

POLICY ISSUE INFORMATION

June 27, 2007

SECY-07-0105

FOR: The Commissioners

FROM: Luis A. Reyes
Executive Director for Operations

SUBJECT: ENHANCEMENT TO THE VENDOR INSPECTION PROGRAM WITHIN
THE OFFICE OF NEW REACTORS

PURPOSE:

To inform the Commission that the Office of New Reactors (NRO) is enhancing the NRO Vendor Inspection Program (VIP) in support of new reactor licensing and construction and to describe these enhancements, including the development of program guidance and an anticipated increase in audit and inspection activities.

SUMMARY:

This paper describes the VIP and planned enhancements to the program as a result of expected increase in activities within the nuclear industry associated with new plant design and construction. Specific enhancements to the VIP are described including broadening its scope, increasing oversight of supplier audit activities, and developing additional inspection, as well as training and qualification guidance. The staff also describes several significant factors that led to these planned enhancements including the following: (1) entry of new suppliers into the U.S. nuclear industry; (2) use of modular construction techniques during new reactor fabrication; (3) inspections, tests, analyses, and acceptance criteria (ITAAC) verification activities; and (4) use of suppliers for engineering and licensing services.

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BACKGROUND:

In the February 2001, Staff Requirements Memorandum for COMJSM-00-0003, the Commission directed the staff to assess its technical, licensing, and inspection capabilities and to identify any enhancements needed to ensure that the agency is prepared to review applications for early site permits (ESPs) or for the construction of new nuclear power plants. In response, the staff developed SECY-01-0188, "Future Licensing and Inspection Readiness Assessment," dated October 12, 2001, which described, in part, enhancements to support new reactor licensing and committed to provide the Commission with semiannual updates of the status of new reactor licensing activities.

Within these updates, the staff described the development of the Construction Inspection Program (CIP), which, in part, considered the effect of new reactor construction on the vendors providing products and services to the nuclear power industry. The staff further described the potential need to broaden oversight of nuclear component suppliers in response to new plant construction in SECY-04-0001, dated January 2, 2004, and SECY-04-0117, dated July 9, 2004, both titled "Semiannual Update of the Status of New Reactor Licensing Activities." This current paper expands on that theme and identifies specific enhancements to the NRO VIP necessary for continued oversight and evaluation of these component suppliers.

DISCUSSION:

The U.S. Nuclear Regulatory Commission (NRC) describes the current VIP in Inspection Manual Chapter (IMC) 2700, "Vendor Inspection Program," and associated inspection procedures to govern staff activities with respect to ensuring adequate inspection of contractors and suppliers to the commercial nuclear industry. Historically, the agency has conducted inspections at vendor facilities principally to examine whether vendors have complied with requirements under Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," of the *Code of Federal Regulations* (10 CFR Part 50), hereafter referred to as Appendix B, and 10 CFR Part 21, "Reporting of Defects and Noncompliance," (10 CFR Part 21) as required under vendor procurement contracts with licensees.

Within the framework of IMC-2700, the NRC staff conducts routine and reactive inspections of nuclear component suppliers. The staff performs routine supplier inspections to verify effective implementation of a supplier's quality assurance (QA) program used to furnish safety-related components and/or services to the nuclear industry, as required by Appendix B. The agency performs focused, reactive inspections of nuclear component suppliers when needed for allegation support and under special circumstances to address operational events or allegations.

Based on the expected increase in activities within the nuclear industry associated with new plant design and construction, the staff believes that expanded oversight of nuclear component suppliers is needed because of a number of significant factors, including the following:

- The entry of new suppliers to the U.S. nuclear industry, most of whom are expected to be based overseas;

- The use of modular construction techniques during the fabrication of new reactors, which may occur offsite;
- The requirement to verify completion of ITAAC associated with systems and components; and
- The extensive use of contractors to provide engineering and licensing services to most applicants.

To address these factors, NRO is enhancing the NRO VIP through the development of additional inspection guidance and by broadening the NRO VIP inspection effort to specifically target the areas identified above and to support the CIP. During the next several months, the staff will be performing vendor inspections at a number of facilities identified as suppliers of items and services for the construction of new nuclear power plants. These inspections will afford the staff an opportunity to pilot these enhancements to the NRO VIP program, including inspection program guidance, and to engage interested stakeholders in the process and results of such efforts. Specific enhancements to the NRO VIP that are currently underway are summarized below.

