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**Comments of Nuclear Information and Resource Service in Support of a Generic
Communication Requiring Industry Adherence to Federal Codes for
Effective Inspections To Better Evaluate
Steam Generator Tube Integrity**

To Whom It May Concern:

On behalf of Nuclear Information and Resource Service (NIRS), I am submitting comments to the U.S. Nuclear Regulatory Commission as provided by notice in the Federal Register, May 14, 2003 (Volume 68, Number 93) on Pages 25909-25912 regarding "Proposed Generic Communication; Requirements for Steam Generator Tube Inspections."

As Commissioner Kenneth Rogers remarked, now approaching 15 years ago, steam generators are "a loaded gun, an accident waiting to happen." Of the 69 operational Pressurized Water Reactors (PWR) that were the subject of Commissioner Roger's warning, only 31 have replaced their steam generators as of July 2002. Of that number, only 22 units replaced their vulnerable steam generators with components fabricated of what is currently thought to be the more crack resistant Alloy 690. This leaves the bulk of the PWR fleet and the public's safety relying upon steam generators fabricated with a material (Alloy 600) known to be susceptible to early degradation.

NIRS notes that steam generator tube inspections are of such safety significance that they are included in each of the PWR technical specifications.

NIRS, therefore, supports the issuance of a generic communication requiring prompt industry adherence to established federal codes for complete and thorough steam generator tube inspections with the best available non-destructive evaluation technology.

However, NIRS is concerned with any proposed communication that might serve to obfuscate regulatory compliance issues without actually better assuring the public's safety through prompt, thorough, and effective steam generator tube inspections. In fact, NIRS does not necessarily agree with the staff's position that safety issues and the acceptability of a more limited inspection can be resolved by merely requiring the licensees to submit to the amendment application process. NIRS contends that the license amendment process does not carry the same level of confidence for reasonably assuring the public safety as does adherence to requirements contained within the technical specifications for regular and thorough inspections of steam generator tubes.

NIRS is equally alarmed by a historic lack of rigor of NRC oversight and technical review of steam generator license amendments and the lack of regulatory enforcement for identified non-compliances. Therefore, the emphasis of any proposed generic communication must be placed on actual steam generator tube inspections utilizing state of the art non-destructive-evaluation technology.

NIRS is extremely leery of NRC leaving a door open to the seemingly endless debates, delays, deferrals, and continued stonewalling by the operators who continue to operate reactors with defective steam generator tubes in noncompliance of safety regulations.

As stated by the proposed generic communication, compliance is required by Criterion IX of 10 CFR 50, Appendix B, where "measures shall be established to assure that special processes, including welding, heat treating and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements."

As stated in the proposed generic communication, technical specifications for pressurized water reactors require the regular inspection of the entire length of hot leg tubing within the tube sheet area of the steam generators. As additionally stated by the proposed communication, the bobbin coil detection technology is not reliable nor is it qualified for effectively identifying axial cracking in locations where masking signals are present or for the detection of circumferential cracks. As the proposed communication further states, specialized probes designed to enhance inspections in masked areas within the tube sheet are not currently being applied by licensees over the entire length of the tubes subject to the required inspections. While these specialized probes are readily available to industry, the non-destructive evaluation technology is not being used for the overall inspection of degrading steam generator components because the specialized probes are viewed by the industry as too slow. Rather than take the required time at the expense of production schedules due to the associated longer outages, the licensees currently rely on speedier engineering judgments to replace effective inspections. Such analyses conveniently and economically conclude that inspections with specialized probes are not necessary outside of the industry limited areas already inspected.

The NRC's proposed communication has identified that the potential exists for "circumferential cracks to occur deeper into the tube sheet beyond the region inspected by the specialized probes." The proposed document further states that "In each instance the licensee was aware of the potential for such cracks to exist deeper in the tubesheet, but the licensee did not employ techniques qualified for detecting such cracks based on the licensees' analysis that such cracks did not have safety implications."

The proposed communication then states that the staff is concerned that "failure to expand the scope of the specialized probe inspection deeper into the tubesheet to detect cracks likely to be present poses a potential compliance issue with respect to the plant TS in conjunction with 10 CFR 50 Appendix B."

NIRS recognizes the staff's acknowledged "compliance issue" more explicitly to be an operational safety issue where the continued absence of the regulatory required enhanced inspection is representative of an undue and unacceptable increased risk to the public health and safety. Steam generator tubes fully comprise 50% of the primary pressure boundary for a pressurized water reactor without the protective benefit of the reactor containment system.

The growing risks associated with continued reactor operation with defective steam generator tubes continues to increase uncertainties already recognized regarding age-related degradation mechanisms associated with steam generator tubes. These uncertainties include crack initiation and crack growth rates. Attempts to analytically bound steam generator tube degradation given these uncertainties are as much or more guesswork than a reliable analytical assessment. Confidence in previous assumptions regarding stress corrosion cracking and other degradation mechanisms is eroding. Such assumptions continue to be revised as surprising new events modify the operational data.

