROM: Timothy Kobetz, Chief***/RA/***
Reactor Inspection Branch
Office of Nuclear Reactor Regulation

SUBJECT: SAFETY EVALUATION REGARDING ENDORSEMENT OF NEI GUIDANCE FOR ADHERING TO THE LICENSED THERMAL POWER LIMIT (TAC NO. MD9233)

By letter dated September 24, 2007, Nuclear Energy Institute (NEI) requested that the Nuclear Regulatory Commission (NRC) incorporate the "Jordan Memo" guidance into Manual Chapter 0612, "Power Reactor Inspection Reports," due to the Jordan Memo guidance to NRC Inspectors being rescinded when RIS 2007-21, "Adherence to Licensed Power Limits," was issued on August 23, 2007 (ADAMS ML071440035). The NRC responded by conducting a public meeting on November 15, 2007, to determine if additional NRC or industry guidance was needed beyond the guidance provided in RIS 2007-21.

NEI developed industry guidance that was intended to enhance the guidance specified in RIS 2007-21 but to also allow licensees to operate as close to the maximum power level as specified in each plant's license condition. Another public meeting was held on June 12, 2008, at which time NEI presented the final draft of "NEI POSITION STATEMENT – Guidance to Licensees on Complying with the Licensed Power Limit" (ADAMS ML081750537).

The NRC has documented in the enclosed safety evaluation that the guidance developed by NEI is an acceptable method for monitoring the maximum thermal power level. Therefore, the NRC endorses NEI POSITION STATEMENT – Guidance to Licensees on Complying with the Licensed Power Limit.

Enclosure: Safety Evaluation

CONTACT: T. Kolb, NRR/DIRS/IRIB
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SAFETY EVALUATION
NEI GUIDANCE DOCUMENT TO LICENSEES ON COMPLYING WITH THE LICENSED POWER LIMIT

1.0 INTRODUCTION

By letter dated September 24, 2008, Nuclear Energy Institute (NEI) requested the Nuclear Regulatory Commission (NRC) consider reinstating the "Jordan Memo" guidance that was superseded when RIS 2007-21, "Adherence to Licensed Power Limits," was issued on August 23, 2007. The NRC met with NEI and members of the public on November 15, 2007, and agreed that NEI would develop industry guidance relating to complying with the licensed power limit. On June 12, 2008, at a public meeting, NEI submitted their final draft of the NEI POSITION STATEMENT for Guidance to Licensees on Complying with the Licensed Power Limit. This Safety Evaluation addresses endorsement of the NEI POSITION STATEMENT.

2.0 REGULATORY REQUIREMENTS

10 CFR 50.54, "Conditions of licenses," states that the licensee shall at any time upon request supply information to enable the NRC to determine if a license should be modified, suspended or revoked.

10 CFR 50.72, "Immediate notification requirements for operating nuclear power reactors," requires an eight-hour report for the nuclear power plant being in an unanalyzed condition that significantly degrades plant safety.

10 CFR 50.73, "License event report system," requires a licensee event report within 60 days after discovery of the event due to the nuclear plant being in an unanalyzed condition that significantly degraded plant safety.

10 CFR 70.32, "Conditions of licenses," states that the Commission may incorporate, in any license issued pursuant to the regulation in this part (Domestic Licensing of Special Nuclear Material), such additional requirements and conditions as it deems appropriate or necessary in order to protect health or to minimize danger to life or property.

3.0 TECHNICAL EVALUATION

The NRC issued RIS 2007-21 to remind licensees of the regulatory requirement to adhere to the Maximum Power Level identified in their respective plant licenses. Each plant has a separate license condition which specifies the maximum thermal power output of the plant. RIS 2007-21 stated that licensees were not allowed to intentionally operate above the limit specified in their respective license and that if they find themselves above their licensed limit then prompt action shall be taken to get within their thermal power license condition limit.

The NEI POSITION STATEMENT "Guidance to Licensees on Complying with the Licensed Power Limit" does not change any license condition for any plant. The guidance reinforces that the License Condition for maximum thermal power shall not be intentionally exceeded and that if the licensee finds themselves above the maximum thermal power limit then prompt action shall be taken to get back within the limit. The guidance implements the information provided in RIS 2007-21 in the following manner:

Step 4.1 defines Steady State as *temperatures, pressures, and flows are stable such that the nominal value of reactor power remains stable, subject to statistical uncertainties and normal fluctuations (e.g., bi-stable flow for BWRs and feedwater oscillations for PWRs)*. This definition is consistent with the application of this term as used throughout the industry to describe stable plant conditions (i.e., parameters are not changing significantly or parameters are being controlled in automatic with slight or negligible changes due to feedback signals). A specific example of this can be found in NUREG-1434, Vol.2, Bases for SR 3.1.2.1 which states "steady state operations (no control rod movement or core flow changes)."

The staff agrees that normal fluctuations (i.e., automatic control system response), random processes (i.e., feedwater temperature changes, bi-stable flow for BWRs), and instrument uncertainties (i.e., flow meter measurement uncertainties) may slightly affect core thermal power indications, but these affects do not result in a violation of the licensed power limit license condition when operating at steady state conditions. However, the steady state condition must be at or below the licensees maximum thermal power licensed condition limit. Therefore, the NEI POSITION STATEMENT definition is consistent with the staff's understanding of steady state and is acceptable.

