OFFICE OF THE INSPECTOR GENERAL
U.S. NUCLEAR REGULATORY COMMISSION

Audit of NRC's Baseline Inspection Program

OIG-05-A-06 December 22, 2004

AUDIT REPORT

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December 22, 2004

MEMORANDUM TO: Luis A. Reyes
Executive Director for Operations

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

SUBJECT: AUDIT OF NRC'S BASELINE INSPECTION PROGRAM
(OIG-05-A-06)

Attached is the Office of the Inspector General's (OIG) audit report titled, *Audit of NRC's Baseline Inspection Program.*

The report reflects the results of our audit to determine whether NRC's baseline inspection program (1) is based on a sound methodology, (2) is carried out by sufficient, qualified staff, and (3) is completed at all operating commercial nuclear power plants. Overall, the audit found that NRC staff, licensees, and stakeholders view the Reactor Oversight Process, which includes the baseline inspection program, as a significant improvement over the previous plant assessment program. However, OIG identified several weaknesses associated with the baseline program. Specifically, NRC's baseline inspection program is generally sound, but needs improvement; impacts on the baseline program from resource challenges are likely to continue; the resident inspector training program needs improvement; the report of 100 percent baseline inspection program completion in CY 2002 is not fully supported by documentation; and guidance is unclear for new baseline completion criteria.

This report makes 10 recommendations to improve the efficiency and effectiveness of the baseline inspection program.

During an exit conference on August 30, 2004, NRC officials provided informal comments concerning the draft audit report. Subsequent to that meeting, OIG met with NRR senior managers to address issues and comments needing further clarification and/or explanation. Comments your office provided at the exit meeting, during subsequent discussions, and in your November 23, 2004, written response to the draft report have been incorporated, as appropriate, in our final report. Appendix F contains your written response in its entirety. Appendix G contains our point-by-point analysis of the agency's formal comments.

If you have any questions, please call Russ Irish at 415-5972 or me at 415-5915.

Attachment: As stated

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EXECUTIVE SUMMARY

BACKGROUND

The Nuclear Regulatory Commission (NRC) is responsible for developing, implementing, and enforcing rules and regulations that govern licensed, commercial nuclear power plants. To carry out that responsibility, NRC conducts inspections at the Nation's 103 operating commercial nuclear power plants to ensure adequate protection of the public health and safety, the common defense and security, and the environment in the civilian use of nuclear materials.

Beginning in April 2000, the NRC's Reactor Inspection Program and the Reactor Performance Assessment program were combined into a single program for commercial nuclear power plants. This combined program implements the revised reactor oversight process (ROP). An integral part of the ROP is the baseline inspection program, which was developed using a risk-informed approach to determine a comprehensive list of areas to inspect (i.e., inspectable areas). The baseline inspection program evaluates licensee performance in areas not measured, or not fully measured, by licensee-reported performance indicators.

NRC resident inspectors and senior resident inspectors located at each plant site carry out a major part of the baseline inspection program. Their primary role is to observe, evaluate, and verify the adequacy of licensees' nuclear safety activities, concentrating on day-to-day licensee operational and event follow-up activities, and licensee activities and processes that are important to safety and reliability. In addition, region-based inspectors with specific qualifications have primary responsibility for performing a number of the baseline inspection procedures related to specialty areas, such as Radiation Protection and Physical Security Protection. NRC uses inspectors from headquarters, as requested by the regions and in exceptional circumstances, to provide the regions with assistance towards the completion of the baseline inspection program.

PURPOSE

This audit was conducted to determine whether NRC's baseline inspection program:

< is based on a sound methodology,
< is carried out by sufficient, qualified staff, and
< is completed at all operating commercial nuclear power plants.

RESULTS IN BRIEF

Overall, NRC staff, licensees, and stakeholders view the ROP, which includes the baseline inspection program, as a significant improvement over the previous, more subjective, plant assessment program. NRC's most recent ROP self-assessment[1] indicates that the ROP was generally effective in monitoring operating commercial nuclear power plant activities, as well as focusing NRC resources on significant performance issues in CY 2003. As a result, the staff believes that plants are receiving an appropriate level of oversight commensurate with their performance. However, the Office of the Inspector General (OIG) identified weaknesses associated with the program. Specifically,

A. the baseline inspection program framework is generally sound, but needs improvement (see page 7),

B. impacts on the baseline inspection program from resource challenges are likely to continue (see page 25),

C. the resident inspector training program needs improvement (see page 31),

D. the report of 100 percent baseline inspection program completion in CY 2002 is not fully supported by documentation (see page 35), and

E. guidance is unclear for new baseline completion criteria (see page 40).

These issues exist primarily because the agency lacks a mechanism to assess the overall effectiveness and quality of the baseline program. As a result, issues such as unclear guidance, inconsistent implementation of the program, and insufficient documentation of inspection activities have not been adequately evaluated. Due to its importance in ensuring the Nation's safety, additional management focus is warranted to improve the effectiveness of NRC's baseline inspection program. Although the current program provides a framework for managing the agency's inspection activities at operating nuclear power plants, the program should be strengthened to better define expectations regarding implementation, completion, and training. Addressing the identified weaknesses will improve the overall effectiveness and efficiency of the baseline program and provide assurance that all aspects of the program are coordinated.

[1] SECY-04-0053, *Reactor Oversight Process Self-Assessment for Calendar Year 2003*, dated April 6, 2004.

RECOMMENDATIONS

A Consolidated List of Recommendations appears on page 43 of this report.

OIG ANALYSIS OF AGENCY COMMENTS

At an exit conference with agency senior executives held on August 30, 2004, NRC officials generally agreed with most of the report's findings and recommendations. Subsequent to that meeting, OIG met with NRR senior managers to address specific issues and concerns needing further clarification and/or explanation. On November 23, 2004, the Executive Director for Operations (EDO) provided a formal response to this report in which he agreed with nine of the report's eleven recommendations. However, the EDO stated that Recommendation 3 is not appropriate under the current ROP philosophy and that Recommendation 5 would be better addressed through the agency's response to Recommendation 4. The EDO's transmittal letter and specific comments on this report are included as Appendix F.

This final report incorporates revisions made, where appropriate, as a result of the subsequent meetings and the agency's informal and formal written comments. Because OIG takes exception to the agency's comments regarding Recommendations 3 and 5, a point-by-point analysis is presented in Appendix G. Recommendation 5 has been retracted and will be addressed, as the agency requested, through the agency's response to Recommendation 4. However, upon submittal, OIG will evaluate the agency's proposed plan of action for addressing Recommendation 4 to ensure that the intent of Recommendation 5 is incorporated.

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ABBREVIATIONS AND ACRONYMS

BWR	boiling-water reactor
CFR	Code of Federal Regulations
CY	calendar year
EDO	Executive Director for Operations
FTE	full-time equivalents
FY	fiscal year
GE	General Electric
IMC	Inspection Manual Chapter
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
OIG	Office of the Inspector General
OMB	Office of Management and Budget
PWR	pressurized-water reactor
ROP	reactor oversight process
ROP3	reactor oversight process inspection cycle 3

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I. BACKGROUND

Fort Calhoun nuclear power plant
(Photo courtesy of NRC Website)

Authorization and Responsibilities

The NRC is responsible for developing, implementing, and enforcing rules and regulations that govern licensed, commercial nuclear power plants. Under the Atomic Energy Act and the Commission's regulations, licensees must allow NRC representatives to inspect the premises and facilities where nuclear material is used or stored. NRC conducts inspections at the Nation's 103 operating commercial nuclear power plants to ensure adequate protection of the public health and safety, the common defense and security, and the environment in the civilian use of nuclear materials.

Principles of Good Regulation

NRC adheres to the Principles of Good Regulation, which, among other things, includes elements of *independence, openness, and clarity*. *Independence* means that NRC decisions will be based on "objective, unbiased assessments of all information . . ." and documented with reasons explicitly stated. *Openness* considers that "Nuclear regulation is the public's business, and it must be transacted publicly and candidly. The public must be informed about and have the opportunity to participate in the regulatory processes as required by law." And *clarity* means that "Regulations should be coherent, logical, and practical. There should be a clear nexus between regulations and agency goals and objectives whether explicitly [or implicitly] stated. Agency positions should be readily understood and easily applied."

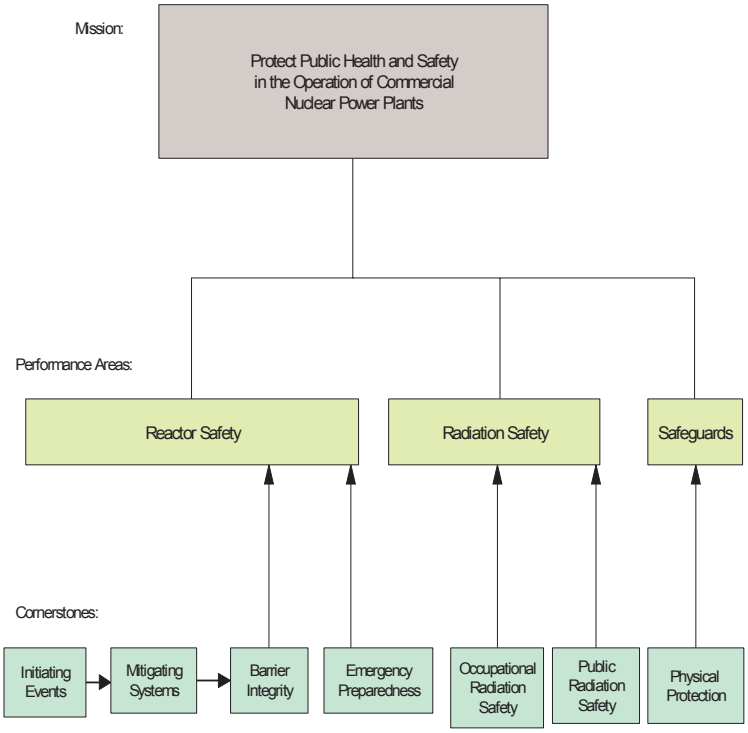
The Reactor Oversight Process Framework

Beginning in April 2000, the NRC's Reactor Inspection Program and the Reactor Performance Assessment program were combined into a single program for commercial nuclear power plants. This combined program implements the revised reactor oversight process (ROP). The ROP is designed to verify that agency licensees operate in accordance with NRC

rules and regulations in order to identify and resolve issues before the safety of plant operations is affected. The ROP includes risk-informed baseline inspections, use of licensees' performance indicator data, and a revised reactor assessment process. Another goal of the ROP is to effectively focus attention on risk-significant activities while reducing unnecessary regulatory burden on licensees.

The ROP assesses three key performance areas: reactor safety, radiation safety, and safeguards. Each area contains "cornerstones" of safety that reflect the essential aspects of safe plant operation. The following chart shows the seven ROP cornerstones and three ROP cross-cutting areas within which NRC assesses licensee performance.

