UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555 - 0001

March 15, 2004

Mr. Daniel F. Stenger
Counsel for the Nuclear Regulatory Services Group
Ballard, Spahr, Andrews and Ingersoll, LLP
601 13th Street NW, Suite 1000 South
Washington, DC 20005-3807

Dear Mr. Stenger:

I am responding to your letter, submitted on behalf of the Nuclear Regulatory Services Group (NRSG), to Dr. Nils J. Diaz, Chairman, U.S. Nuclear Regulatory Commission (NRC), dated December 9, 2003. You requested that the NRC consider amending the 1985 Commission Policy Statement on Engineering Expertise on Shift (Engineering Expertise Policy Statement). Specifically, you propose the Commission provide an alternative to the present bachelor's degree educational requirement for the shift technical advisor (STA) position.

NRSG proposes that the Commission allow the use of a nondegreed senior reactor operator (SRO) in the combined SRO/STA position if the SRO meets the education and operating experience criteria for the operations shift supervisor as specified in ANSI/ANS-3.1-1993, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants." You state that changing the educational criteria would reduce unnecessary regulatory burden by allowing licensees to use increasingly scarce engineering resources more judiciously while continuing to maintain safety.

As justification for modifying the STA educational requirements, you list several improvements that have been implemented in the nuclear industry: accredited training programs and standardized generic fundamentals examination (GFESs), site-specific simulators, symptom-based emergency operating procedures (EOPs), and emergency response organizations (EROs). Each of these items is assessed in the enclosure to this letter against the Commission's objective in establishing the degree requirement for the STA or combined SRO/STA positions.

While improvements have been made in these areas, the NRC's position continues to be that, for the reasons stated in the enclosure, on-shift engineering expertise is still necessary and must be immediately available to cope with situations not anticipated by the training programs or operating procedures. The NRC believes that the level of engineering and technical

knowledge of shift operating personnel has a direct bearing on the safety of nuclear power plants. The elimination of the degree requirement for the STA or the combined SRO/STA positions would reduce the amount of engineering expertise available to the operating crews and falls short of satisfying the Commission's expectations in this area.

Sincerely,

/RA/

J. E. Dyer, Director
Office of Nuclear Reactor Regulation

Enclosure: As stated

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Sincerely,

/RA/

J. E. Dyer, Director
Office of Nuclear Reactor Regulation

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Response to Proposal to
Amend the Educational Requirements for
Shift Technical Advisor (STA) Position

The NRC agrees that improvements have been made in the nuclear industry over the past two decades, including simulators, training and qualification of nuclear power plant personnel, procedures, and emergency response. However, as discussed below, the NRC continues to believe that on-shift engineering expertise is necessary and must be immediately available. Each of the points outlined justification for amending the STA education requirements is discussed below.

Accredited systems-approach-to-training programs and standardized Generic Fundamentals Examinations that ensure operators meet NRC standards for fundamental knowledge in physical, engineering and analytical principles.

In the attachment to your letter, you state: "On-shift SROs receive effectively the same specialized training that designated STAs receive, including training in accident recognition and response." Although portions of the training programs for SROs and STAs are similar, there are key differences. A comparison of the currently recommended content for these programs reveals differences in the areas of calculus, classical physics, heat transfer, fluid flow and thermodynamics, materials sciences, accident recognition and response, and mitigation of core damage. The accredited STA training program, as described in INPO 90-003, "Guidelines for Initial Training and Qualification of Shift Technical Advisors," assumes the candidate has taken "sufficient [college level] courses to provide a background for understanding the design and operation of nuclear power plants. These courses should include mathematics (calculus through ordinary differential equations), chemistry, physics, thermodynamics, heat transfer, fluid mechanics, electrical theory, basic electronics, and strength of materials. The accredited licensed operator training programs, as described in ACAD 00-003, "Guidelines for Training and Qualification of Licensed Operators," assume candidates possess a high school diploma or equivalency certificate. While the licensed operator training programs provide training in mathematics (logarithms and exponential functions), chemistry, physics, thermodynamics, heat transfer, fluid mechanics, electrical theory, basic electronics, and strength of materials, the material is presented at a more basic level than in college level courses. Thus, the engineering knowledge and skills provided by senior operator training programs, including the GFES, alone are more limited and not equal to the knowledge obtained by degreed STAs in college-level thermodynamics, heat transfer, and fluid mechanics courses. The accredited STA training program builds on the knowledge acquired in obtaining a 4-year engineering or science degree and additionally provides training in the application and integration of this knowledge utilizing plant-specific information.

The Commission Policy Statement on Education for Senior Reactor Operators and Shift Supervisors at Nuclear Power Plants (54 FR 33939, 8/15/89) (Operator Education Policy Statement) speaks directly to the point:

> The Commission believes that the level of engineering and technical knowledge of shift operating personnel has a direct bearing on the safety of nuclear power plants. Accordingly, the Commission believes that the safety of commercial power reactors is enhanced by having on each shift a team of NRC-licensed

professionals that combine technical and academic knowledge with plant-specific training and substantial hands-on operating experience. [The STA education requirement brings the needed academic knowledge to the operating shift.]

