NUCLEAR ENERGY INSTITUTE

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September 24, 2007

Mr. James E. Dyer
Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Regulatory Issue Summary 2007-21, "Adherence to Licensed Power Limits"

Project Number: 689

Dear Mr. Dyer:

On August 23, 2007, the NRC issued Regulatory Issue Summary (RIS) 2007-21, "Adherence to Licensed Power Limits," concerning adherence to the maximum power level specified in individual plant licenses. The RIS also retracted long-standing enforcement guidance that has been used by inspectors and licensees to determine whether normal and expected fluctuations in power meet plant license requirements.

NEI fully supports the primary message of the RIS. NRC licensees should not intentionally operate above 100% steady state rated thermal power (RTP), and they should take corrective action to reduce thermal power whenever they find it above the operational limit specified in the plant-specific operating license. However, some degree of fluctuation in thermal power is a normal part of plant operation, and is neither a license violation nor outside the design basis.

The enforcement guidance retracted by RIS 2007-21 was developed in 1980 to establish a practical definition of steady-state operation at RTP. Its retraction without being replaced by alternative guidance has created a significant regulatory void. Licensees are concerned that inspectors may no longer accept current operating practice with respect to short-term fluctuations in steady-state power at RTP. Inconsistent inspector response to normal fluctuations in the steady-state power level could have adverse safety and economic consequences, for example, unnecessary plant de-rates to increase operating margin to a non-safety limit.

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We strongly urge your consideration of this matter. Further, we recommend that, absent a clear and demonstrated need for change in a long-standing staff position, NRC reinstate the previous guidance. The enclosed white paper provides additional background on industry concerns and recommendations we believe will address industry concerns as well as the primary intent of the RIS. These recommendations are:

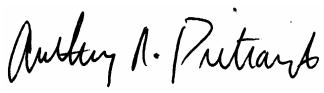
1. Guidance contained in IP 61706 should be maintained. The applicability of this guidance to address questions regarding unintentional operation above licensed thermal power should be communicated to inspectors.

2. Guidance contained in the "Jordan memo" (and IP 61706) should be incorporated as part of Manual Chapter (MC) 0612, *Power Reactor Inspection Reports*, to provide a means for inspectors to screen instances where licensed thermal power is inadvertently exceeded to determine if they represent performance deficiencies.

The issues raised in this letter highlight the importance of early communication between NRC and industry on issues that have generic applicability. Generic communications should be released in draft form to obtain information about potential adverse impacts. A public notice and comment period would foster constructive discussion in advance of final issuance and help avoid the reactive discussions that may otherwise result.

Please contact me if you have any questions regarding this matter.

Sincerely,



Anthony R. Pietrangelo

Enclosure

c: Terrence Reis, NRC
Michael J. Case, NRC
NRC Document Control Desk

Industry Concerns Regarding NRC Retraction of Long Standing Guidance on Full Steady-State Power Operation

II. Background

NRC issued Regulatory Issue Summary (RIS) 2007-21, "Adherence to Licensed Power Limits," on August 23, 2007. The "Summary of Issue" section of the RIS (page 2) states:

> *Licensees are reminded that there is no existing regulatory guidance condoning or authorizing operation of any nuclear power plant in excess of the maximum power level specified in the facility's operating license. While recognizing that thermal power may rise slightly due to normal changes in plant parameters, operators are expected to take prompt corrective action to reduce thermal power whenever it is discovered to be above the licensed limit. Licensees may not intentionally operate or authorize operation above the maximum power level as specified in the license.*

The primary intent of the RIS is to communicate to licensees that intentional operation in excess of the maximum steady-state power level is not allowed. The perceived need for communication on this matter arose in response to three documented instances, the first occurring in 1989, where licensees intentionally operated above their licensed power limits for short periods of time. All three instances were addressed by the normal inspection and enforcement process.

Importantly, this RIS also retracts 1980 enforcement guidance contained in a memorandum to NRC Regional Administrators (E.L. Jordan, *Discussion of "Licensed Power Level",* August 22, 1980). The RIS states that the 1980 memorandum ("Jordan memo") was intended only as guidance to inspectors on how to address unintentional operation in excess of the licensed power level. The RIS also states that existing Reactor Oversight Process (ROP) tools contain appropriate guidance for screening and dispositioning performance issues related to exceeding the licensed power level.