REACTOR OVERSIGHT PROCESS PERFORMANCE AREAS AND CORNERSTONES



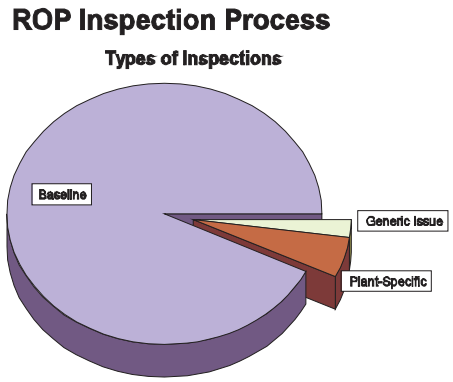
Cross-cutting areas:
- human performance
- safety conscious work environment
- problem identification and resolution

There are two main principles of the ROP:

< the agency's mission of assuring public health and safety is met when the agency has reasonable assurance that licensees are meeting the objectives of the seven cornerstones, and

< there is a level of performance above which the NRC does not need to engage the licensee beyond some minimum level of oversight.

The ROP uses both inspection findings developed from selective examinations and performance indicator data to assess plant performance within the framework of the seven cornerstones of safety.



The proportions for each area are: baseline - 93%; plant-specific - 5%; and generic issues - 2%.

The ROP inspection process is composed of three major elements:

1. a **baseline inspection program**, [emphasis added]

2. plant-specific inspections, and

3. generic issue inspections (address areas of emerging concern or those requiring increased emphasis because of recurring problems).

The Baseline Inspection Program

The baseline inspection program is an integral part of the agency's reactor oversight process. The program was developed using a risk-informed approach to determine a comprehensive list of areas to inspect (i.e., inspectable areas) within each of the seven cornerstones. The baseline inspection program evaluates licensee performance in areas not measured, or not fully measured, by licensee-reported performance indicators.

Baseline Inspection Program Objectives

According to NRC's Inspection Manual Chapter (IMC) 2515, Appendix A, *Risk-Informed Baseline Inspection Program*, the baseline program supports the goals and objectives of the reactor oversight process. The program's objectives are:

- to obtain sufficient inspection information to use in conjunction with performance indicators to assess the safety performance of power reactor licensees,

- to determine the licensee's ability to identify, assess the significance of, and effectively correct issues commensurate with their risk significance,

- to verify the accuracy and completeness of performance indicators used in conjunction with inspection findings to assess the performance of power reactor licensees, and

- to provide a mechanism for the NRC to remain cognizant of plant status and conditions.

Organizational Responsibilities and Budget

The Office of Nuclear Reactor Regulation (NRR) has the overall responsibility for providing guidance and direction for the ROP and the baseline inspection program.

Inspection Planning
(Photo courtesy of NRC Website)

The agency's four regional offices are responsible for implementing the baseline inspection program through planning and conducting the inspections.

The FY 2003 costs for the ROP exceeded approximately 336 full-time equivalents (FTE) with an additional $16.4 million spent for contractor support and travel costs. Approximately 251 FTE were expended toward completing the baseline inspection program. The agency estimated approximately 350 FTE for the ROP in FY 2004 (including contractor support and travel costs) of which about 271 are for completing the baseline inspection program. Table 1 shows the allocation and actual usage of ROP resources dedicated for the baseline inspection program in the four regions. According to NRR, the actual resources expended on the baseline inspection program in calendar year (CY) 2003 included time spent on direct inspections, inspection preparation and documentation, and plant status efforts.

Table 1: Baseline Inspection Program Resources

Fiscal Year	FTE Allocated	Actual FTE Expended/calendar year[2]
2003	273.3	251 /CY 2003
2004	271[3]	CY 2004 (to be determined)

In an effort to avoid baseline inspection program resource challenges in future years, NRC added 15 FTE inspector positions for FY 2004 through FY 2006. The additional FTE is intended to increase inspector resources for performing plant-specific activities and supplemental inspections.

Baseline Inspection Program Inspectors

Resident inspectors and senior resident inspectors located at each plant site carry out a major part of the baseline inspection program and also participate, to a lesser degree, in plant-specific and generic safety issue inspections. Their primary role is to observe, evaluate, and verify the adequacy of licensees' nuclear safety activities, concentrating on day-to-day licensee operational and event follow-up activities, and licensee activities and processes that are important to safety and reliability.

In addition, region-based inspectors with specific qualifications have primary responsibility for performing a number of the baseline inspection procedures related to specialty areas, such as Radiation Protection and Physical Security Protection. NRC uses inspectors from headquarters, as requested by the regions and in exceptional circumstances, to provide the regions assistance towards the completion of the baseline inspection program.

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2 The ROP is implemented on a calendar year basis; however, staff obtains and reports resource data on a fiscal year basis. The staff asserts that there is no reason to believe that these results would be significantly different if prepared on a calendar year basis. Nonetheless, OIG requested NRR to provide actual numbers for the CY 2003 total resource effort.

3 In March 2004, the agency increased its FY 2004 regional allocation by 3 FTE to 271 FTE for baseline inspections.

II. PURPOSE

The objectives of this audit were to determine whether the baseline inspection program:

, is based on a sound methodology,

, is carried out by sufficient, qualified staff, and

, is completed at all operating commercial nuclear power plants.

Appendix A provides a detailed description of the audit's scope and methodology.

III. FINDINGS

Overall, NRC staff, licensees, and stakeholders view the ROP, which includes the baseline inspection program, as a significant improvement over the previous, more subjective, plant assessment program. NRC's most recent ROP self-assessment[4] indicates that the ROP was generally effective in monitoring operating commercial nuclear power plant activities, as well as focusing NRC resources on significant performance issues in CY 2003. As a result, the staff believes that plants are receiving an appropriate level of oversight commensurate with their performance. However, OIG identified weaknesses associated with the program. Specifically,

A. the baseline inspection program framework is generally sound, but needs improvement,

B. impacts on the baseline inspection program from resource challenges are likely to continue,

C. the resident inspector training program needs improvement,

D. the report of 100 percent baseline inspection program completion in CY 2002 is not fully supported by documentation, and

E. guidance is unclear for new baseline completion criteria.

4 SECY-04-0053, *Reactor Oversight Process Self-Assessment for Calendar Year 2003*, dated April 6, 2004.

As stated by one regional administrator, the baseline inspection program provides a good foundation for licensee oversight, but its effective implementation needs significant management involvement. Addressing these weaknesses will improve the efficiency and effectiveness of the baseline inspection program.

A. THE BASELINE INSPECTION PROGRAM FRAMEWORK IS GENERALLY SOUND, BUT NEEDS IMPROVEMENT

In general, NRC staff and industry representatives believe the baseline inspection program's framework is generally sound, in that focus on safety is excellent and that, for the most part, resources are appropriately focused across the seven cornerstones of safety. As required, the agency performs an annual self-assessment of the ROP which includes a discussion of program effectiveness. However, the overall effectiveness of the baseline inspection program cannot be adequately assessed because the agency lacks a mechanism to measure effectiveness or quality. As a result, the agency does not critically assess the effectiveness of several aspects of the baseline inspection program. For example, weaknesses in the following areas have not been addressed in any evaluation of the baseline inspection program:

- insufficient documentation of the rationale for the sampling methodology,
- inadvertent negative effects from changes to the operating experience program,
- inconsistent handling of informal issues, and
- inadequate performance measures.

A review of the above issues could identify significant weaknesses; therefore, a critical re-evaluation of the current baseline inspection program is needed to determine whether changes are warranted.

Agency Lacks Documentation to Support Rationale for Sampling Methodology

According to agency documents, the ROP is designed to maintain safety more effectively by focusing NRC and industry attention on risk-significant activities, while reducing unnecessary regulatory burden on NRC licensees. The agency performs a baseline program of inspections at each operating commercial nuclear power plant by conducting at least a "minimum" level of effort (i.e., lowest acceptable number of samples) as defined by each inspection procedure. Yet, agency managers expect the inspection program

to be completed using a "nominal" (i.e., median) level of samples and inspection hours even though the agency has not sufficiently documented the basis for the sample sizes established in each inspection procedure. Additionally, there is (1) no clear understanding of whether inspection samples or inspection hours is the intended focus of the program and (2) no documented rationale for the use of "minimum" versus "nominal" inspection effort. As a result, NRC cannot assure that the defined sample sizes are adequate to assess licensee performance or that NRC resources are being used as efficiently as possible. In addition, the commercial nuclear power industry and the public cannot be sure that the agency's rationale for its sampling methodology adequately justifies the "minimum" inspection effort.

No Consensus on Basis for Sample Sizes

Opinions regarding the basis for the determined sample sizes vary among agency staff responsible for developing and implementing the baseline inspection program. OIG interviewed 7 of 14 members of the three ROP development teams regarding the basis of the new ROP. All seven said the ROP risk insights were provided by risk analysts' using historical knowledge, but tempered by the team's experience and past findings information. According to the team's program manager, the idea was to look at only samples having risk significance in order to achieve a balance between having nothing to inspect and what has to be inspected. The team also determined the expectation of "minimum" samples and developed data regarding how long it took (hours) to inspect an area under the old inspection system. After the first year of trial and implementation, the agency made major revisions to all baseline inspection procedures at which point a range of samples from minimum to maximum was provided to give flexibility and satisfy regional managers.

The majority of the development team members interviewed said there was no statistical basis for the sample sizes identified for each baseline inspection procedure. In fact, the program manager said the team "did not get to" the population of activities in the inspectable areas to determine [statistical-based] sample sizes because the population varies too much from plant to plant. Other members said that:

- the team looked at how things were done in the past and that information weighed into how many samples were enough;
- the team developed "rough estimates" of the samples that could be done in the estimated hours; and,
- the sampling was based on expert judgment rather than any rigorous statistical methodology.

One of the program developers indicated that there was some statistical basis for the sample sizes, citing a 95 percent confidence[5] sampling methodology from NUREG-1475, *Applying Statistics.* He added that it would not be possible to do "random" sampling because inspectors would have to do "something like 50 or 60 samples per inspection procedure." A co-author of the above-referenced book said that the concept cited (i.e., 95 percent confidence level) does not apply to a risk-informed baseline inspection program because the samples must be completely random. The underlying concept of the risk-informed inspection program is that the program "intends" to examine samples which have a greater probability of impacting safe plant operations or, in essence, have a higher "priority." In addition, inspectors may be able to further inform their inspection sample selection (e.g., picking "smart" samples) on higher priority areas known to have performance problems at the plant in question or in other, similar plants. Therefore, according to the statistics expert, one needs to recognize that the samples selected by experienced inspectors are far from "random."

