INTS 006

AUDIT REPORT

Audit of NRC's Quality Assurance
Planning for New Reactors

OIG-10-A-02 November 16, 2009

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

OFFICE OF THE
INSPECTOR GENERAL

November 16, 2009

MEMORANDUM TO: R. William Borchardt
Executive Director for Operations

FROM: Stephen D. Dingbaum **/RA/**
Assistant Inspector General for Audits

SUBJECT: AUDIT OF NRC'S QUALITY ASSURANCE PLANNING FOR NEW REACTORS (OIG-10-A-02)

Attached is the Office of the Inspector General's (OIG) audit report titled, *Audit of NRC's Quality Assurance Planning for New Reactors.*

The report presents the results of the subject audit. Agency comments provided during and subsequent to a September 1, 2009, exit conference have been incorporated, as appropriate, into this report.

Please provide information on actions taken or planned on each of the recommendations within 30 days of the date of this memorandum. Actions taken or planned are subject to OIG followup as stated in Management Directive 6.1.

We appreciate the cooperation extended to us by members of your staff during the audit. If you have any questions or comments about our report, please contact me at 415-5915 or Sherri Miotla, Team Leader, Nuclear Safety Audit Team, at 415-5914.

Attachment: As stated

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EXECUTIVE SUMMARY

BACKGROUND

The Nuclear Regulatory Commission (NRC) regulates the design, siting, construction, and operation of nuclear power plants. Title 10 Code of Federal Regulations (CFR) Part 52 (Part 52) establishes the process to apply for a combined license, which, if approved by the NRC, allows the applicant to construct and operate a nuclear power plant. The Office of New Reactors (NRO) is responsible for reviewing combined license applications.

Under Part 52, each combined license applicant is required to submit a final safety analysis report that describes the facility and presents a safety analysis of the facility as a whole. This report must include a description of the applicant's quality assurance (QA) program to be applied to the design, fabrication, construction, and testing of the structures, systems, and components of the facility. Part 52 references the QA program requirements, which are described in Title 10 CFR Part 50, Appendix B (Appendix B). Appendix B applies to all activities affecting safety-related functions of the facility. NRO staff reviews, which include an evaluation of QA, are performed in accordance with NUREG-0800, the standard review plan.

During the application process, applicants often conduct activities associated with new nuclear power plant construction, including developing processes that will be used during construction, testing, and operations; establishing programs for areas such as corrective action, security, and training; and procuring materials and parts. The applicant must provide oversight of vendor programs if safety-related parts are procured. Many nuclear vendors are now foreign-based companies and oversight of these foreign-based companies can present new challenges, such as overcoming cultural and language barriers.

PURPOSE

The audit objective was to determine the extent to which NRC provides oversight of applicant and licensee new nuclear power plant QA programs.

RESULTS IN BRIEF

The purpose of Appendix B QA programs is to ensure the nuclear power plant safety-related systems perform adequately in service. Given that the interest to build new nuclear power plants is in its infancy, NRO is appropriately focusing on QA as it relates to design and procurement activities. The Office of the Inspector General (OIG) has identified areas

needing management attention while NRO continues its ongoing QA review activities. Specifically,

- Coordination of QA reviews among NRO branches is informal.
  - The coordination among NRO branches of QA reviews during the combined license application review process, when it occurs, is informal. Sections of the standard review plan specify that the responsible technical reviewer will coordinate the applicable QA reviews with the NRO's QA branches. However, this coordination is not clearly defined and there is no process in place to ensure that it occurs. Consequently, there is no way to verify that the QA review coordination has occurred, nor that all the QA portions of the standard review plan technical chapters have been fully satisfied.
- NRC's QA oversight does not include a review for accurate translations.
  - NRC's oversight of applicant and licensee QA programs and activities does not include a review for accurate document translations, and NRC has not fully assessed the impact of translated document quality on QA oversight. Consequently, NRC and its new nuclear power plant applicants and licensees could be relying on inaccurate translations. Furthermore, the accuracy of translated documents used for design, construction, and operation of new nuclear power plants could be called into question.

RECOMMENDATIONS

This report makes four recommendations to help NRC improve its oversight of combined license applicant and licensee QA programs. A consolidated list of recommendations appears in Section VI.

AGENCY COMMENTS

On August 25, 2009, OIG provided a draft report to the Executive Director for Operations. OIG held an exit conference with the agency on September 1, 2009. During that meeting agency management provided informal comments to the draft report. Also, on September 8, 2009, OIG held an additional meeting with NRC staff to discuss the agency's informal comments to the draft report.

On September 24, 2009, OIG provided the agency a final draft report, and on October 1, 2009, the agency declined to provide any formal comments. The final report incorporates revisions made, where applicable, as a result of meetings with NRC staff.