Step 4.2(1) states that *no actions are allowed that would intentionally raise core thermal power above the licensed power limit for any period of time*. This requirement enforces guidance in RIS 2007-21 which states *Licensees may not intentionally operate or authorize operation above the maximum power level as specified in the license*.

This statement is a fundamental basis for all license conditions such that they shall not intentionally be violated or exceeded. Therefore, stating this in a guidance document for plant operation is acceptable to the staff.

Step 4.2(1) also states *Small, short-term fluctuations in power that are not under the direct control of a licensed reactor operator (e.g., fluctuations caused by bi-stable flow in some BWRs and secondary-side control valve oscillations for PWRs) are not considered intentional.* RIS 2007-21 states that *slight changes in thermal power may occur due to expected variances in plant parameters*. NEI demonstrated to the NRC at a public meeting held June 12, 2008, that for short durations (1 minute average for thermal power) some peaks which lasted for less than one second exceeded the thermal power limit but the average was below the licensed power limit. NEI indicated that this was due to the read-out being a calculated value from secondary inputs (i.e., feedwater flow being the most dominant factor) and that automatic control systems reacted appropriately to maintain the average below the licensed power limit.

The staff understands that core thermal power is a calculated value derived from secondary plant inputs (i.e., pressure, temperature and flow rate measurements). The core thermal power is inferred by a heat balance using calorimetric measurements of the feed and steam flows with feedwater flow being the most sensitive. Feedwater flow

cannot be set at a certain value and remain at exactly that value. The total feedwater flow is controlled by feedwater regulating valves that maintain a certain flow value by use of a feedback signal which either opens or closes the feedwater regulating valves to maintain a constant flow rate. This results in the feedwater flow indication oscillating around the selected setpoint while in the automatic mode of operation. Therefore, the inherent oscillation of feedwater flow also affects, on an instantaneous basis, the derived value of core thermal power. The result is that there are instantaneous high and low peaks for the thermal power indication which provide input into the average thermal power calculation. Therefore, the staff has determined it is acceptable to verify core thermal power by using an average value derived from secondary plant indications. Additionally, the maximum thermal power licensed limit is not considered to be exceeded when the short duration peaks are normal fluctuations inherent in the design of the controlling system as long as the average thermal power level is at or below the maximum thermal power licensed limit.

Steps 4.2(2) and 4.2(3) provide guidance for monitoring adherence to the maximum thermal power licensed limit and the actions to take when the monitoring criteria is exceeded. NEI, licensees, and the staff understand that license conditions are applicable at all times. That doesn't mean that the parameter needs to be ***continuously*** monitored by operators but that it needs to be monitored on a frequency that ensures the parameter has not exceeded the limit and that an adverse trend can be detected in a timely manner. An example of this is BWRs have a technical specification (TS) requirement that the Minimum Critical Power Ratio (MCPR) is $\geq$ the MCPR operating limits when thermal power is $\geq$ 25% Rated Thermal Power (RTP). The TS only requires the parameter to be verified every 24 hours but is required to be met at all times when power is $\geq$ 25% RTP.

The staff agrees that monitoring the 2 hour average core thermal power and the average core thermal power over each shift is sufficient to verify the license condition is being met and that timely action is taken to adhere to the licensed power limit. Additionally, each time the license condition for maximum thermal power is exceeded, except for short duration peaks due to normal fluctuations inherent in the design of the controlling system, licensees are required to evaluate the condition per 10 CFR 50.72 and 10 CFR 50.73. Therefore, the staff finds the guidance for monitoring maximum thermal power is acceptable.

Section 4.3 Pre-planned Evolutions provides guidance to licensees to consider the effect on core thermal power prior to initiating action that could increase power above the maximum thermal power license condition limit such as swapping feedwater pumps. If the evolution is expected to cause core thermal power to exceed the maximum thermal power license condition limit then action should be taken to reduce power prior to the evolution.

The staff agrees that this guidance provides a prudent action to take since the licensees cannot intentionally increase reactor power above the maximum thermal power license condition limit. Therefore, this guidance is acceptable to the staff.

Additional guidance is provided in the NEI POSITION STATEMENT regarding performance deficiency examples. This is not an all-inclusive list of possible performance deficiencies but reflect the most probable issues.

The staff agrees that these are potential performance deficiencies but each issue will be evaluated in accordance with MC 0612, "Power Reactor Inspection Reports," to determine if a performance deficiency exists. Therefore, the staff finds it acceptable to provide examples of performance deficiencies since some of these examples are referenced in RIS 2007-21.

4.0 CONCLUSION

The NEI POSITION STATEMENT, "Guidance to Licensees on Complying with the Licensed Power Limit," describes a method for ensuring that licensees adhere to their license condition limit for maximum thermal power. Guidance is also provided for an acceptable way to monitor thermal power such that the licensee ensures compliance with the maximum thermal power license condition. This method reinforces that licensees cannot intentionally exceed their maximum thermal power license condition limit and it provides direction for licensees to take if they find themselves above their maximum thermal power license condition limit. Additionally, guidance is provided for pre-planned evolutions which could affect core thermal power. The staff has evaluated the guidance and has determined that this guidance is an acceptable way to ensure that licensees are in compliance with their maximum thermal power license condition limit. Therefore, the staff endorses the NEI POSITION STATEMENT by incorporation into Revision 1 to RIS 2007-21.

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