Opinions on the basis of sample sizes also vary widely among agency managers responsible for implementing the baseline inspection program. For example, many of the senior executives OIG interviewed thought expert panels developed the sampling basis. Others believed that the samples were derived from old findings identified under the previous inspection program, while still others had no idea how the sample sizes were developed. According to some of the managers, there was no scientific bases behind the methodology; it was a "best guess" at what to look at. In fact, they said the number of samples required is minuscule in many areas compared to the number of licensee activities that could be sampled.

Focus of the New Baseline Inspection Program

IMC 2515 states that the inspection activities [prescribed in each procedure] and "minimum" sample sizes must be completed to provide an adequate assessment of each cornerstone; hours are estimated for resource planning only. However, there is some misunderstanding among senior managers and inspectors in the field regarding whether the intended focus of the inspection program is samples, hours, or inspection scope. This lack of common understanding leads to an inconsistent application of the program.

According to the development team program manager, the team focused on samples (rather than hours) -- the concept being "here's how many things to inspect not how much time should be spent on those things." Yet another team member said risk information was tied to the hours needed to do inspection work in that area, and a senior risk analyst on the team said the focus was on content of the inspections and not on the sample sizes. The

[5] According to NUREG-1475, *Applying Statistics,* by D. Lurie and R. Moore, dated February 1994, "95% confidence" is a probabilistic measure of assurance.

analyst added that a well-defined scope of the inspection would determine the hours needed, and the hours would then determine the sample size needed to satisfy the defined scope. In fact, the analyst said that doing the same amount of activity at different plants would not be appropriate, so exact sample sizes would "not be the way to go."

Similar to the development team members, there was no consensus among agency senior managers or inspectors about whether samples or hours, or both, are most important for assessing licensee performance. Generally, those interviewed said the focus, right or wrong, is on samples. However, the hours spent in an inspection area are considered by regional senior managers as key to completing an inspection procedure. The lack of common understanding of the actual intent, samples or hours, leads to inconsistent implementation of the inspection program.

Adequacy of Sample Sizes to Assess Licensee Performance

Overall, those NRC staff interviewed said the minimum level of inspection is adequate to assess a licensee's programs. Yet, without giving any specific reasoning, nearly every senior manager interviewed said that he/she expects or wants inspectors to inspect more than the minimum number of samples (e.g., use nominal levels of effort). The following represent typical comments received from every level of management on the adequacy of sample sizes:

< A regional administrator said he "wants" inspectors to do nominal sample sizes, but recognizes there are resource constraints preventing that.

< Division directors said that something may get missed if the agency continues to do just the minimum program.

< A branch chief admitted a "concern about doing only the minimum sample sizes" especially for more than a year. (OIG notes that the minimum has been done for the last two inspection cycles.)

< In addition, a "minimum" inspection program is adequate only if certain caveats and assumptions are true, such as resident inspectors are continually on-site. As one senior executive said, if resident inspectors were not on-site continually monitoring licensee performance, the program would not provide adequate information (at the minimum level of oversight).

< A division director said that whether the sampling is adequate to assess licensee programs is a mixed answer, yes and no. Some sample sizes are so small that even doubling or tripling them would not be meaningful unless the population of the activity was correspondingly small.

< A branch chief said that the sample size in some procedures is unrealistic for assessing overall performance. He cited the application of one sample size regardless of the number of units at a site (in other words, an inspector could fulfill the required sample size by inspecting only one of multiple units at a plant).

< Senior resident inspectors cited specific procedures where the sample size is out of proportion to the population of activities. For example, the operability evaluation procedure is "too light on samples" (i.e., inspect 19-25 samples out of the 1,000-2,000 evaluations generated by the licensee) and a surveillance procedure requires a sample of six out of a "very large" number of surveillance activities.

Use of Minimum Versus Nominal Sample Sizes

The premise of the baseline inspection program is that every plant receives the same basic level of oversight with the flexibility of adding additional oversight depending on NRC's assessment of a licensee's performance. However, the baseline inspection program lacks clarity about "when" to do which level of sampling (minimum or nominal). In fact, there appears to be no criteria, aside from available time, for when to do more than the minimum under a routine baseline inspection. For example, one deputy regional administrator said that while his inspectors have to do the minimum program, they are free to perform as many samples as time will allow. Other managers said that their inspectors are to perform just the minimum because headquarters has determined that minimum is good enough. Yet, nearly every senior manager interviewed said it would be preferable to have inspectors use a nominal sample size if resource shortages do not prevent that from happening. The number of samples inspected appears dependent on available resources as opposed to performance-based. Without clear criteria for when more than a minimum level of effort is necessary, NRC may experience inefficient use of its inspection staff. In addition, contrary to the ROP's goal of reducing unnecessary burden on licensees, accommodating inspections of more than the required minimum samples without a clear basis can result in an extra burden.

It is important to note that OIG is not questioning whether the sample sizes are adequate, but rather that there is not enough support for the sample sizes selected as the minimum necessary to adequately assess licensee performance. The agency went to some lengths to have experts help develop and design the baseline inspection program and the majority of people interviewed believe the baseline inspection program is appropriately focused on safety. Yet, there is no documented basis or sound rationale behind the determination of sample sizes used to assess licensee performance in the safe operation of their facilities. The agency also has no documented rationale and or distinction of when (or why) to use more than a minimum sample size at good performing plants.

Summary

Agency managers have different opinions about the effectiveness of the baseline inspection program, but most agree it is only effective with certain assumptions and caveats in place. There are also differing interpretations regarding whether the focus of the baseline inspection program should be on the number of samples conducted or the hours spent in an inspection area, or a combination of both. With or without a rationale for the sample size, staff agreed that the adequacy of assessing licensee performance through the baseline inspection program depends on the "quality" of the samples chosen for inspection.

The agency draws conclusions about licensee performance in particular baseline areas based on a relatively small number of samples which are not randomly selected. According to the agency's statistician, it is acceptable to preselect the samples in a risk-informed program provided plant-specific risk knowledge is being used effectively by inspectors. However, he added that the agency must be clear that the conclusions drawn pertain to the samples taken and should not necessarily be projected to the whole population. Without a documented basis for the sampling, the agency cannot determine whether there is more (or less) inspection effort applied than necessary, which impacts the agency's use of its inspection resources and burden on the NRC licensees. Additionally, NRC, the nuclear industry, and the public cannot be assured that the agency's justification and rationale for it's sampling methodology is adequate to obtain sufficient inspection information needed to assess the overall safety performance of power reactor licensees.

RECOMMENDATION

OIG recommends that the Executive Director for Operations (EDO):

1. Document the basis and rationale for the determined baseline inspection program sample sizes, including a discussion of when, or why, to use more than minimum samples.

Operating Experience Program Needs Improvement

NRC made a commitment to use operating experience to maintain safety, protect the environment, and promote the common defense and security. However, over time the agency made changes in the amount and type of operating experience data it collects and analyzes, most notably in the area of human factors information. As a result, operating experience information that may be critical to NRC's understanding of risks at power plants is being lost. Because this lost information may be important to focusing inspection work in risk important areas and assisting inspectors in sample selections, the agency should reconsider changes previously made to the program.

Historical Handling of Operating Experience at NRC

NRC's goal to maintain safety, protect the environment, and promote the common defense and security is the preeminent agency performance goal. Although NRC licensees continue to have the primary role in maintaining safe operation of the Nation's commercial nuclear power plants, NRC states it will take action to improve safety performance before it falls below acceptable levels and will require plants to shutdown when their safety performance is unacceptable. This principle is inherent in the NRC's new ROP. Among the strategies NRC uses to achieve its performance goals is a commitment to *evaluate operating experience and the results of risk assessments for safety implications*.

Operating experience[6] is a broad term that has evolved to describe NRC and licensee evaluation and use of operational safety data. It has long been recognized that NRC's systematic collection and evaluation of operating experience data is an important part of its mission to ensure that commercial nuclear power plants are operated in a safe manner. In fact, in July 1979, the Office of Analysis and Evaluation of Operational Data was created to:

< coordinate operational data collection;

< systematically analyze and evaluate operational experience;

< feed back the lessons of experience to improve the safety of licensed operations;

< assess the effectiveness of the agency-wide program; and

< act as a focal point for interaction with outside organizations for operational safety data analysis and evaluation.

Also in 1979, the nuclear industry took action and created the Institute of Nuclear Power Operations, in part to provide an independent capability to evaluate operational experience and feed back lessons learned to licensees.

In 1998, as a result of further study, the Commission approved the staff's proposal for consolidating Office of Analysis and Evaluation of Operational Data functions into program offices. The Commission noted that these functions need to continue with a degree of independence. The

6 Operating experience in this context includes a broad range of information about events and conditions at commercial nuclear power plants collected from a variety of sources, including but not limited to, Licensee Event Reports, 10 Code of Federal Regulations (CFR) 50.72 notifications, 10 CFR Part 21 reports, component failure data, and inspection reports, as well as industry reports and foreign operating experience reports.

Commission also recognized the importance of sharing lessons learned from the independent assessments of operational events with the nuclear industry in an effort to improve the safety of licensed operations and to assess the effectiveness of agency-wide programs.

In 2002, agency executives raised questions regarding the effectiveness of NRC's operating experience program in the aftermath of a safety significant event at a U.S. nuclear power plant. In response, NRC formed a task force to evaluate the agency's reactor operating experience program and to recommend specific program improvements. The task force's November 2003 final report[7] cited an earlier agency finding that a number of specific NRC operating experience programs had been reduced in scope or eliminated following previous program evaluations, but the impact of those changes on the effectiveness of the operating experience program had not been systematically assessed. The task force report made 21 recommendations for improvements to NRC's operating experience program, including periodic assessments of the program's effectiveness.

Because of the extensive review performed by the task force, OIG limited its work in the operating experience area. However, due to the importance of operating experience to the baseline inspection program, OIG reviewed the task force's report. OIG found that, if implemented, the recommendations presented will result in significant needed improvements to the operating experience program and improve inspection efforts. OIG published the results of its review of the task force report in a March 2004 memorandum report,[8] which included six recommendations aimed at strengthening the task force's recommendations to ensure that existing weaknesses are addressed. Additionally, OIG noted that human factors operating experience was one area not specifically addressed by the task force report. Therefore, during this audit, OIG placed a particular focus on this important feature of operating experience.

Loss of Human Performance Operating Experience Data

Humans are integral to the safe operation of a nuclear power plant. Understanding that human performance and error contribute to the root causes that underlie performance problems in nuclear power plants, NRC established human performance as an ROP cross-cutting issue. An NRC-sponsored study on the risk impact of human performance in operating

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7 Memorandum from C. Ader, Manager, Operating Experience Task Force to the Task Force Steering Committee re: *Reactor Operating Experience Task Force Report*, dated November 26, 2003.