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ABBREVIATIONS AND ACRONYMS

ABWR	Advanced Boiling Water Reactor
AP1000	Advanced Passive 1000
Appendix B	Title 10 Code of Federal Regulations, Part 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants*
ASME	American Society of Mechanical Engineers
B&PV	Boiler and Pressure Vessel
CFR	Code of Federal Regulations
EPC	Engineering Procurement Construction
EPR	United States Evolutionary Power Reactor
ESBWR	Economic Simplified Boiling-Water Reactor
NRC	Nuclear Regulatory Commission
NRO	Office of New Reactors
OIG	Office of the Inspector General
Part 50	Title 10 Code of Federal Regulations, Part 50, *Domestic Licensing of Production and Utilization Facilities*
Part 52	Title 10 Code of Federal Regulations, Part 52, *Licenses, Certifications, and Approvals for Nuclear Power Plants*
QA	Quality Assurance
US-APWR	United States Advanced Pressurized-Water Reactor

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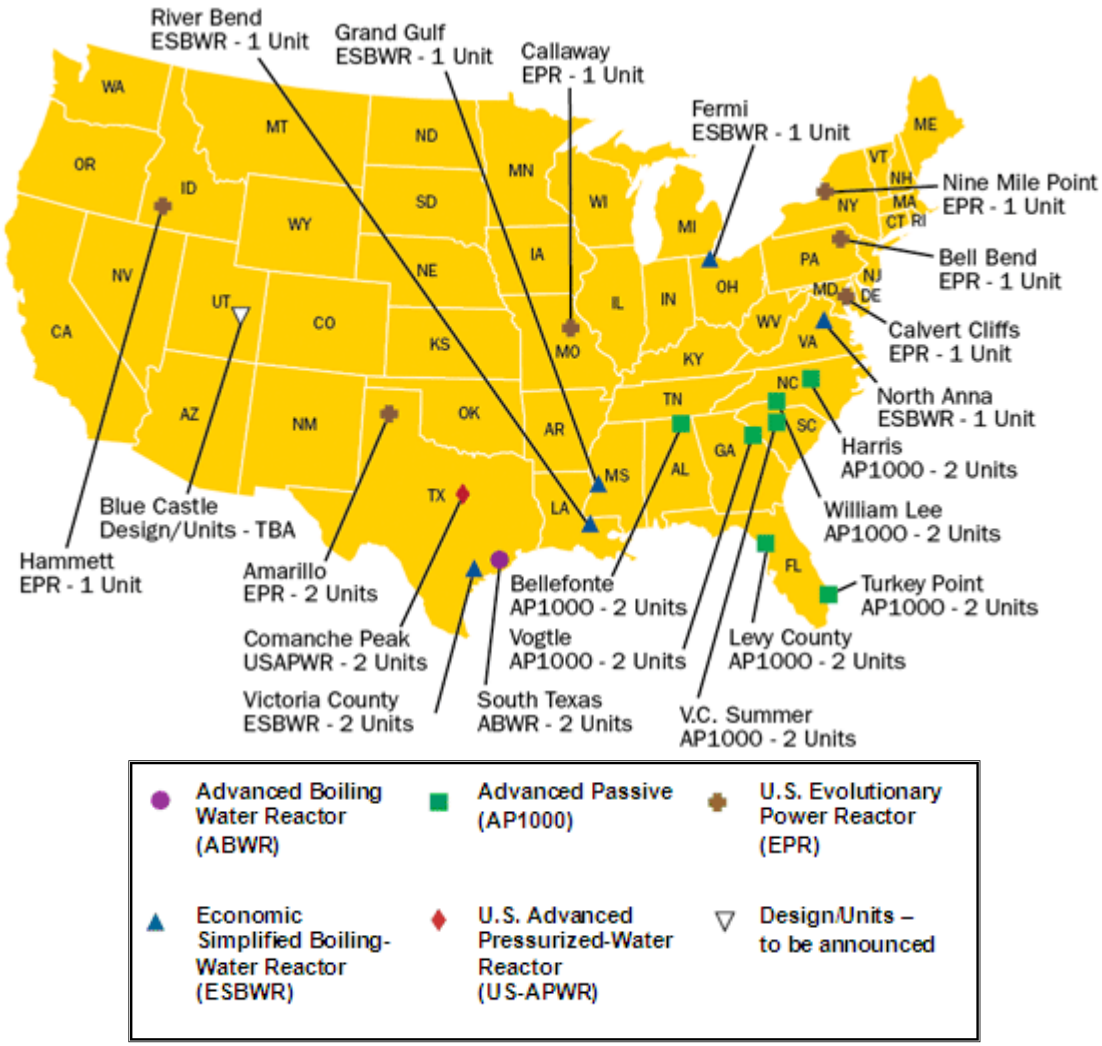
I. BACKGROUND

The Nuclear Regulatory Commission (NRC) protects the health and safety of the public and the environment by regulating the design, siting, construction, and operation of nuclear power plants. With a renewed interest in nuclear energy in the United States, energy providers have submitted applications to NRC for nuclear power plant standard design certifications and for the construction and operation of new nuclear power plants. NRC reviews applications submitted by prospective licensees and issues, as appropriate, standard design certifications, early site permits, and combined licenses. As of May 2009, NRC had received 17 license applications for 26 new nuclear power plants using 5 different designs. A map of the projected new nuclear power plant locations is shown in Figure 1, below.