Most recently, the Seabrook nuclear power station after only 10 Effective Full Power Years discovered "unexpected and unusual" Outer Diameter Stress Corrosion Cracking in thermally treated Alloy 600 material that has appeared in both the hot and cold leg steam generator tubes at unique locations in stress relieved materials. NRC Information Notice 2002-21 Supplement 1 issued April 1, 2003 reported that the early onset of stress corrosion cracking "may be difficult to screen for susceptibility" to cracking using eddy current testing. NIRS notes that 21st EPRI Steam Generator NDE Workshop conducted in July 2002 indicated that there are approximately 281,000 Alloy 600 Thermally Treated steam generator tubes currently in-service and that the scope of inspection and frequency widely varies throughout the industry.

The public-safety-minded are not reassured by such findings.

The Advisory Committee on Reactor Safeguards (ACRS) identified in NUREG-1740 "Voltage-Based alternative Repair Criteria: A Report to the Advisory Committee on Reactor Safeguards by the Ad Hoc Subcommittee on a Differing Professional Opinion" that an accident initiated by steam generator tube failure can lead to the melting of the reactor core with massive releases of radioactivity. A substantial amount of that

radioactive material released from the reactor core can escape through ruptured and severed steam generator tubes. NUREG/CR-6365 “Steam Generator Tube Failures” shows that as a result a design basis accident the multiple failure of as few as 15 steam generator tubes would not only likely lead to a core melt accident but would also result in the release of radioactivity to the environment as a result of a by-pass of containment.

Additionally, NUREG-1740 concluded that the “staff does not currently have a technically defensible analysis of how steam generator tubes, which may be flawed, will behave under severe accident conditions in which the reactor coolant system remains pressurized.”

NIRS, therefore, reiterates its support for the enforcement of the requirement of complete and thorough steam generator tube inspections. Given the uncertainties and the recent surprises, NIRS supports that the proposed generic communication be expanded to cover the inspection of the entire length of all in-service steam generator tubes. NIRS additionally supports required and periodic inspections of all plugs in out-of-service plugged tubes to insure their continued plug integrity.

However, the problem is not so easily solved for the licensees coming into compliance with technical specifications regarding steam generator tube inspections by merely going through the license amendment process. The lack of rigor of NRC technical reviews of steam generator amendment applications and the lack of enforcement of non-compliance issues contributes as much or more to the decline in public safety confidence as do the licensees’ ready willingness to substitute dubious risk analyses for thorough and effective inspections.

NIRS remains concerned by the historic glacial pace towards regulatory resolution and a demonstrated lack of willingness on the part of NRC to enforce its requirements for steam generator tube non-compliances. Because of the identified uncertainties and possibility for the associated by-pass-of-containment accident, NIRS asserts that there is an immediate need for requiring strict compliance backed up by strict regulatory enforcement. Such enforcement language needs to be more explicit in the proposed generic communication.

It is widely recognized that the NRC is aware of numerous and significant steam generator tube problems and that the agency is not taking adequate and effective action to have the problems corrected.

A recent and compelling example is illustrated by the February 15, 2000 steam generator tube rupture at the Indian Point Unit 2 nuclear power station. The Office of the Inspector General’s Event Inquiry “NRC’s Response to the February 15, 2000, Steam Generator Tube Rupture at Indian Point Unit 2 Power Plant,” Case No. 00-03S, August 29, 2000 concluded that despite the fact that NRC and the nuclear industry had long-standing concerns about the loss of integrity of steam generator tubes, “NRC did not conduct a technical review of the July 29, 1997 steam generator inspection when it was submitted to NRR [Division of Nuclear Reactor Regulation].”

OIG further determined that NRR's review of a 1999 IP2 license amendment request to defer the required steam generator tube inspections (a one year extension) for that year was not adequate, including a lack of review by NRR of source documents. Additionally, the OIG found that during the amendment review process, the NRC staff requested additional information from IP2 in the form of a Request for Additional Information to clarify outstanding issues relative to the steam generator inspection program. However, senior management intervened and no additional questions were asked by NRC. The result was a steam generator tube rupture within eight months just 35 miles from Times Square in New York City.

The proposed generic communication recognizes that the licensees' analytical acceptance of steam generator tube integrity without going through either the specialized inspection or the license amendment process is a blatant violation of the station's licensing agreement. NIRS reiterates that while merely requiring the licensee to submit to the license amendment application process it does not assure that actual safety issues will be effectively addressed by the license amendment process, particularly when production and capacity concerns have been demonstrated to outweigh even technical requirements and the public's safety in the NRC review process.

NIRS, therefore, asserts that the focus of the generic communication must be to require all affected licensees to conduct the enhanced and qualified inspections to better evaluate steam generator tube integrity rather than NRC merely providing the industry with a road map for legally maneuvering their stations into a deceptive regulatory compliance.

Sincerely,

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Nuclear Information and Resource Service