As noted in the "Jordan memo" (Attachment 1), the exact meaning of "full, steady-state licensed power level" (and similarly worded expressions of the maximum allowable steady-state power level), had been a subject of many lengthy discussions among NRC staff. The guidance contained in the "Jordan memo", and later incorporated into the NRC Inspection Manual (IP 61706, *Core Thermal Power Evaluation*), provided a means to assess whether inadvertent operation above the licensed thermal power limit is within normal expected fluctuations or a performance deficiency subject to further evaluation. This guidance has been in use since its issuance in 1980.

In 1990, an NRC internal memorandum addressed the reportability pursuant to 10 CFR 50.72 of inadvertently exceeding licensed power (Rossi to Crutchfield, *Reportability of Exceeding Licensed Thermal Power Levels*, August 31, 1990). The memo states:

> *In defining the upper limit of normal power operation, recognition must be given to the normal fluctuation about a mean power level and the uncertainties of calibration of instruments. The guidance provided in the Jordan memo of August 22, 1980 appears to provide a practical approach toward placing reasonable limits on operation.*

While intended as enforcement guidance for NRC inspectors, the "Jordan memo" and IP 61706 have been used widely (and for the most part appropriately) by licensees to define normal steady-state operation and to determine reportability under 10 CFR 50.72 for situations in which a plant unintentionally operates slightly above the licensed thermal power limit. Plants have operating procedures and instructions that are conservative with respect to the "Jordan memo", but also recognize that small fluctuations around the nominal steady-state power level are normal and expected.

Both NRC inspectors and licensees have used the "Jordan memo" and IP 61706 innumerable times since 1980 to help determine whether a performance deficiency existed in situations where a plant's licensed thermal power limit was marginally exceeded. The "Jordan memo" has served for 27 years as a stable reference point for licensee procedures, and should not be easily discounted. The reasons given in the RIS for retracting this established guidance are not compelling.

Equally troubling is the fact that there is currently no replacement to the "Jordan memo." The void left by its retraction leaves open a number of questions about operation at the licensed power limit and whether current operating procedures and operator guidance are sufficient.

III. Problem Statement and Impact on Licensees

Thermal power is calculated from inputs that fluctuate. It is not static and absolute. It can be monitored and controlled in a number of ways ranging from instantaneous measurement to average measurements over an increment of time (e.g., 10 minutes, 1 hour, 8 hours, etc.).

Licensees optimize power generation by operating close to the licensed power limit. Normal fluctuations in power output result in most instantaneous measurements falling below the licensed power limit, but some may be above the limit. On average, the power is controlled below the limit.

The retraction of the "Jordan memo" raises a number of questions about the regulatory treatment of fluctuations in steady-state power level that briefly exceed the licensed power

limit. Licensees are concerned that fluctuations formerly considered normal and expected will now be considered performance deficiencies.

For example, how must power be measured in the context of RIS 2007-21? Is averaging still acceptable? If so, what time intervals are acceptable? Is it acceptable to exceed (inadvertently) the licensed power limit during the time interval if the average is below the limit? If prompt operator action is necessary, what is the definition of "prompt" in this context? Such questions were addressed by the "Jordan memo." Its retraction forces licensees to reevaluate their procedures, with the possibility of introducing unintended consequences. The uncertainty created by the NRC's retraction of long-standing guidance could result in unnecessary transients if operators are expected to "chase the power peaks" by adding negative reactivity in response to minor power fluctuations. Increasing the frequency of manual reactivity control increases the potential for a reactivity transient.

The RIS 2007-21 states:

> *While recognizing that thermal power may rise slightly due to normal changes in plant parameters, operators are expected to take prompt corrective action to reduce thermal power whenever it is discovered to be above the licensed limit*." (Page 2, Summary of Issue, second sentence)
>
> and
>
> *The existing Reactor Oversight Process (ROP) tools contain the appropriate guidance for screening and dispositioning performance issues related to exceeding the maximum power level for a reactor."* (Page 2, last paragraph of Background section)

On the contrary, no tools exist, other than the retracted 1980 guidance as reflected in IP 61706, for determining normal power fluctuations around RTP or for documenting regulatory expectations for operator action. Absent additional enforcement guidance, inspector responses to steady-state power fluctuations that exceed RTP are likely to be inconsistent.