8 Memorandum to W. Travers from S. Dingbaum, *Memorandum Report: Review of NRC's Reactor Operating Experience Task Force Report (OIG-04-A-13)*, dated March 30, 2004.

events confirmed this position. Additional work documented how the ROP monitors, analyzes, and feeds back information on human performance and compares it to findings from the review of operating events.[9]

The NRC-sponsored study concluded that, in general, the ROP is likely to capture important issues through a combination of baseline inspections, supplemental inspections, performance indicators, cornerstones, and cross-cutting issues and that the ROP identifies the same-type of human performance issues that were identified through analyses of operating events. The study resulted in a number of findings regarding the influence of human performance on the analyzed sample of 37 significant operating events, including the following ones considered most important to probabilistic risk assessment:

- Without exception, the 37 operating events included multiple contributing factors. On average, the events contained four or more human errors in combination with hardware failures. Fifty percent of events contained five or more errors.

- Eliminating "no color findings[10]" because they are of low risk significance may make current practices more objective but may result in the unavailability of raw data if many human performance insights individually fail to trigger the significance determination process.

- Trending low safety significant problems and issues can potentially indicate declining plant performance. Trends in human performance below established thresholds may be an indicator that is predictive of future systems performance.

- Human errors can likely result in failure of risk-significant equipment.

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9 NUREG/CR-6753, *Review of Findings for Human Error Contribution to Risk in Operating Events*, Date Published: March 2002 and NUREG/CR-6775, *Human Performance Characterization in the Reactor Oversight Process*, Date Published: September 2002. Both studies were conducted for NRC by the Idaho National Engineering and Environmental Laboratory.

10 The Commission recognized that some issues should be documented even though they could not be evaluated under a specific cornerstone and its associated significance determination process. The ROP contemplated that substantive cross-cutting issues could be documented in inspection reports. According to NRR, inspectors can, and do, document these types of findings (formerly called "no-color findings") but for clarity have given them a "green" color. IMC 0612 describes this type of finding and what is required for inspectors to be able to document them in NRC inspection reports.

- Latent errors[11] were present in every event and more predominant than active errors.

According to an NRC specialist in the correlation of human factors to performance problems at commercial nuclear power plants, in the time between the two sets of data discussed above the content of inspection reports was changed due in part to changes in the definition of the threshold for what constitutes a finding. As a result, the number of findings in inspection reports was reduced. Although cited as an important source of information about human performance, findings that are not greater than minor significance[12] have been essentially eliminated from inspection reports, and thereby, unavailable for trending by agency analysts.

Summary

Research has established human performance as a significant factor in performance problems at commercial nuclear power plants. In fact, an NRC human factor's specialist said that the agency's preliminary review of recent information again shows the correlation between human error and poor performing plants to be positive with a range from +0.3 to +0.6 (on a scale of -1.0 to +1.0), and an average of +0.5. NRC awareness of human performance allows for informed decision making about changes that may be needed in NRC's inspection guidance and contributes to appropriate focusing of inspection activities for each plant. However, changes made to the threshold for inspection report content and a reduction in licensees' event reporting requirements resulted in a decrease of NRC's access to important operating experience information related to potential performance problems at commercial nuclear power plants. This reduces the staff's ability to compile and evaluate human performance data in order to trend performance issues at the plants.

RECOMMENDATION

OIG recommends that the Executive Director for Operations:

2. Develop guidance on how to identify human performance trends and how that information should be integrated into the reactor oversight process.

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11 Latent errors are those committed pre-event but whose effects are not realized until the event occurs. Latent conditions can be present for long periods of time before combining with workplace factors, including active errors, to produce an event. Latent errors contributed most often to plant events and caused the greatest increases in plant risk.

12 These types of findings were formally referred to as "no-color findings."

Agency Lacks Clear Guidance on Handling Informal Issues

Informal issues are generally viewed as a very important part of NRC's inspection effort and, as such, NRC managers and the inspection manual encourage inspectors to discuss this information with licensees. However, as noted in a 2002 OIG audit report related to the reactor oversight process,[13] NRC had not developed written guidance for informal issues. That remains the case today. Individual regions have provided some guidance about the handling of informal issues and several managers stated they provide verbal guidance to inspectors. However, such instruction may be inconsistent and management expectations are not clear. This results in an important part of the inspection program being implemented inconsistently. Important information about plant operations can be lost because of inconsistent or non-existent documentation. As a result, NRC could miss opportunities to identify declining plant performance and the public has no access to information on informal issues considered important to inspectors.

Management Accountability and Control

According to Office of Management and Budget (OMB) Circular No. A-123, *Management Accountability and Control*, agency managers are encouraged to continuously monitor and improve the effectiveness of management controls associated with their programs. Clear guidance helps to ensure effective and efficient use of valuable agency resources and consistent regulation of NRC licensees.

Agency Guidance

NRC has an established policy regarding the threshold by which inspection findings are considered significant. IMC 2515 also (1) provides guidance for its inspectors on inspection report content and (2) conveys that licensees desire to hear inspector insights, even in instances where the insights do not reach the threshold for documentation in inspection reports. Staff clarified that this type of information, typically called "inspector observations" or "informal issues," relates to issues that inspectors see as a concern or about which they want a licensee to know, but do not meet the threshold for inclusion in inspection reports. Because such information falls below the prescribed threshold, IMC 2515 does not provide guidance regarding the handling of informal inspection issues. Nevertheless, varying levels of attention are being spent by agency managers and inspectors on informal issues.

NRC inspectors document violations of NRC regulations (findings) in inspection reports. But, inspectors also identify other informal issues regarding plant operations which are included with "no-color findings" which typically get eliminated from inspection reports. NRC and licensee officials

[13] OIG Report 02-A-15, *Review of NRC's Significance Determination Process,* dated August 21, 2002.

stated that they view informal issues as very important to improving plant operations. In fact, inspectors are encouraged to bring informal concerns about plant operations to licensee management, but these concerns cannot be included in inspection reports because they fall below a defined threshold of importance. Despite the importance and widespread use of informal issues, NRC has not provided adequate guidance because cognizant senior managers believe that issues which fall below the threshold for inclusion in inspection reports do not require formal guidance. As a result, the handling of informal issues has been inconsistent.

NRC inspectors regularly discuss informal issues with licensee officials and with NRC managers. Many NRC inspectors and managers believe in the importance of these informal issues, specifically that they can prevent future violations. In order to ensure licensees resolve the "informal" concerns properly, most inspectors and some region managers track these issues. In fact, most of the inspectors and many of the managers interviewed said a "second set of books" is kept which captures this information. In addition, some inspectors and managers analyze informal issues to identify trends that could reflect potential problem areas at plants. For example:

< An NRC inspector performing a Health Physics inspection discussed a specific situation with the licensee who then put the concern into its corrective action program. However, this issue won't be in an NRC inspection report because it does not meet the criteria for inclusion. According to the inspector, if he had not seen the situation and mentioned it, the result would have been a violation. The significance was minor -- there was no violation, but there would have been a violation if not identified by the inspector.

< According to one NRC manager's informal tracking system, an inspector recognized many examples where the licensee had not identified the appropriate equipment to be protected during various maintenance activities. The issues were discussed with the licensee who was very appreciative and intended to issue a general communication about the problem.

Licensees Encourage Information Exchange

Licensee officials stated that they appreciate NRC inspectors bringing informal issues to their attention and that they take action to correct the issues in virtually all cases. Many licensee officials viewed discussion of informal issues as being proactive and predictive of potential performance problems at their plants. In fact, several officials viewed informal issues as more important to improving plant operations than formal inspection findings in NRC inspection reports. Some of the licensees said they would not have a problem with NRC capturing informal issues in the formal inspection reports, as long as the issues are appropriately characterized.

Inconsistencies in Implementation and Expectations

During this audit, OIG informed NRR and region managers about inconsistencies related to handling informal issues. For example, some region managers specifically tell their inspectors not to document or track informal issues while others have developed elaborate tracking systems and encourage their staff to keep records. OIG also found that, despite not meeting threshold requirements, one region actually documents discussion of minor, "informal" issues in their formal baseline inspection reports.

Given their awareness that inspectors and/or managers are developing tracking systems and spending time collecting and documenting informal issues, OIG asked why NRR has not issued guidance or communicated expectations related to handling informal issues. One NRR senior executive said that when he asked staff about the handling of informal issues, he was repeatedly told that the ROP would eventually deal with the issue. But, according to staff who have a vested interest in the development of the ROP, the topic has yet to be discussed because of the relative newness of the ROP.

In disagreement that the ROP, after four years, is too new, a number of agency senior managers expressed that it is an appropriate time to do a critical reassessment of the ROP, including the handling of less than reportable issues. According to one cognizant manager, it is important to look at the issue now to answer the primary question of "how much effort should be put into these minor things?" He acknowledged that some of the minor issues discussed between inspectors and licensee staff would be considered operating experience, albeit specific to an individual plant. But, that operating experience will not get captured on the operating experience websites if the issue does not meet the risk significance threshold, and may or may not get shared with other inspectors. In his opinion, NRR will have to look at the resources already expended on informal issue tracking systems in each region and get each region's expectations before deciding on what further guidance is needed. Despite the existence of guidance in the agency inspection manual regarding thresholds, this important part of the inspection program continues to be inconsistently implemented.

In the finding titled, *Operating Experience Program Needs Improvements*, OIG noted that potentially important information about operating experience was no longer documented and preserved in NRC inspection reports. Because there is no continuity in how informal data is captured or shared, important information about plant operations which could help inspectors pick "smart" samples could be lost. As a result, NRC could miss information critical to NRC's understanding of risk and identification of declining plant performance (trends).

Certain Information Not Publicly-Available

One of the agency's goals is to increase public confidence through open communications. Typically, the public should have access to enough information to understand how the agency makes decisions, including its annual rating of a licensee's performance. However, informal issues and inspector observations are typically shared with licensees during informal in-plant discussions or before/after formal inspection exit meetings. Therefore, the public is not privy to certain information regarding licensee performance. As a result, there may not be enough documentation in inspection reports to gain public confidence on NRC's assessment of licensee performance.

According to one senior manager, the baseline inspection program produces two levels of information: formal inspection findings which are documented in the reports, and a second tier of informal observations and minor issues which do not rise to the threshold for inclusion in the reports. He thinks that if the inspectors (or their management) think any of the "minor" issues might need follow-up, that information should probably be documented somewhere, but he is not sure the public needs to be aware of it. The questions of where informal issues should be documented and to what the public should have access need to be answered.