Figure 1: Location of Projected New Nuclear Power Plants



Source: NRC Public Web site.

The Office of New Reactors (NRO) is responsible for reviewing early site permit, standard design certification, and combined license applications. For fiscal year 2009, the agency budgeted $243.5 million, including 819 full-time equivalent staff, for all activities associated with reviewing new nuclear power plant applications. Among NRO's activities are quality assurance (QA) licensing and inspection, which is primarily performed by two QA and vendor branches.

NRC regulations establish the process for obtaining approval to construct and operate new nuclear power plants. All of the 104 operating nuclear power plants were licensed under the two-step process described in Title 10 Code of Federal Regulations (CFR) Part 50, *Domestic Licensing of Production and Utilization Facilities* (Part 50). Under that regulation, applicants were first required to submit an application for a construction permit for NRC approval. For the second step, the applicant submitted an application for an operating license, usually during construction. In an effort to improve efficiency and reduce potential regulatory risks during licensing of new nuclear power plants, NRC established a one-step licensing process under Title 10 CFR Part 52, *Licenses, Certifications, and Approvals for Nuclear Power Plants* (Part 52). Part 52 establishes the combined license, which is made up of a construction permit and an operating license. Part 52 also describes the rules and procedures for issuing standard design certifications for new nuclear power plants, in which NRC approves a nuclear power plant design independent of an application to construct or operate a plant at a specific site. The 17 applications for new nuclear power plants under NRC review utilize the Part 52, one-step licensing process.

Under Part 52, each applicant is required to submit a final safety analysis report that describes the facility, presents the design bases,[1] as well as presents a safety analysis of the facility as a whole. The final safety analysis report must include a description of the applicant's QA program to be applied to the design, fabrication, construction, and testing of the structures, systems, and components of the facility. Part 52 references the QA program requirements, which are described in Part 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants* (Appendix B). Appendix B applies to all activities affecting safety-related functions of structures, systems, and components that prevent or mitigate the consequences of accidents that could cause undue risk to the health and safety of the public. QA comprises all planned and systematic actions necessary to provide adequate

[1] Design bases means that information which identifies the specific functions to be performed by a structure, system, or component of a facility, and the specific values or ranges of values chosen for controlling parameters as reference bounds for design. These values may be (1) restraints derived from generally accepted "state of the art" practices for achieving functional goals, or (2) requirements derived from analysis (based on calculation and/or experiments) of the effects of a postulated accident for which a structure, system, or component must meet its functional goals.

confidence that a structure, system, or component will perform satisfactorily in service. A QA program includes elements such as procedures, recordkeeping, inspections, corrective actions, and audits.

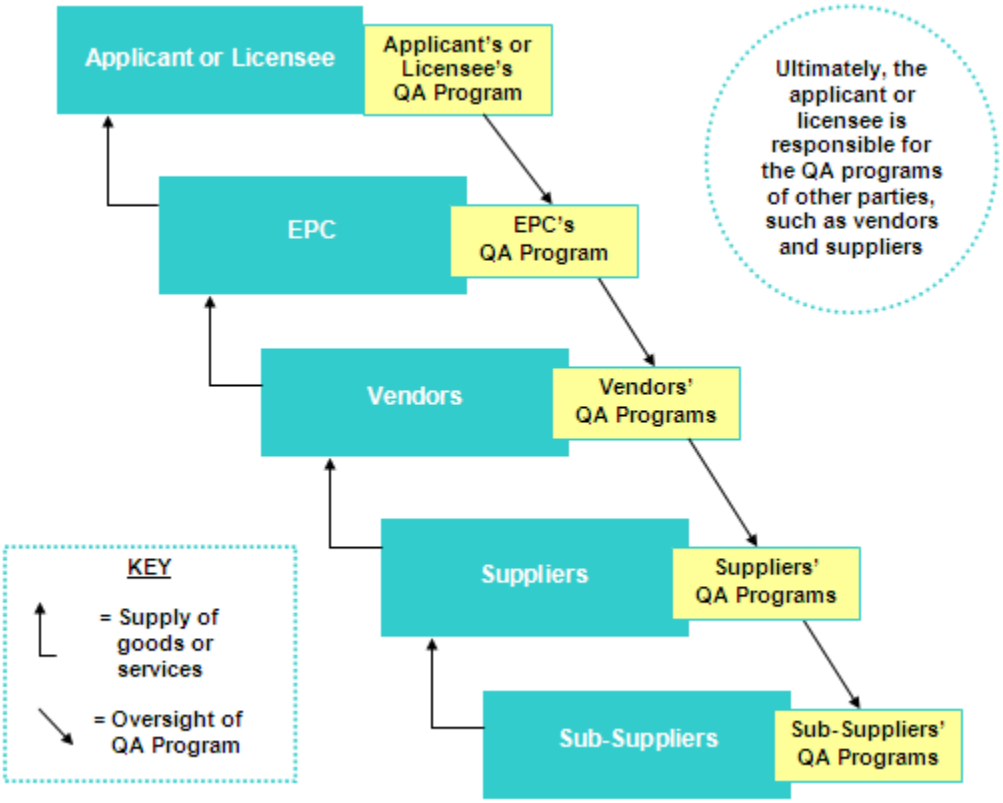
Applicants often conduct activities associated with new nuclear power plant construction during the application process. These activities include developing processes that will be used during construction, testing, and operations; establishing programs for areas such as corrective action, security, and training; and procurement of materials and parts for nuclear power plant construction. The applicant must provide oversight of vendor programs if safety-related parts are procured. Many nuclear vendors are now foreign-based companies and oversight of these foreign-based companies can present new challenges, such as overcoming cultural and language barriers as well as technical standards for parts fabrication.