IV. Examples

Pressurized water reactors (PWRs) with integrated power control systems set the maximum licensed power into the system, and the system automatically maintains that power level. When reactor power goes slightly above the setpoint, the control system automatically responds by bringing it back down to the established setpoint (licensed power level). Thus, on occasion, the plant slightly exceeds maximum power, but the system automatically responds to reduce power. In this automatic mode of operation, power never exceeds licensed thermal power when averaged over a selected time period. The plant operators do not do anything "promptly" to bring power down, because the system does it automatically. We believe that automatic

systems of this type meet the intent of RIS 2007-21 with respect to prompt operator action. However, licensees are concerned that inspectors may reach different conclusions.

Most plants operate with power set close to the licensed power limit. Although the steady-state power level is relatively stable, it will fluctuate above and below the setting. Consistent with the "Jordan memo", plant procedures direct operators to monitor and take action to ensure that power does not exceed licensed thermal power when averaged over a 1-hour or 8-hour period.

The language of the RIS, combined with the retraction of the "Jordan memo", has led many plants to question whether plant procedures should be changed to direct operators to promptly respond and reduce power every time power fluctuates above the licensed power level based on instantaneous measurement. Such an approach would require frequent power adjustments and reactivity changes. Frequent reactivity changes could increase the likelihood of human error and distract operators from monitoring other important parameters.

Boiling water reactors (BWRs) can experience bi-stable flow. The phenomenon can result in a step change in core flow upwards or downwards, leading to corresponding step changes in thermal power. The changes can be as short as a few seconds or as long as 15 minutes. By averaging power over a shift, plants can operate near rated power and accommodate the changes without operator action. BWR plants are now evaluating the need to either derate to accommodate bi-stable flow or instruct operators to "chase" the power fluctuations. Some plants have instituted an interim derating of 0.2% to accommodate bi-stable flow step changes pending further dialogue between NRC and NEI on this issue.

V. Conclusions

NEI agrees that licensees may not intentionally operate (or authorize operation) above RTP. However, some conditions that a nuclear plant experiences at RTP may result in steady-state power fluctuations that cause RTP to be exceeded by small amounts for brief periods of time. A "limiting" interpretation of RIS 2007-21 would preclude operation (or actions that appear to authorize operation) above RTP, regardless of intention, magnitude or duration.

The guidance to inspectors in the 1980 "Jordan memo" and IP 61706 recognizes the difficulty inherent in maintaining an unchanging steady-state licensed power level (or similarly worded expression of the limiting power level). It also acknowledges the low safety significance of minor power fluctuations above the licensed power level. With the exception of a very few instances (as noted in RIS 2007-21), when operators misapplied the guidance in the "Jordan memo" to justify intentional operation above licensed thermal power, there have been no industry problems or concerns with the guidance for over 27 years.

The risk significance of minor fluctuations above RTP that occur as part of normal plant operation is low and does not support the withdrawal of adequate existing guidance and an effort to develop new guidance.

NEI does not believe that NRC intends RIS 2007-21 to discourage normal steady-state full-power operation. However, absent guidance to address normal, unintentional exceedances, licensees may feel obliged to either operate at less than nominal full power to ensure that normal power fluctuations do not cause the power level to exceed RTP (i.e., derate to add operational margin) or cycle the plant more frequently (i.e., by adjusting reactivity with rod motion, boron injection or core flow changes) to more closely manage core power. Putting aside commercial concerns with either approach, operational perturbations of this nature could introduce a greater risk factor than that being offset.

VI. Recommendations

The guidance to inspectors, contained in the 1980 "Jordan memo" and IP 61706, was developed in full recognition of the difficulties inherent in maintaining "full, steady-state licensed power level" (and similarly worded power limits) along with an acknowledgement of the low safety significance of minor power fluctuations above this level. With the exception of instances, as noted in the RIS, where operators have misapplied the guidance to intentionally operate above licensed thermal power, there have been no industry problems or concerns with the guidance that has been in place for over 27 years. There would appear to be no compelling reason or justification for the revocation action taken by the RIS. In addition, the risk significance of minor fluctuations above licensed power that occur as part of normal plant operation do not compel the effort that would be required to develop new guidance. As such, the following actions are recommended:

1. Guidance contained in IP 61706 should be maintained. The applicability of this guidance to address questions regarding unintentional operation above licensed thermal power should be communicated to inspectors.

2. Guidance contained in the "Jordan memo" (and IP 61706) should be incorporated as part of Manual Chapter (MC) 0612, *Power Reactor Inspection Reports*, to provide a means for inspectors to screen instances where licensed thermal power is inadvertently exceeded to determine if they represent performance deficiencies.