The Commission's position is predicated on the fact that, even though reactor licensees try to anticipate and address in training programs and reactor operating procedures all conceivable situations which could arise during normal and off-normal operation, there will always be the potential for situations to arise which are not covered through training or operating procedures.

[Further, the knowledge needed for these situations consists of] scientific and engineering fundamentals and the basic scientific principles that govern the behavior of electrical, mechanical, and other engineered systems. This is precisely the type of knowledge that academic institutions develop and convey well and that forms the basis of an academic degree program in a technical discipline.

A program of scientific and engineering studies should provide plant operating personnel an enhanced capacity for reasoning and judgement, as well as enhanced confidence, to perform better during both normal and off-normal operation, but particularly in the stressful and complex environment during reactor transients and accidents which may arise in the course of reactor operations. Individuals with such education can utilize their in-depth knowledge when called upon to assess the causes of a novel incident and determine the appropriate responses.

Use of site-specific simulators that make it possible to test operator analysis and response on any credible accident scenario.

Plant reference simulators have enhanced operations training and are a fundamental tool in the NRC's operator licensing process.

While simulators and associated computers and programs have improved dramatically, there are still limitations in their capabilities. Programmers cannot model every conceivable event. Unexpected events can and do occur at plants, and the probability of severe accidents can be reduced, but never eliminated. The simulator is limited in its ability to provide useful training in operational areas that have not been anticipated or modeled. In such events, where operator actions taken in response to the observed symptoms may not work or be effective, the degreed STA should be better able to recognize the need for and develop alternative paths to stabilize the plant and mitigate the consequences of the event.

Increased shift staffing of Control Rooms and Standard Technical Specification (STS) requirements that ensure adequate staffing of command and control personnel.

The minimum licensed operator control room staffing requirements established by 10 CFR 50.54(m)(2)(i) and facility technical specifications were based on the assumption that sufficient engineering expertise is immediately available to the licensed operators. STS Sections 5.2.2.a, and 5.2.2.f discuss staffing of nuclear power plants by nonlicensed operators and by an individual who provides advisory technical support to the operations crew,

respectively. The table in 10 CFR 50.54(m)(2)(i) ensures that sufficient command and control personnel are available either in the control room or on site to mitigate any off-normal events. Relief in staffing requirements was previously provided by the NRC endorsement of the combined SRO/STA position. This endorsement was granted based upon a recognition that the dual-role position requires more education and training than either a dedicated SRO or STA alone receives through accredited training programs. The additional engineering expertise that comes with an engineering degree is considered essential for the position during off-normal events, including severe accidents.

Use of EOPs, as well as Severe Accident Management Guidelines (SAMG) that provide guidance for actions to mitigate the consequences of beyond design basis accidents.

EROs that provide key personnel who must be able to report within specific timeframes to the Technical Support Center (TSC) and provide engineering and management support to Control Room operators, including transient and accident analysis and response functions.

As stated in the Operator Education Policy Statement, "there will always be the potential for situations to arise which are not covered through training or operating procedures." While symptom-based EOPs are an improvement over the off-normal procedures existing prior to the Three Mile Island event, they were not intended to be an alternative to increasing the level of knowledge of shift personnel. If the EOPs do not mitigate the consequences of an event or if, based on the symptoms, the operators are not able to use the EOPs, the additional engineering expertise provided by a degreed STA is necessary to develop alternate mitigation strategies.

While SAMGs and the ERO will be available to provide guidance and support following potential transients and accidents, including beyond-design-basis accidents, the ERO will not be immediately available. The ERO nominally has 60 minutes to staff the TSC and cannot provide immediate engineering expertise and support to the on-shift licensed operators. Prior to the arrival of the ERO, the degreed STA or combined SRO/STA on shift should provide immediate support for assessment and accident mitigation.

While many changes in nuclear power plant operation have occurred over the past two decades, including improvements in simulators, shift staffing, training, procedures, and emergency response, the need to have a degreed engineer on-shift, serving as either the dedicated STA or dual SRO/STA, still exists. Additionally, the STA degree question should not be looked at in isolation. It should be looked at in the context of the broader goals stated in the following excerpt from the Operator Education Policy Statement:

> The Commission further believes that programs which encourage experienced nuclear professionals [reactor operators and senior operators] to obtain college degrees and personnel with degrees to obtain a senior operator license and hands-on operating experience create an important source of management talent for the industry. Such individuals are more likely to be selected for management positions and, because of their understanding of the unique operational problems associated with nuclear power operation, are in a better position to enhance nuclear safety by fostering a strong safety culture within their organization.