Industry Role in QA

QA of every safety-related component and service used in a nuclear power plant, including those provided by vendors and sub-suppliers, is ultimately the responsibility of the applicant or the licensee. In practice, the applicant or licensee oversees its Engineering Procurement Construction (EPC)[2] contractor's QA program; the EPC oversees its vendors' QA programs; the vendors oversee their suppliers' QA programs; the suppliers oversee their sub-suppliers' QA programs; and so on, as shown in Figure 2 below. Ultimately, the applicant or licensee must ensure that applicable regulatory requirements, which are necessary to assure adequate quality, are included in the documents for procurement of material, equipment, and services, whether purchased by the applicant, or licensee, or by its vendors or sub-suppliers.

[2] Typically, an EPC is a company, or a consortium of companies, hired by a new nuclear power plant applicant to manage all, or most, of the new nuclear power plant project, including engineering design, preparation of construction drawings, procurement of parts and materials, construction management, and pre-operational testing.

Figure 2: QA Program Oversight Process



Source: OIG analysis and NRC documents.

NUREG-0800, the Standard Review Plan

NRO staff conduct reviews that result in a safety evaluation report describing the staff's review, findings, and conclusions. These reviews, which include an evaluation of QA, are performed in accordance with NUREG-0800, *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants*. In all, there are 19 standard review plan chapters, which are broken down into sections. The individual sections are assigned to an NRO branch to perform the review. For each section of the standard review plan, the responsible reviewer from the assigned NRO branch writes the corresponding section of the safety evaluation report.

In general, the standard review plan chapters correspond to the final safety analysis report chapters in the power plant standard design certification and combined license applications. Chapter 1 is the introduction and general description of the plant. Chapter 17 pertains to QA. Chapters 2 through 16, 18, and 19 guide the review of specific technical aspects, components, or systems, and are referred to in this

report as "technical chapters." The 2 NRO branches—Quality & Vendor Branch 1 and Quality & Vendor Branch 2—responsible for the chapter 17 reviews are referred to in this report as the "QA branches." The 34 NRO branches responsible for reviewing the technical chapters of the application are referred to in this report as the "technical branches."

Growing Dependency on Foreign Suppliers

There have been many changes in the nuclear industry since the previous generation of nuclear power plants. One of the most significant differences is the current prevalence of foreign vendors and suppliers. The change in the composition of companies accredited by the American Society of Mechanical Engineers (ASME) to supply parts to U.S. nuclear plants illustrates this change. As of July 2009, 100 of the 210 existing ASME-accredited companies were foreign firms. Moreover, there are many components that are available only from foreign companies, such as reactor vessels and other critical parts and systems. Under NRC regulations, some safety-related components must meet the requirements of the ASME Boiler and Pressure Vessel (B&PV) Code. In order to supply components that meet the ASME code, an ASME N-type or material organization accreditation is required.[3] The number of companies accredited by ASME as N-type providers or material organizations has decreased from more than 600 in 1980 to fewer than 200 in 2007. That decline was due almost entirely to the reduction of the number of American firms accredited by ASME.

This necessary reliance by the United States on foreign vendors as a significant source for nuclear plant components is likely to have important implications for quality in new nuclear plant construction. For example, foreign vendors bring new challenges, such as language and cultural differences and technical standards that may need adjustments to meet code requirements for U.S. reactors. This new global environment makes the translation of documents from foreign languages to English an essential aspect of the nuclear industry, as NRC and its applicants must rely on documents that were originally written in a foreign language.

II. PURPOSE

The audit objective was to determine the extent to which NRC provides oversight of applicant and licensee new nuclear power plant QA programs. The appendix provides information on the audit scope and methodology.

[3] ASME provides many different types of B&PV code certifications for suppliers to nuclear plants and other industries. N-type accredited firms supply B&PV code-certified components to nuclear power plants, such as vessels, pumps, valves, and other supports. Material organizations supply the materials—such as tubes, plates, and fasteners—to be used by N-type accredited firms.

III. FINDINGS

NRO conducts reviews of applicant QA programs for new nuclear power plant design, construction, and operation, as well as reviews of vendor QA programs. Given that the interest to build new nuclear power plants is in its infancy, NRO is appropriately focusing on QA as it relates to design and procurement activities. The Office of the Inspector General (OIG) has identified areas needing management attention while NRO continues its ongoing QA review activities. Specifically:

A. Coordination of QA reviews among NRO branches is informal.

B. NRC's QA oversight does not include a review for accurate translations.

A. Coordination of QA Reviews Among NRO Branches Is Informal

The coordination among NRO branches of QA reviews during the license application review process, when it occurs, is informal. Sections of NRC's standard review plan—a document to assure the quality and uniformity of staff safety reviews—specify that the responsible technical reviewer will coordinate the applicable QA reviews with the QA branches. However, this coordination is not clearly defined and there is no process in place to ensure that it occurs. Consequently, there is no way to verify that the QA review coordination has occurred, and therefore that all the QA portions of the standard review plan technical chapters have been fully satisfied.