Summary

NRR management is aware of the inconsistencies related to the documenting and sharing of informal/minor issue information. NRR is also aware that the public is not privy to a lot of the informal issue information shared with licensee staff during exit meetings and through other informal discussions, even though some of this information would be considered operating experience. NRR managers recognize the need to address this issue, but before deciding on what guidance is needed, NRR must determine:

< how much effort should be put into "these minor things,"

< what resources are already being used in each region,

< what are each region's expectations regarding internal use, and

< what information should be documented for public view (e.g., in inspection reports).

RECOMMENDATION

OIG recommends that the Executive Director for Operations:

3. Develop and implement guidance for documenting, tracking, and trending informal inspection issues.

Performance Measures Need Improvement

NRC's methodology for reviewing the success of the baseline inspection program is generally sound. However, although baseline inspections are used to assess whether plants are safely operated, the agency does not have performance measures which adequately assess the quality of those inspections or define "effectiveness" of the program.

Guidance from the agency and OMB states that the "effectiveness" of a program must be measured. Performance measures established in NRR's Operating Plan for the baseline inspection program do not meet the intent of guidance because there is no method established to measure "effectiveness." An NRC group previously identified the lack of a definition or method to measure effectiveness as a weakness in the agency's ability to assess a program's success, in this case, the baseline inspection program. In addition, the agency lacks a metric regarding the "quality" of its baseline inspections. Without such measures, the agency cannot adequately evaluate the effectiveness of baseline procedures nor the quality of the inspection program itself. As a result, NRC cannot be assured that the baseline inspection program is adequately contributing to the agency's mission and, therefore, the Commission does not get a reliable annual assessment of overall ROP effectiveness.

Performance Goals and Measurement System

A primary objective of the ROP is to help fulfill the agency's performance goals, including efficiency and effectiveness of its activities. A performance measurement system is a process organizations use to collect data, prepare performance measurements, analyze performance, and report on and use the results. Those measures should reflect and align with the mission of the agency, identify expected outputs, identify what aspect of performance needs measuring, and establish performance goals or targets. Outputs include measurable characteristics of program activities such as effectiveness, efficiency, and quality. (For a detailed description of performance and output measures, see Appendix B.)

Guidance Requires Measure of Effectiveness

Guidance from the Office of the Executive Director for Operations' states:

> A major area targeted for improvement in the FY 1999 operating plans is the establishment of effectiveness metrics. All other metrics are superfluous if the program is not achieving its desired results or outcome. Effectiveness is also at the heart of self assessment. Therefore, effectiveness metrics are a required element for the FY 1999 operating plans.

As early as October 1998, NRC established guidelines for ***internal*** output measures for Planned Accomplishments.[14] A model was provided which suggested establishing metrics for:

- effectiveness [the accomplishment of the desired result]
- efficiency [accomplishing the desired result without wasting resources]
- quality [degree of excellence]
- quantity [how many]
- timeliness [performance of the activity within defined milestones]

For the baseline inspection program, there is one Planned Accomplishment Code, #103-140 - *Baseline Inspections*. NRC offices were required to establish, at a minimum, an effectiveness metric at the Planned Accomplishment level if there were no performance plan output measures for that accomplishment. In fact, for the period subject to this review, there was no performance plan output measure specifically defined for effectiveness in the baseline inspection program.

In the President's budget for FY 2004, OMB describes its initiative to implement performance budgeting throughout the Federal government in 2005 by using "effectiveness" at influencing outcomes as a justification for resources.[15] As OMB describes for budgeting purposes, NRC must link the performance of day-to-day activities, like baseline inspections, to long-term, higher level performance goals in order to build a solid foundation for managing program performance and achieving performance and strategic goals.

Measure of Effectiveness Absent from Agency Plans

NRC's Strategic Plan presents strategic goals which are consistent with its mission and supported by performance goals. The performance goals represent outcomes the NRC plans to achieve. NRC's FY 2004-2009 Strategic Plan, Performance Goal 1[16] is *Ensure protection of public health and safety and the environment*. There are several performance or outcome measures associated with this goal which need improvement. For example, in accordance with OMB's guidance, one of NRR's Operating Plan

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[14] NRC defines a Planned Accomplishment as a level of discrete activity below the program level, where FTE and budgetary resources can be identified.

[15] OMB Circular No. A-11, *Preparation, Submission, and Execution of the Budget*, revised July 2004.

[16] NUREG-1614, Vol. 3., *U.S. Nuclear Regulatory Commission Strategic Plan FY 2004-FY 2009*, dated August 2004.

performance measurements asks, "What is the tangible contribution to the outcome goals... in the core activity from doing this work. (What will success look like or what will we measure to know that this activity was successful? How do baseline inspections contribute tangibly to the agency's outcome goals?)" NRR's answer does not provide specific quantitative terms for measuring the baseline inspection program's tangible contribution to the outcome goals, nor does it describe what should be measured to know that baseline inspections were effective.

At the operational level, management should include, when possible, measures for each of the performance categories; effectiveness, efficiency, quality, quantity, and timeliness. It is important to have clear drivers or targets in each area to ensure the program effort is not "pushed" in any one direction at the expense of others. Specifically, the NRR FY 2004 Operating Plan describes the planning, budgeting, and performance management process as implemented by NRR. The process is directed toward achieving organizational effectiveness by measuring and monitoring performance against measures and targets, and assessing performance.

The Operating Plan defines success for all planned accomplishments and includes planning templates for each accomplishment discussed in the plan. Each template establishes the measures of success and targets for NRR management. OIG reviewed the baseline inspection program's performance measures and targets and found there are no metrics established to adequately measure effectiveness or quality. Appendix C presents a table of OIG's evaluation of the specific leadership and operational performance measures and targets. In addition, other inconsistencies were found in the baseline inspection program which are fully discussed in Appendix B. If inconsistences are not addressed, performance measures and targets may not be developed in alignment with program objectives.

Efficiency Focus Group

In 2002, an agency Efficiency Focus Group looked for ways to improve resource efficiencies in the ROP and concluded that there could be no comprehensive assessment of the effectiveness of the baseline inspection procedures until "effectiveness" was defined. The focus group recognized that, aside from the number and significance of inspection findings, there are a number of less tangible effects of inspections that will be difficult to measure directly. The focus group also noted that IMC 0307, *Reactor Oversight Process Self-Assessment Program,*[17] which was then under development, would require an annual review of the "effectiveness" of baseline inspection procedures. The focus group recommended that

[17] IMC 0307, *Reactor Oversight Process Self-Assessment Program*, dated December 12, 2003.

measures be developed once "effectiveness" is defined so that an assessment could be made. However, the group did not attempt to define "effectiveness."

Incomplete Annual Review of Baseline Inspection Procedures

Subsequent to the Efficiency Focus Group's comments, IMC 0307 was issued and currently requires certain staff, called inspectable area leads,[18] to monitor and report annually on the effectiveness and efficiency of inspection activities and program objectives within their assigned areas of responsibility. One of the primary objectives of this annual review is a critical 'big picture' evaluation of "all of the inspectable areas together to justify retaining them in the baseline inspection program, or determine if the addition of a new inspectable area is warranted."

In accordance with IMC 0307, multiple inspectable area leads[19] recently completed the CY 2003 annual review of their assigned baseline procedures.[20] As with previous reviews, they did not identify the need for any significant changes to the overall inspection program (e.g., either the addition or removal of inspection procedures). In fact, the staff mainly recommended minor adjustments or "tweaks" to levels of effort (i.e., hours), clarification of the definition of a sample, or how many samples constitutes completion for procedures that received any revision. However, there is no evidence that the required 'big picture' review was conducted or, according to many senior officials, that operating experience is being incorporated into changes to inspection procedures as anticipated.

As noted by the focus group and as seen in the NRR Operating Plan, references to "effectiveness" appear in individual inspection procedures. Yet the agency has not defined what effectiveness means for the baseline inspection program. As a result, the agency cannot properly evaluate the effectiveness of the procedures, and thereby, the program. When senior NRR executives were asked why there was no definition of "effectiveness," one said this issue has been on his radar because he too realized the "effectiveness" of the baseline inspection program had never been measured. Another said that interim graded measures will be put into effect as a first step, but NRR needs to get closer correlation between its operating plan and NRC's strategic goals.

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[18] An "inspectable area lead" is a Division of Inspection Program Management, NRR, staff member assigned responsibility to oversee and manage the use of individual baseline inspection procedures or attachments to those procedures.

[19] For CY 2003, there were approximately 11 different NRR staff members serving as individual area leads.

[20] The annual review did not include the physical protection procedures which were covered under a current NRC temporary instruction.

Lack of "Quality" Measures in the Baseline Inspection Program

In addition to effectiveness, appropriate "quality" measures should be developed. Monitoring only the other types of measures and targets can drive performance in another direction at the expense of quality. For example, there is no measure showing whether inspectors do quality inspection work, a critical component of baseline inspection program success. Such a measure might, for example, reflect the quality of inspection samples chosen.

IMC 0307 also includes the inspection program metrics used in the annual ROP self-assessment. There are 11 inspection program metrics in IMC 0307 which go beyond those in the Operating Plan. However, IMC 0307 also has no measures of effectiveness or quality.

Summary

The existing measures and targets for the baseline inspection program capture some important aspects of program activity and provide some useful information to managers. However, management has not adhered to performance measure requirements in that critical types of measures are missing. Specifically, the existing measures and targets do not reflect the most important aspects of evaluating the activity — effectiveness and quality. Without such measures, agency managers cannot adequately evaluate the effectiveness of baseline procedures nor the inspection program itself. Managers also cannot use the existing performance information to most effectively manage resources and ensure optimal performance in attaining the agency's goals. As a result, NRC cannot be assured that the baseline inspection program is effectively contributing to the agency's mission.

RECOMMENDATION

OIG recommends that the Executive Director for Operations:

4. Define "effectiveness" as it pertains to the ROP and establish performance measures and targets to demonstrate that the baseline inspection program meets that definition.

B. IMPACTS ON THE BASELINE INSPECTION PROGRAM FROM RESOURCE CHALLENGES ARE LIKELY TO CONTINUE

NRC must allocate adequate, qualified staff to achieve desired program outcomes. Over the last two years, NRC has faced numerous challenges to completing the baseline inspection program. According to senior staff, the primary cause for the current challenges began with a change to the inspector staffing policy. Although OIG's analysis did not support that belief, a number of other tangible factors impact the agency's ability to carry out the

baseline inspection program. Specific challenges include: a hiring policy change, an increase in supplemental inspections, a loss of qualified inspectors, and diversion of inspectors from baseline activities. In response to these challenges, the agency instituted coping strategies including changing its expectations for completing the baseline inspection program from a nominal to a minimum level of effort. While NRC appears to be addressing these challenges, they persist today and undesirable "short term" coping measures are still in place. Because these challenges significantly impact a critical agency program, it is imperative that continual senior management attention be given to the possible negative impacts of the long-term use of short term coping strategies.