Global Market Challenges

In response to changes in the manufacturing sector since the last large-scale construction of domestic nuclear power plants, new reactor construction will require a shift from a mostly domestic to a more broad, international market for the design, engineering, procurement and fabrication of items and services. The staff anticipates that this will result in an increase in the number of nuclear component suppliers that are new to the industry, many of whom will likely be based overseas. In response, through increased direct inspection of such suppliers, the staff will ensure that these suppliers provide items and services of a quality commensurate with their importance to safety in a manner consistent with applicable regulatory requirements. Importantly, the staff will need to ensure that the quality standards implemented by these international suppliers meet Appendix B and 10 CFR Part 21 requirements. The staff will accomplish this through planned periodic inspections of vendor QA program implementation at these supplier facilities. An initial pilot audit of the QA program implementation at Japan Steel Works (JSW) was conducted in April 2007. Based on this activity, the staff was able to assess the implementation of draft vendor inspection procedures and provided feedback to JSW on implementation of its quality assurance program. In addition to interactions with JSW during this visit, the staff met with Japanese regulators and concluded that further interactions with Japanese regulators would be mutually beneficial and would support NRC in its enhancement of vendor oversight in Japan.

NRO is finalizing plans to conduct approximately 6–10 vendor inspections of major component suppliers in 2007–2008. Typical routine vendor inspections would include one week of direct inspection by a team of four qualified inspectors. Reactive vendor inspections could require additional resources based on the specific issues that resulted in the reactive inspection. The staff is evaluating how best to expedite foreign travel to facilitate inspections at foreign-based vendors. To the extent that these activities will require interaction with foreign-based vendors and regulatory bodies, the NRO VIP will leverage these inspections to encourage and facilitate cooperation with the NRC's international regulatory counterparts. International activities would

be coordinated with the developing framework of the Multinational Design Evaluation Program, where appropriate.

Modular Construction Techniques

New reactor projects will likely employ extensive modular construction techniques. The staff plans to inspect the contractors supplying these modules and aspects of the modules which have ITAAC, to ensure that the module and its components are fabricated consistent with the certified design and using an approved QA program that meets the requirements of Appendix B and 10 CFR Part 21. These inspections will be coordinated between the QA and vendor inspection (CQV) staff and the regional construction inspection staff to ensure appropriate oversight of the vendors and the adequate completion of ITAAC. Additionally, direct inspection of vendor facilities during the fabrication of key plant components, such as reactor vessels and steam generators, will also support the staff's review of the ITAAC associated with those components.

ITAAC Verification

To enhance ITAAC verification and closure, the staff plans to implement a process that explicitly relates vendor inspections findings to ITAAC for certified designs. The process involves identifying the critical attributes related to the design, fabrication, and construction of the associated components for the 19 ITAAC families identified under the CIP (See SECY-07-0047, "Staff Approach to Verifying the Closure of Inspections, Tests, Analyses, and Acceptance Criteria Through a Sample-Based Inspection Program," dated March 8, 2007 (ML070430501), for a description of the ITAAC families.) Using this process, the staff will focus its vendor inspections on specific components directly related to a certified design ITAAC, and on verifying the critical attributes necessary to provide adequate confidence that the relevant ITAAC have been performed and successfully completed.

Engineering and Licensing Support Services

The staff anticipates that applicants under 10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants," will rely on vendors for extensive engineering and licensing support services. These services will most likely include translation of the certified design and licensing-basis requirements into procurement, fabrication, and testing documents (i.e., first-of-a-kind engineering). CQV staff, with support from appropriate technical organizations, will conduct first-of-a-kind engineering inspections to provide reasonable assurance that the process governing the translation of a certified design or design certification rule requirements into detailed design, procurement, fabrication, and testing documents meets Appendix B requirements. The staff currently envisions these engineering inspections to occur before initial plant construction and to serve as input to support combined license (COL) review and/or ITAAC verification activities conducted by regional staff. The staff anticipates that it will conduct these engineering inspections for the reference COL within a design center and will expend a lower level of effort for each subsequent COL applicant within that same design center in both the National Nuclear Safety Administration (NNSA) and the NRC evaluation of the first-of-a-kind engineering for the Westinghouse reactor design, AP-1000.