NUREG-0800, the Standard Review Plan

The principal purpose of the standard review plan is to assure the quality and uniformity of staff safety reviews. It is intended to be a comprehensive and integrated document that provides the reviewer with guidance that describes methods or approaches that are acceptable for meeting NRC requirements. The standard review plan was also designed to make information about regulatory matters widely available as well as to improve communication among NRC, interested members of the public, and the nuclear power industry, in order to increase understanding of NRC's review process.

The standard review plan was developed from many years of NRC experience in establishing and applying safety requirements for various nuclear power plant designs. It was first issued in 1975 as a routine tool

for NRC staff to use in evaluating nuclear plant designs. According to an Office of Nuclear Reactor Regulation office instruction, the standard review plan was established to document:

- "the integrated result of the hundreds of conscious choices made by the staff and by the nuclear industry in developing design criteria and design requirements for nuclear power plants," and

- "the most definitive basis available for specifying the NRC's interpretation of an acceptable level of safety for light-water reactor facilities."

Although the standard review plan is guidance as opposed to a regulation, it is NRC management's expectation that it be used by reviewers, and that deviations from its use, if any, be based on consultations between reviewers and their supervisors.

QA Review Coordination According to the Standard Review Plan

Sections of the standard review plan specify that the responsible technical reviewer will coordinate the applicable QA reviews with the QA branches. This coordination is described in the standard review plan in different ways, assigning responsibility for the QA review coordination to different entities. For example:

- Chapter 2, *Site Characteristics*, specifies that the *QA branch reviewers* will coordinate the review of geotechnical engineering QA aspects with the staff members responsible for reviewing the stability of slopes.[4]

- Chapter 3, *Design of Structures, Components, Equipment, and Systems*, specifies that the review for QA is coordinated and performed in accordance with the standard review plan chapter 17.[5]

- Chapter 5, *Reactor Coolant System and Connected Systems*, specifies that the *responsible technical reviewer* for reactor coolant pump flywheels will coordinate with the staff member responsible for performing QA.

- Chapter 7, *Instrumentation and Controls*, specifies that parts of the chapter 7 review should be coordinated with the QA branches as part of the QA branches' primary review responsibility.

[4] This refers to the stability of all natural and man-made earth and rock slopes whose failure could adversely affect the safety of the nuclear power plant.
[5] Chapter 17 of the standard review plan is titled, "Quality Assurance."

QA Review Coordination Among Branches Is Informal

Coordination of QA reviews among the technical reviewers and the QA branch reviewers, when it occurs, is actually informal communication. Some individual reviewers informally communicate through phone calls and e-mail, usually to address a specific issue rather than to coordinate a QA review. For example, OIG learned that a QA reviewer may ask a technical reviewer to provide assistance with a technical issue, or to participate in a QA audit or inspection. Similarly, a technical reviewer may have a question for the QA branch regarding QA requirements. This interaction is dependent on the initiative of an individual reviewer.

OIG attempted to obtain evidence of more formal QA review coordination among NRO branches by reviewing safety evaluation reports associated with standard design certification applications. The safety evaluation reports contain sections that correspond to sections in the standard review plan. The reports are intended to describe the staff's safety review, findings, and conclusions. OIG reviewed selected final and draft sections of various safety evaluation reports and found that none documented any coordination of QA review. Some of these reports described the use of QA guidance and regulations, but otherwise did not indicate that any QA review coordination occurred.

Figure 3: Cutaway View of the U.S. EPR Standard Design

Source: NRC public Web site.

No Definition of or Process for QA Review Coordination

There is no definition of, or process for, the QA review coordination described in the standard review plan. Specifically, NRO staff members could not explain what QA review coordination means or how it is supposed to occur. There is no definition in the standard review plan that clarifies what is meant by QA review coordination, nor are there any office instructions explaining the coordination language. NRO staff also could not identify any system that alerts license application reviewers of the necessity of QA review coordination.

Moreover, some staff members were either unaware of the QA review coordination language in the standard review plan, or opted not to follow it due to a lack of understanding of what it means or what is expected. One NRO manager pointed out that QA review coordination may be necessary. However, the manager added that coordination, when it occurs, is more the exception rather than the rule. Another NRO manager said that there

would be no way for the QA branch reviewers to become aware of the expectation to coordinate with the technical branches unless they read the entire standard review plan, which the manager said is unreasonable.

QA Review of Technical Chapters Cannot Be Verified

Without a definition of, or process for, QA review coordination, there is no way to verify that any necessary coordination between branches has occurred. The QA review coordination described in the standard review plan cannot be ensured due to the fact that it is not defined in the first place. Therefore, there is no way to know if all QA aspects of the standard review plan have been satisfied. This could cause missed opportunities for component-specific QA reviews. This is important because the QA program is the primary measure used by the nuclear industry to provide assurance that errors are found and corrected.