The Move from N+1 to N

In a memorandum dated January 11, 2000, the Commission approved a revision to the inspector staffing policy to reduce the number of resident inspectors at operating commercial nuclear power plants having multiple units on site from "N+1" (i.e., the number of units plus one additional inspector) to "N" (an equal number of inspectors to units at a site).[21] The change was temporary pending completion of an impact study due in June 2001. The June study concluded that baseline inspections could be accomplished by "N" resident inspectors with some assistance from region-based inspectors. As a result, the staffing reduction at plant sites was continued, but the staff proposed the development of criteria for the allocation of additional inspection resources for other than performance-related issues (e.g., unique design or organization features).

Staffing Policy Changes

Many agency managers and inspectors assert that the challenges to completing the baseline inspection program began with the change in staffing from N+1 to N. Using time charges for CY 2002, OIG tested this theory and found no evidence that hours allocated for completion of the baseline inspection program are inadequate. To justify an argument for a return to N+1 staffing at all plants, analysis should show that significantly more than two FTE (i.e., closer to three FTE) are needed to complete resident inspector-performed baseline inspection procedures at plant sites. To the contrary, the data indicates it took fewer than two FTE to complete the program, including assistance provided by other NRR staff. Even on a plant-specific basis, no plant in CY 2002 required enough FTE to justify a return to N+1 in order to complete the routine baseline inspection program. Additionally, a rough estimate of travel costs related to providing inspector assistance to sites provided no support for a return to N+1. (OIG notes that over the last three years, the agency has granted approval for at least three plants to return to the N+1 policy due to unique unit designs or performance issues.)

[21] The revised policy did not impact single unit sites which continued to require two resident inspectors.

An alternative argument could be that challenges will persist and that an additional inspector at plant sites would relieve the burden of applying coping strategies to deal with existing resource challenges. However, OIG's analysis shows that any additional FTE would be better positioned at the regions because the additional coverage needed to complete resident inspector-performed inspections at plant sites is far less than one FTE.

Analysis shows that, if there are two full-time resident inspectors at each plant site, as required, baseline inspection procedures can be completed at the minimum level. Interviews with resident inspectors support the position that there is more than sufficient time for the baseline inspection program with the caveat that inspectors are not continually diverted to other activities (such as, temporary instruction inspections, allegations, and enforcement activities).

Challenges to Completing the Baseline Inspection Program

NRC revised its personnel policy for FY 2002 regarding new hires. According to agency documents, the revision called for one of every four (25 percent) new hires to be entry level, "recent [college] graduates." Therefore, the new hires will have little to no field inspection experience. As one senior manager said, having such a policy will continue to place a burden on qualified inspectors because it takes new hires approximately two years to process into fully qualified inspectors. Additionally, the agency notes that it should be recognized that "any" new inspector, including those with extensive field experience, requires some time to understand the NRC's regulatory role and management expectations for professionalism in the conduct of inspector functions. According to NRC, the average time to qualify experienced personnel is one year.

In a July 2002 memorandum to the regions, NRR discussed challenges faced by the regions to complete the baseline inspection program. These challenges included an unexpected increase in supplemental inspections, the loss of qualified inspectors, and diversion of inspectors to other initiatives. Multiple "coping measures" were provided for consideration, including:

< deferral of biennial/triennial inspections,

< increased use of inspectors qualified at the "basic" level,

< delay of personnel moves,

< deferral of non-required training, and

< utilizing the minimum sample size in each inspectable area.

Responses from the regions to headquarters identified the possible negative impacts of the proposed coping strategies, especially those associated with reducing the target sample size to minimum (low end) at most plants. For

example, a Deputy Regional Administrator reported that it would be difficult to judge what effects the across-the-board reduction in samples would have (e.g., what problems might be missed, if any) from the reduced effort. He contended that if done year-after-year, it would erode the agency's ability to obtain adequate indications of licensee performance and to identify risk-significant issues. In his words, there was a need to recognize "one-time compromises as just that — measures not suitable for repetition."

Although all four NRC regions were challenged to complete the baseline inspection program in CY 2002, two regions were particularly hard pressed which led to a change in intended performance. For example, one region intended to continue with nominal sample sizes at six nuclear plants due to poor performance. Resource shortages eventually led that region to reduce its level of inspection effort at those six plants and to implement the minimum level of effort at its other assigned plants. In addition, the subject region had to request 13 weeks of inspection assistance to meet the minimum completion requirements. A second region was extremely challenged by a shortage of staff and fully-qualified inspectors, increased supplemental and special inspections, and diversionary activities involving problem plants. In fact, that region requested 46 weeks of inspection assistance to complete the minimum level baseline inspection program.

In order to provide assistance to the regions in need, another region implemented most of the proposed coping measures, particularly the reduction of inspection effort to minimum levels at all its assigned plants. In that case, poor performance and risk did not impact the decision to reduce the level of effort to the minimum; instead it was based on resource shortages. Nevertheless, in a memorandum to staff regarding management expectations for the CY 2002 cycle, a region branch chief said the intent and scope of the inspection procedures was to be met and that "a reduction in samples and hours does NOT mean you should select the easiest or least time consuming sample."

End of CY 2002 Cycle Realizations

In a December 2002 memorandum, headquarters conceded that a number of unanticipated events occurred during the CY 2002 cycle that would continue to impact the baseline inspection program through CY 2003. The four regions responded to the headquarters memo with similar messages; specifically, that they were only able to complete the CY 2002 cycle by implementing coping strategies. As stated in a region memorandum, completion in CY 2002 required "a number of less-than-desirable" coping measures that would need to extend into CY 2003 due to anticipated continued shortfalls of inspection resources (from an FTE or technical skill perspective).

Agency Attempts to Address Challenges

In an effort to alleviate some of the challenges to complete the baseline inspection program in CY 2003, the agency took a number of actions, most notably, double-encumbering of inspector positions, continuation of the minimum level of inspection effort, and the identification of former inspectors available from headquarters to assist with baseline inspections.

Double-encumbering

IMC 2515 was revised in April 2003 to give regional administrators the authority to "double encumber" the resident and senior resident inspector positions at operating commercial nuclear power plants. This limited "early reassignment" was expected to minimize the number and duration of gaps in inspector assignments and site coverage due to personnel changes. The new policy allows for assignment of a permanent resident inspector up to 12 months before the planned departure of the incumbent and 6 months for senior resident inspectors. NRR appropriately cautioned the regions that close management be exercised to ensure that resources expended to complete the baseline inspection program were not increased solely as a result of the additional inspectors on site.

In practice, double-encumbering is only effective when there is advance notice of a proposed vacancy. However, according to NRR, resident vacancies frequently occur with little notice. For example, an inspector leaving for a promotion may give only two weeks notice. As a result, there is little opportunity for the regions to implement double-encumbering to address gaps in resident vacancies and, thereby, assist in completing the baseline inspection program.

Continuation of Minimum Level of Effort

In a May 2003 memorandum to the regions, NRR established guidance for completion of the CY 2003 baseline inspection program stating that completion of the minimum baseline inspection program is a "fundamental annual objective in support of the [NRC] strategic goal of maintaining safety." To ensure the program could be completed, NRR specifically requested the four regions to perform only the minimum samples, wherever possible, based on the safety performance at each plant. Headquarters recognized that some inspectors believed that more than the minimum was warranted at some plants but cautioned that any additional inspection effort should be "judiciously applied and focused in those specific areas only where needed." In addition, headquarters requested the regions to continue with similar coping measures to those employed during CY 2002.

In response, two regions again identified a need for assistance to complete the minimum baseline inspection program primarily due to a shortage of qualified inspectors and diversion of inspectors to non-baseline activities. Despite applying numerous coping strategies (e.g., reduced preparation and

documentation effort, deferred training, delay of "full" inspector qualifications), these regions projected a need for between 43 and 120 weeks of outside assistance to complete the minimum baseline requirements. Both regions stated a preference for individuals with full or previous qualifications and those with knowledge of the ROP.

Identification of Former Inspectors

Headquarters responded to the regions' requests for assistance by providing a chart of former and current-certified inspectors (currently in positions within NRR) and what level of qualification they retained. NRR intended that these individuals would provide help in completing baseline inspection programs where needed. However, some of the identified inspectors were qualified at only the "basic" level. The use of "basic" qualified inspectors helps the agency meet the criteria for site coverage, but the practice places an extra burden on senior resident inspectors because headquarters instructed that inspectors having "basic" certification could only inspect under "close supervision." Therefore, there is not a 1-for-1 payback from this type assistance because "basic" certified inspectors cannot independently conduct baseline inspections.

Commission notified of impediments to completing the program

In the last quarter of the CY 2003 inspection cycle, the EDO notified the Commission that the loss and shifting of resources impacted the agency's ability to have two qualified resident inspectors at each site. As a result, upon evaluation of inspection resource challenges in future years, the FY 2004-2006 regional budget for plant specific inspection activities was increased by 15 FTE over the FY 2003 budget. The EDO anticipates that this additional regional FTE will alleviate resource challenges once the new staff become a pool of fully qualified inspectors who can relieve resident inspectors from diversionary activities, such as assisting in supplemental inspections. However, filling the new positions may prove difficult given the agency's recent experiences with the inability to retain the existing inspectors. For example, 27 of the 74 resident inspector positions were vacant at some point during CY 2003 and 14 senior resident inspectors left the program in CY 2003 for various reasons, including promotions, reassignments, and retirement. In addition, the full benefit of the new FTE will not be realized until they are fully qualified as inspectors which takes approximately two years.

Summary

The regions experienced numerous resource challenges in completing the baseline inspection program in CYs 2002 and 2003. Coping strategies, encouraged by headquarters in CY 2002 as one-time measures, continued in CY 2003. The agency anticipated some relief to the resource challenges by allowing more flexibility in use of "basic" qualified inspectors and early assignment of new resident inspectors. Yet the value of both measures was

limited because there is not a 1-for-1 payback in conducting and completing baseline inspection procedures using "basic" qualified inspectors and there is little opportunity to implement the double-encumbering policy.

The agency anticipates that the allocation of an additional 15 FTE to inspection activities will alleviate some future problems in meeting the baseline inspection program by relieving resident inspectors of diversionary activities. But, the full benefit of a new, fully qualified inspection FTE will not be realized for at least 18-24 months after those positions are filled. Because regions have had a difficult time keeping vacancies filled, despite aggressive recruiting, challenges will likely persist until FY 2006. The persistent use of coping strategies and continual shifting of resources that results from the shortages warrants close management attention. Without sufficient management oversight, pressure on completing the program could, among other things, result in:

– inspector "burnout,"

– delayed inspector qualifications (which continues the burden on fully qualified staff),

– choosing easier rather than "smart" samples to meet the minimum program, and

– deferrals of biennial and triennial inspections to sometime later in the required time frame (which could, according to a region senior executive, result in some areas going nearly four or six years before being inspected).