For the inspection of the AP-1000 first-of-a-kind engineering, the staff expects to benefit significantly from the recently approved Memorandum of Cooperation with the Chinese regulatory authority, the NNSA. Under that agreement, NRC and NNSA will share information and expertise in both the NNSA and the NRC evaluation of the first-of-a-kind engineering for the AP-1000.

Oversight of Industry Vendor Audit Activities

Criterion VII of Appendix B, "Control of Purchased Material, Equipment, and Services," requires licensees who procure material, equipment, or services from contractors or subcontractors to perform evaluations of those suppliers. The purpose of this evaluation is to ensure the suppliers implement an effective quality assurance program, consistent with the requirements of Appendix B and the licensee's technical requirements for those items and services purchased by the licensee. Historically, licensees have performed these activities independently by utilizing their own technical and QA staff. Industry initiatives to promote effective and efficient standardization of these audit activities have culminated in licensees sharing their technical resources through joint audits of suppliers furnished by third-party industry consortiums. For example, the Nuclear Utilities Procurement Issues Committee (NUPIC) performs audit activities and approves suppliers of replacement items that meet the QA requirements of Appendix B for its licensee members. This is accomplished through the NUPIC joint utility audit program, which encompasses all domestic and several international nuclear utilities operating nuclear power plants. In addition to NUPIC, other industry groups may engage in supplier auditing services to meet the demands associated with a broadening international supplier market.

Over the last several years, the NRC staff has provided oversight of NUPIC audits at least twice per year, and has regularly participated at NUPIC committee meetings. The purpose of NRC oversight of NUPIC audits is to verify the effectiveness of the NUPIC joint utility audit process and to leverage these audits to evaluate the supplier's 10 CFR Part 21 program and implementation. Oversight of NUPIC audits has typically required one week of direct inspection effort by two qualified inspectors. As new vendors begin providing products and services to the U.S. reactor market, the staff will re-evaluate whether oversight of two NUPIC audits per year are sufficient to support new reactor construction.

NRO plans to continue and anticipates broadening oversight of supplier audit activities and to formalize this process through specific NRO VIP enhancements. The staff believes that a more formal approach is required to effectively leverage these industry-led audit activities and will work with the appropriate stakeholders, such as NUPIC, to incorporate NRC's oversight role of such activities within the framework of the NRO VIP. The NRO staff is coordinating this effort with the Office of Nuclear Reactor Regulation (NRR) to assure a consistent regulatory framework is established.

Finally, in addition to the areas identified above, the staff will continue to perform reactive inspections of component suppliers based on insights from new plant operating and construction experience. Reactive vendor inspections will assess specific processes, such as commercial-grade dedication practices, licensee/applicant vendor oversight, and reporting of defects and noncompliance associated with safety-related components or services used in a nuclear power plant. Additionally, these inspections will verify that vendors are appropriately identifying the root cause(s) of reported defects and noncompliance and that they are

developing and implementing suitable corrective actions.

To meet the challenges of increased NRC vendor inspections anticipated as a result of new reactor activities, the staff is enhancing the NRO VIP guidance, including inspection requirements and procedures, for all anticipated vendor inspection activities identified within the program.

Successful implementation of the NRO VIP requires specific expertise related to design, engineering, procurement, and fabrication processes (e.g., welding, non-destructive examination, etc.), as well as detailed knowledge of the related industry codes and standards. The staff has identified vendor inspector team member qualification requirements, has developed a vendor inspector training qualification manual, and is actively pursuing staff qualification and hiring activities as well as the potential use of contractor technical expertise to meet anticipated agency needs.

The staff will continue to assess the effectiveness of the VIP implementation in providing reasonable assurance that the quality of products and services furnished to new reactors in the U.S. is commensurate with their importance to safety and in accordance with applicable regulatory requirements.

RESOURCES

The estimated cost have been included in the FY 2008 budget (5.4 FTE and \$359,000). Resources for FY 2009 will be addressed through the planning, budgeting and performance management (PBPM) process.

COORDINATION:

The Office of the General Counsel has reviewed this package and has no legal objection. The Office of the Chief Financial Officer has reviewed this package and has no objection.

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