For example, the standard review plan specifies that the responsible technical reviewer for a certain safety-related system will coordinate with the staff members responsible for performing QA. The QA review of this system is important because the component's failure would have significant safety consequences, as it could lead to possible damage to the reactor coolant system, the containment, or the engineered safety features. The draft safety evaluation report for a standard design certification application makes no mention of a QA review for this safety-related system. Because it is unclear what is meant by QA review coordination, there is no way to verify that all QA portions of the standard review plan have been met. One reviewer responsible for this safety-related system stated that QA was not reviewed as part of the evaluation. Therefore, because NRC has not performed a QA review for this safety-related system, the agency unnecessarily accepts increased risk that this system may not be able to perform its safety-related function.

Recommendations:

OIG recommends that the Executive Director for Operations:

1. Clearly define the QA review coordination requirements of the standard review plan.

2. Develop a process for reviewers to coordinate QA reviews and a method to determine that the QA coordination has occurred.

B. NRC's QA Oversight Does Not Include a Review for Accurate Translations

NRC's oversight of applicant and licensee QA programs and activities does not include a review for accurate document translations. Translation service companies and an international translation guide emphasize the importance of QA for translations. However, NRC has not fully assessed the impact of translated document quality on QA oversight. Consequently, NRC and its new nuclear power plant applicants and licensees could be relying on inaccurate translations. Furthermore, the accuracy of translated documents used for design, construction, and operation of new nuclear power plants could be called into question.

The Importance of QA for Translations

Translation service companies and an international translation guide emphasize the importance of QA for translations. Applying a QA process to translations can help ensure that the translation is accurate and meets the needs of the requester.

ASTM International, one of the largest voluntary standards development organizations in the world, provides an important new guide for the professional translation industry and its clients. The *Standard Guide for Quality Assurance in Translation* defines translation as the "process comprising the creation of a written target text based on a source text in such a way that the content . . . can be considered to be equivalent."[6] The guide notes that translation QA includes writing clear translation specifications and adhering to them throughout the process. It provides that translation quality is the degree to which the translation fulfills the specifications of the customer. The guide also identifies attributes of quality language translation services, which include selecting the appropriate translator(s), utilizing specific methodologies for editing and formatting the translation, and undertaking proofreading and verification steps.

Translation service companies also use QA processes that include translation by a professional translator, editing by a native language speaker, and proofreading. Additionally, translation service companies and translators stated that when translating a highly technical document, knowledge of that subject matter is key. Moreover, some translation experts contend that translations of foreign language documents into English should be produced by translators whose native language is English.

[6] *Standard Guide for Quality Assurance in Translation*, Designation F 2575-06, ASTM International, approved May 1, 2006, published June 2006.

NRC Does Not Verify QA for Translations

NRC's QA oversight for new nuclear power plants does not include verifying whether applicants, licensees, and vendors assure the quality of translations. This includes documents submitted to NRC as part of an application review or inspection activity, as well as documents submitted to applicants and licensees from vendors. Individual NRC staff members had varying opinions regarding the applicability of Title 10 CFR Part 50, Appendix B QA criteria to translations. Most NRC staff members interviewed during this audit did not consider the quality of translations to be covered by Appendix B, particularly for licensing activities.[7] However, some staff members and managers acknowledged that there may be instances where Appendix B does apply to translation.

Given the current industry reliance on foreign vendors and sub-suppliers for the design and manufacture of safety-related components, such as reactor vessels, the accuracy of translated design basis and other documentation, such as technical manuals, becomes more relevant for applicants/licensees and NRC alike. Indeed, OIG discovered one large nuclear vendor with a QA procedure for translation that it uses in-house for foreign language document translation. The vendor does not, however, apply the same QA procedure to its foreign suppliers, and simply requires its suppliers to provide documentation in English, without regard for the translation process.

Like applicants and licensees, NRC relies on translated documents to conduct QA oversight activities. During new nuclear power plant licensing and inspection,[8] NRC staff sometimes need documents to be translated from a foreign language into English. For example, NRC staff requested that a vendor supplying the digital instrumentation and control system for a new nuclear power plant design translate several documents from Japanese into English. Also, one NRC QA inspector told OIG that during inspections in France and Spain, each vendor translated documentation into English for the purposes of the inspections. Furthermore, in anticipation of an upcoming NRC inspection of a Japanese vendor working for new nuclear power plant applicants, an inspector said that the vendor would need to translate all its audits into English.

[7] According to NRC managers, NRC reviews application information in English no matter the source of that information. Any license granted would be based on the information provided in the English documentation. Managers stated that if a licensee misrepresented information in an application due to an erroneous translation of a licensing document, the licensee would have to apply to NRC for a licensing amendment.

[8] NRC conducts QA oversight through licensing activities, which includes reviewing combined license applications and certified design applications, as well as inspections of combined license applicants' and vendors' implementation of QA.