OIG notes that the actual resources needed for completion cannot be determined until the size of the program is established and justified.

RECOMMENDATION

OIG recommends that the Executive Director for Operations:

5. Develop a planned, scheduled approach for phasing out the use of the coping measures.

C. THE RESIDENT INSPECTOR TRAINING PROGRAM NEEDS IMPROVEMENT

NRC requires specific training for baseline inspection program inspectors and there is a comprehensive inspector training program in place. However, there is room for improvement. Specifically, (1) inspectors are occasionally required to inspect areas outside of their comfort zone, (2) inspectors are occasionally assigned to plants outside their specific training, and (3) there is no requirement for inspectors to receive vendor-specific training. As a result, the agency may not be maximizing the efficiency and effectiveness of its

resident inspectors and those inspectors may miss opportunities to identify performance problems.

Background

Inspector at work
(Photo courtesy of NRC Website)

IMC 1245 defines the training requirements for NRC inspectors. The objective of the program is to ensure that NRC staff have the knowledge and skills necessary to successfully implement the agency's inspection programs, including the baseline inspection program. According to guidance, inspectors must understand the facilities, equipment, processes and activities of the program, as well as the criteria, techniques, and mechanics of implementing the program.

There are two levels of inspector qualifications: "Basic" and "Full." A Basic Inspector Certification allows an inspector to perform limited scope inspection activities under an appropriate degree of detailed supervision (from fully qualified inspectors). Fully qualified inspectors can independently perform the full scope of inspection activities with only routine oversight and supervision.

Every inspector is expected to understand the technology associated with their assigned plant and apply concepts in various technical areas to allow the NRC to carry out its overall responsibilities. Inspectors need to develop and maintain an understanding of how basic nuclear plant design and operations provide for protection of public health and safety, and use knowledge of a specific reactor type to identify, address, and resolve regulatory issues. In order to receive "full" certification as a resident inspector, staff are required to take a Reactor Full Series course for one nuclear technology — either boiling-water reactors (BWR) or pressurized-water reactors (PWR).

Inspector Assignments

The agency's intent is that inspectors will be assigned to plants which match the training they have received due to significant differences between the nuclear technologies. In fact, the majority of resident inspectors have had the technology training for their assigned plants, as intended. However, there are at least six instances where an inspector is mismatched to the technology at the plant to which they are assigned, four of which are senior resident inspector assignments. For example, a permanently assigned resident inspector had not received technology series training; a reactor engineer on a 6-month rotation as a resident inspector at a BWR plant had not taken the BWR simulator training class; and the senior resident inspector at a PWR plant is a BWR-trained inspector.

Resident inspectors are required to have a general knowledge of plant operations and systems in order to perform baseline inspections. However, there are a number of baseline inspection procedures, in areas such as radiation health and physical security protection, that require or suggest performance by specialists (e.g., inspectable area experts). Because of shortages of qualified staff, resident inspectors have been tasked with performing more of these types of specialized inspections.

OIG asked more than 20 resident and senior resident inspectors if they felt "fully qualified to perform all inspection procedures required of your position?" Overall, the inspectors responded that they are comfortable that they possess the knowledge and qualifications to perform required inspections. However, nearly half of the inspectors identified at least one area where their level of comfort could be improved. Five areas, in particular, were cited by multiple resident inspectors where inspections should more appropriately be performed by specialists: fire protection, diesel generators, physical security, motor-operated valves, and inspections related to the Temporary Instruction on lower reactor vessel heads. OIG is aware of at least one occurrence where an inspector asked management for expert help to review a situation within one of the five areas identified above, but outside that inspector's area of expertise. The inspector was told that a shortage of resources would prevent getting the requested assistance. The inspector was tasked, and agreed, to do the review, but documented the level of discomfort.

Vendor-specific Differences

There are multiple vendors for PWRs (e.g., Westinghouse, Babcock & Wilcox, and Combustion Engineering) and multiple vintages of BWRs (e.g., General Electric (GE) 2 through 6). Agency training experts attest that there are not only significant differences between technologies, but also between specific vendors and models within the same technology. Yet, there is no requirement for inspectors to receive specific vendor training because there is a presumption that all PWRs and all BWRs are basically alike. Without having vendor-specific knowledge, inspectors, especially those with less experience in the field, could miss opportunities to recognize degraded utility performance and safety issues.

There are numerous inspectors currently assigned to plants built by vendors other than those for which they have received training. It is realistic to conclude that those numbers will increase as the shortage of qualified inspectors continues. In particular is a situation identified at one commercial nuclear power plant where, according to cognizant staff, there was a complete turnover of the NRC inspection staff at the plant, resulting in a full complement of new inspectors. At the time of their assignments, none were trained in the appropriate vendor-specific technology. Because the once-per-year training course for this technology was full, it was possible that the

three new inspectors would not get the needed training for more than a year. (OIG notes that region management did get two of the three inspectors into the course in April 2004 — more than six months after being assigned.)

When the agency's 17 technical instructors were asked by OIG whether resident inspectors should have vendor-specific training for the plants where they are assigned, 15 of the 16 respondents answered "yes." The instructors presented compelling arguments to support that vendor-specific training would benefit the inspection program. Examples of instructor comments follow:

- All PWR vendors use different features, like rod movement, so an inspector would need vendor-specific training to effectively evaluate a utility's performance.

- An inspector trained on a plant design different from that where he/she is assigned would be insufficiently familiar with the assigned plant or would potentially have to perform a great deal of additional research to develop, understand, or assess findings in areas for which there are no counterparts in the plant design for which he/she received training. This situation is not as efficient or effective as a course specifically targeted to teaching the specifics prior to assignment.

- The GE design is significantly different from the Westinghouse, Combustion Engineering and Babcock & Wilcox design so training would be very important to someone with no experience in the GE design.

- Vendor-specific training would enhance the inspectors' ability to provide an informed, independent assessment of dynamic plant conditions during an event.

One instructor, speaking as a former senior resident inspector, said that information received in the technology classes contributed directly and substantively to the quality of work performed. The instructor stated that "had I been required to figure it all out upon arrival on site, as opposed to having a reference to look to, I could not have been as successful as I was." And finally, an NRR executive said a real concern with inspector interns is that, although the interns are required to qualify on at least one of the plant types (e.g., BWR or PWR), they have no experience at all in actual plant operations. "The lack of vendor-specific training compounds that problem."

Summary

It has become increasingly important to have inspectors work as efficiently as possible given the challenges faced by the agency to keep qualified inspectors available for baseline inspection activities. As discussed in the previous finding, the agency is relying more on inspectors who have only a "basic" certification to fill the numerous resident inspector slots which results in more inspectors with less experience in the field. In addition, resident

inspectors are being tasked to conduct inspections in areas outside of their comfort zones. There are many possible negative outcomes from inspecting outside an area of expertise, being unfamiliar with vendor specifics, or being mismatched between technology training and assigned plant. These include (1) missed opportunities to recognize degradation and non-compliance, (2) inappropriate assessment of inspection findings, (3) impaired evaluation of a utility's performance and safety, and (4) unfamiliarity with specific emergency operating procedure approaches.

RECOMMENDATIONS

OIG recommends that the Executive Director for Operations:

6. Provide additional management guidance for assigning inspectors to perform inspection procedures to ensure that inspectors are adequately qualified for their assignments.

7. Provide guidance for vendor-specific training in resident inspector training requirements.

D. THE REPORT OF 100 PERCENT BASELINE INSPECTION PROGRAM COMPLETION IN CY 2002 IS NOT FULLY SUPPORTED BY DOCUMENTATION

In CY 2002, NRC guidance required 100 percent completion of the minimum samples specified in all baseline inspection program inspection procedures. Overall, for those plants sampled, the majority of the baseline inspection program was completed in CY 2002, as required. However, there are numerous examples of incomplete or missed procedures, due mainly to inconsistent interpretation of completion requirements and reliance on inaccurate data, which were not properly identified to headquarters. Additionally, available documentation does not support completion of inspection requirements for a number of baseline procedures, especially in the areas of Radiation Protection and Physical Security Protection. Therefore, agency records did not sufficiently support NRC's claim that 100 percent of the required baseline inspection program was completed at all reactor sites in the CY 2002 inspection cycle. As a result, despite the belief of agency managers that the intent of the program was met, NRC may not have a comprehensive view of plant operations which could hinder NRC's ability to evaluate plant operations. Finally, inaccurate reporting undermines NRC's credibility which could impact public confidence.

Background

In 2000, the agency established the baseline inspection program as the ***minimum*** level of oversight necessary to assess licensee performance. According to IMC 2515, baseline inspections constitute an appropriate level of inspection at plants whose overall performance remains in a good category. The overall objective of the program is to monitor all power reactor

licensees with a consistent level of defined requirements to indicate whether licensees' performance meets the objectives for each cornerstone of safety. The baseline inspection program defines the planned activities (i.e., inspection procedures) to monitor licensee performance over a 12-month period (i.e., an ROP cycle).

In 2002, OIG's audit of various elements of operations at the four NRC regional offices[22] concluded that reporting on completing the baseline inspection program was a challenge for NRC staff and management. Regional managers stated that they received limited guidance on the definition of terms, results presentation, procedures for data collection and computations, and expectations for quality control. Due to its importance in supporting the agency's mission, OIG again sampled the extent of baseline inspection program completion using data for the CY 2002 inspection cycle. (For a full discussion of the results of OIG's review, see Appendix D.)

Program and Reporting Responsibilities

NRC's four regions constitute the agency's front line in carrying out its mission to protect the health and safety of the public by ensuring the safe operation of nuclear power plants. The regions track their accomplishments in these areas against performance metrics established jointly by headquarters and regional managers. For example, according to IMC 2515, each regional office is responsible for developing annual site-specific baseline inspection plans. However, NRR senior managers are responsible for the overall program direction, revisions to the program, as well as overseeing regional implementation.

Baseline inspection results are reported in formal reports, in accordance with the guidance and requirements of IMC 0612. Two of the objectives of inspection reports are: (1) clearly communicate significant inspection results in a consistent manner to licensees, NRC staff, and the public, and (2) provide inspection results as one input into the Operating Reactor Assessment Program of the ROP.

Completion Requirements

Completion of the baseline inspection program is a mechanism for NRC to remain alert to plant status and conditions at all licensed reactors, and supports the goals and objectives of the ROP. To determine that the objectives of the inspection procedures have been met, each baseline

[22] NRC Reports (all dated February 26, 2003) - OIG-03-A-06, *Management Audit of Region I*; OIG-03-A-07, *Management Audit of Region II*; OIG-03-A-08, *Management Audit of Region III*; OIG-03-A-09, *Management Audit of Region IV*; and OIG-03-A-10, *Headquarters Action Needed on Issues Identified from Regional Audits*.

procedure contains specific inspection requirements. There are more than 40 inspection procedures, each with a specific minimum sample size and/or level of effort prescribed. (See Appendix E for a list of baseline inspection program procedures.)