In isolated instances, some NRC staff members attempted to verify translated documents, but through inadequate means such as comparing word and page counts and document formats between the source and the translation. One NRC staff member said that NRC document translations are reviewed by counting the number of words in the source document and the translated document. Another NRC staff member said that the accuracy of a document translated from a foreign language and submitted to NRC is sometimes verified by comparing the graphics and numbers in the source document and the translated document. Comparing the similarity of graphics and numbers or counting words in the two versions does not assure that the translation accurately reflects the message of the source document.

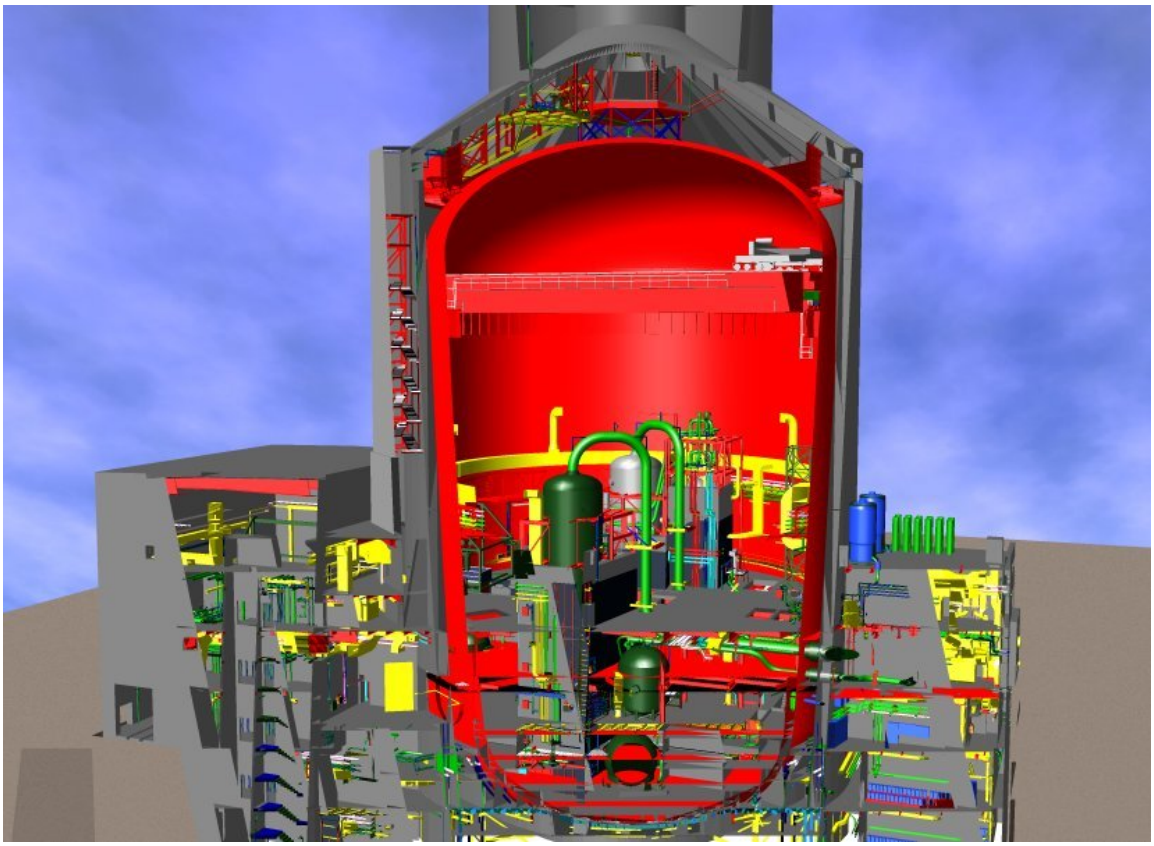
NRC Has Not Assessed Impact of Translated Document Quality

NRC has not fully assessed the impact of translated document quality on QA oversight. On the whole, NRC has undertaken some efforts to assess impacts of the changing nuclear industry on its vendor inspection program.[9] However, NRC has not assessed how translated documents from foreign providers of safety-related systems might impact the quality of safety-related components supplied to new nuclear power plant applicants and licensees in the United States.

Many suppliers of designs and major components are based in foreign countries where English is not the predominant language. For example, as of June 2009, the reactor pressure vessel closure head and three complex steam generator parts for the AP1000 standard design could only be manufactured by firms in Korea and Japan. NRO managers were not aware of any formal activity where NRC analyzed the impact of documents translated into English for NRC's licensing and inspection purposes.

[9] See, for example, SECY-07-0105: Enhancement to the Vendor Inspection Program within the Office of New Reactors.

Figure 4: Cutaway View of the AP1000 Pressurized Water Reactor Standard Design



Source: NRC public Web site.

NRC and Applicants Could Rely on Inaccurate Translations

NRC and its new nuclear power plant applicants could be relying on inaccurate translations and, thus, the accuracy of documents used for design, construction, and operation of new nuclear power plants could be called into question. Without applying a QA process to document translation, there is no way to be certain that a document translated into English meets the customer's requirements. This could result in NRC basing licensing decisions on inaccurate documents.

During the course of licensing and inspections for new nuclear power plants, NRC staff members discovered documents written awkwardly in English. This could be a result of a faulty translation. For example, one NRO technical reviewer described encountering translation problems, including broken English. Similarly, an NRO manager described an instance where NRC technical staff members were frustrated when reviewing a standard design certification application with obvious translation problems. Awkwardly written English documents may be an

indicator of a faulty translation, and NRC should continue to identify these errors to applicants and vendors submitting the translated documents to NRC. However, an awkwardly written English document is not the only indicator of poor translation. Word choice in a translated document reveals nothing about the qualifications of the translator or the efficacy of the review process, if any, applied to the translation. Therefore, without a means to ensure quality translations, nuclear power plant applicants and NRC may be missing instances where documents are written in English with correct style and grammar, but do not accurately reflect the meaning of the source document.

Recommendations:

OIG recommends that the Executive Director for Operations:

3. Determine how the quality of translated documents impacts:

    a). NRC and industry ability to assess the quality of foreign-supplied safety-related parts and services to new nuclear power plants.

    b). NRC and industry QA oversight, including licensing and inspection activities.

4. Incorporate results of the assessments into NRC's QA oversight activities.

IV. CONCLUSION

The early stages of new nuclear power plant licensing present an opportunity for NRC and industry to improve QA oversight and therefore reduce the likelihood of problems during construction and operation. Even at this early stage, there are some challenges associated with implementation of the regulatory vision articulated in Part 52, as well as ongoing changes in the nuclear industry and global supply chain. In the spirit of engaging these early challenges at an opportune moment, OIG has identified areas needing management attention, such as QA review coordination and document translation.

V. AGENCY COMMENTS

On August 25, 2009, OIG provided a draft report to the Executive Director for Operations. OIG held an exit conference with the agency on September 1, 2009. During that meeting agency management provided informal comments to the draft report. Also, on September 8, 2009, OIG held an additional meeting with NRC staff to discuss the agency's informal comments to the draft report.

On September 24, 2009, OIG provided the agency a final draft report, and on October 1, 2009, the agency declined to provide any formal comments. The final report incorporates revisions made, where applicable, as a result of meetings with NRC staff.

VI. CONSOLIDATED LIST OF RECOMMENDATIONS

OIG recommends that the Executive Director for Operations:

1. Clearly define the QA review coordination requirements of the standard review plan.

2. Develop a process for reviewers to coordinate QA reviews and a method to determine that the QA coordination has occurred.

3. Determine how the quality of translated documents impacts:

   a). NRC and industry ability to assess the quality of foreign-supplied safety-related parts and services to new nuclear power plants.

   b). NRC and industry QA oversight, including licensing and inspection activities.

4. Incorporate results of the assessments into NRC's QA oversight activities.

Appendix

SCOPE AND METHODOLOGY

The audit objective was to determine the extent to which NRC provides oversight of applicant and licensee new nuclear power plant QA programs. To address the audit objective, OIG observed three NRC QA implementation inspections, which include NRC's review of the applicants' oversight of vendors according to certain Title 10 CFR Part 50, Appendix B criteria. OIG also reviewed NRC regulations and guidance, and interviewed NRC staff members and industry officials. Additionally, OIG identified and reviewed QA-related reports, reviewed nuclear and translation industry standards, and analyzed NRC QA implementation audit and inspection reports. Some of the key documents reviewed include:

- NUREG-0800, *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants*.
- NUREG-1055, *Improving Quality and the Assurance of Quality in the Design and Construction of Nuclear Power Plants: A Report to Congress*.
- Title 10 CFR Part 50, *Domestic Licensing of Production and Utilization Facilities*.
- Title 10 CFR Part 52, *Licenses, Certifications, and Approvals for Nuclear Power Plants.*
- Inspection Manual Chapter 2502, *Construction Inspection Program: Pre-Combined License (Pre-COL) Phase*.
- Inspection Procedure 35017, *Quality Assurance Implementation Inspection*.
- Management Directive 3.12, *Handling and Disposition of Foreign Documents and Translations*.
- Regulatory Guide 1.28, *Quality Assurance Program Requirements (Design and Construction)*.
- Regulatory Guide 1.33, *Quality Assurance Program Requirements (Operation)*.
- NRC Information Notices.
- Agency Office Instructions.

- QA implementation audit and inspection plans and reports.
- Nuclear industry QA standards and translation industry standards.
- Commissioners' speeches and NRC press releases.

Auditors conducted interviews with 47 agency and industry employees, including NRC managers and staff members at headquarters and one region, members of the nuclear industry, and members of the translation industry.

OIG conducted this audit at NRC headquarters, one region, and selected new nuclear power plant applicants' facilities between December 2008 and July 2009 in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Major contributors to this report were Sherri Miotla, Team Leader; R.K. Wild, Audit Manager; Kevin Nietmann, Technical Advisor; Michael Zeitler, Senior Management Analyst; Rebecca Ryan, Management Analyst; and Vidya Sathyamoorthy, Student Management Analyst.