The inspection activities and minimum sample sizes must be completed to provide an adequate assessment for each cornerstone. Inspection procedure completion status is to be documented in the NRC's Reactor Program System.

Baseline Performance Goal

The agency recently changed its performance requirements for completion of the baseline inspection program for an annual inspection cycle. (These changes will be discussed later in this report.) However, for ROP inspection cycle 3 (ROP3), the scope of this review, the definition of completion was performance of 100 percent of all required inspection procedures at each plant.

Performance Measure for Planned Accomplishment Code 103-140, *Baseline Inspections* (per NRR Fiscal Years 2002/2003 Operating Plans)

Program	Type of Measure	Describe what needs to be measured	Target
Reactor Inspection	Outputs	Extent of program completion at each operating power reactor annually	100% at end of cycle

In an April 21, 2003, paper to the Commission,[23] the EDO reported that the baseline inspection program was completed during ROP3 (CY 2002) in all regions. He added that all annual and biennial inspections were completed by the end of CY 2002. Subsequently, the agency reported to Congress that the baseline inspection program was completed for CY 2002 (i.e., 100 percent of all required procedures completed per IMC 2515).

Results of OIG's Baseline Completion Review

Documentation is a basic quality control procedure. Therefore, documentation should be complete and accurate and should facilitate tracking the transaction or event and related information. Documentation should also be purposeful and useful to managers in controlling their operations and to others involved in analyzing operations or decision

[23] SECY-03-0062, *Reactor Oversight Process Self-Assessment for Calendar Year 2002,* dated April 21, 2003.

making. Without adequate documentation, senior management does not know if metric data is reliable and can be used for making meaningful decisions.

Overall, the agency completed the majority of required baseline inspection procedures for those plants sampled. However, throughout the review of inspection completion for CY 2002, OIG found occurrences of incomplete procedures at all four regions due, in large part, to documentation problems (see partial list of examples below). Therefore, agency records do not support its reported claim that 100 percent of the baseline inspection program was completed for CY 2002.

Examples of Incomplete Baseline Inspection Procedures ROP3 for CY 2002

Procedure No.	Procedure Title	Condition	Cause
71114.06	*Drill Evaluation*	incomplete sample	double-counted procedures
71111.14	*Personnel Performance During Nonroutine Evolutions and Events*	½ the required samples done	ambiguous language
71111.23	*Temporary Plant Modifications*	incomplete sample	lack of documentation
71114.04	*Emergency Action Level & Emergency Plan Changes*	incomplete sample	inaccurate documentation
71121, 71122, & 71130 Series	*Radiation Protection and Physical Security Protection*	unable to discern actual sample size	weak or inconsistent supporting documentation

The lack of clearly identifiable samples and weak supporting evidence in inspection reports occurred due, in large part, to insufficient guidance on how, and what, to document to demonstrate completion. Specific reasons identified by agency managers for failure to meet the 100 percent completion target of some procedures in CY 2002 included:

- inconsistent interpretations of completion,
- lack of quality controls related to the Reactor Program System (i.e., access, validation of data),
- confusion over which procedures can be "double-counted,[24]" and

[24] OIG used the term "double-count" to mean crediting the conduct of samples for one procedure towards the sample size of another procedure.

- ambiguous language in the procedure resulted in identifying incorrect sample sizes.

Similar to the information communicated to region managers during our 2002 regional reviews, OIG found insufficient documentation during this audit to support reported sample sizes by all four regions, especially with the Radiation Protection and Physical Security Protection inspection procedures. Some of these weaknesses may have contributed to NRC managers' inability to identify an incomplete program. For example,

< report language does not describe the required inspection activities necessary to support that the intent of the procedures were met, and

< report language does not consistently identify which inspection is satisfied (i.e., annual or biennial inspection, "full" or "partial" inspection activity).

Reliance on the Reactor Program System

Managers rely on data from baseline tracking tools, like the Reactor Program System, to determine completion status and they expect their inspectors, or their designees, to enter samples accurately. However, within OIG's sample, numerous data reliability and validity issues were identified with the Reactor Program System data. Given the limited nature of the sample, the extent of the inaccuracies is unknown. OIG will address issues with the Reactor Program System in a future audit.

Summary

The baseline inspection program is the *"minimum"* inspection oversight that should be conducted at each plant with a 100 percent completion performance target. While the majority of the required baseline procedures were completed in CY 2002, baseline inspection program records could not sufficiently support the agency's reported 100 percent completion rate. The cited weaknesses in documentation and completion data presented management with challenges for interpreting reported results. Regional managers and inspectors again stated that they have received limited guidance on the definition of terms, results presentation, procedures for data collection and computations, and expectations for quality control. For example, regional managers expressed confusion about which procedures could be combined for "double-counting" samples.

When internal assessment data is included with data reviewed at the agency level, there must be an expectation that some agency managers will use the information to make assessments or draw conclusions about the particular program. Therefore, any data reported must be sufficiently reliable for that purpose. To meet that goal, the process for compiling, reviewing and reporting the data must have adequate management controls.

Absent such assurances, the usefulness of baseline inspection program information for decision making is limited. For example, if the completion data in the Reactor Program System is not accurate, NRC managers cannot be assured that the "minimum" baseline inspection program has been accomplished. If the defined "minimum" program is not completed, NRC may not have a comprehensive view of plant operations which impacts the agency's ability to assure safe plant operations. Finally, NRC's inability to provide sufficient documentation to support the reported 100% completion of the baseline inspection program undermines the agency's credibility which could compromise public confidence in NRC.

RECOMMENDATION

OIG recommends that the Executive Director for Operations:

8. Improve baseline inspection program guidance to include:

   a) direction for implementing a baseline inspection program completion tracking process using RPS to collect inspection completion data at a plant level and in real-time,

   b) how to document completion and sample sizes in inspection reports, and

   c) whether performance of one inspection procedure sample can be counted as a sample for another.

E. GUIDANCE IS UNCLEAR FOR NEW BASELINE COMPLETION CRITERIA

For CY 2004, baseline inspection program completion has been redefined to be "not more than four (4) inspection procedures not completed, per Region." Agency documents indicate the change provides needed flexibility in completing required inspections. However, headquarters has provided little guidance to region managers regarding its expectations regarding the allowance of four non-completed procedures. This may result in possible misuse of allowances and/or inconsistent application in and across regions, insufficient information to assess licensee performance and, thereby, impact public confidence in NRC's oversight activities.

Background

Since its inception, completion of the ROP's baseline inspection program has been defined as performance of 100 percent of the minimum sample size for all required inspection procedures at each plant. For the CY 2004 inspection cycle, NRC redefined completion to allow no more than four non-

completed inspection procedures per region. This annual allowance of sixteen non-completed inspection procedures equates to an annual completion rate of "greater than 99.5 percent."

Reason for Change

The new allowance for non-completed inspection procedures is intended to provide for unanticipated disruptions in inspection scheduling that unavoidably cause an inspection procedure or attachment to not be completed. It also presumes that at least the minimum inspection requirements will otherwise be completed as soon as possible within the quarter immediately following the annual inspection cycle. The agency asserts that achieving this level of performance still provides a basis to conclude that the intent of the program has been met and, therefore, can be reported as complete for each annual cycle.

Management Uncertainties

NRC's inspection manual states the new completion requirements, however headquarters and region managers have differing interpretations of the new performance measure and its planned usage. While some managers express different assumptions and expectations, all agree there has been little, if any, actual discussion regarding the changed parameters, and no formal guidance provided by headquarters. For example, in a recent discussion about the new criteria, a cognizant headquarters' manager stated that all required procedures are expected to be completed at all plants within the year cycle, though as many as 16 procedures could be postponed for up to three months in warranted situations (e.g., samples not available within the inspection year). Yet, one region executive stated that the actual goal is still 100 percent completion and the flexibility to miss procedures is the fallback goal, while another region has already changed its performance measure to reflect less than 100% completion.

Because the guidance and criteria provided regarding this change is unclear, region managers could not answer important questions about its application. Specifically, OIG asked:

- Is it reasonable to miss all four procedures at one plant, or all in risk significant areas?
- Are there procedures which **cannot** be among those missed?
- Are there specific plants where **all** procedures must be completed, despite the region-wide allowance?
- What kind of tracking will be maintained to ensure that each plant does not come in at the end of the cycle with four missed procedures?

Without clearly communicating its expectations regarding the new performance goal, the agency risks inconsistent application, at a minimum. Less likely, but potentially more worrisome, would be possible widespread misuse of the allowance (due to the absence of tracking which procedures at which plants are not being completed). It is important to note that NRC previously established that 100 percent completion of all inspection procedures was the "minimum" oversight necessary to assess licensee performance. Without a sound basis for justifying any reduction in the criteria, public confidence could be impacted.

RECOMMENDATIONS

OIG recommends that the Executive Director for Operations:

9. Clarify existing guidance regarding the expectations and requirements for invoking the new completion criteria.

10. Provide a method for tracking inspection procedures not performed as required by years end in order to ensure that each region stays within the four-procedure allowance.

IV. CONSOLIDATED LIST OF RECOMMENDATIONS

OIG recommends that the Executive Director for Operations:

1. Document the basis and rationale for the determined baseline inspection program sample sizes, including a discussion of when, or why, to use more than minimum samples.

2. Develop guidance on how to identify human performance trends and how that information should be integrated into the reactor oversight process.

3. Develop and implement guidance for documenting, tracking, and trending informal inspection issues.

4. Define "effectiveness" as it pertains to the ROP and establish performance measures and targets to demonstrate that the baseline inspection program meets that definition.

5. Develop a planned, scheduled approach for phasing out the use of the coping measures.

6. Provide additional management guidance for assigning inspectors to perform inspection procedures to ensure that inspectors are adequately qualified for their assignments.

7. Provide guidance for vendor-specific training in resident inspector training requirements.

8. Improve baseline inspection program guidance to include:

   a) direction for implementing a baseline inspection program completion tracking process using RPS to collect inspection completion data at a plant level and in real-time,

   b) how to document completion and sample sizes in inspection reports, and

   c) whether performance of one inspection procedure sample can be counted as a sample for another.

9. Clarify existing guidance regarding the expectations and requirements for invoking the new completion criteria.

10. Provide a method for tracking inspection procedures not performed as required by years end in order to ensure that each region stays within the four-procedure allowance.

V. AGENCY COMMENTS

On August 30, 2004, OIG discussed its draft report with agency senior executives. Subsequent to that meeting, OIG met with NRR senior managers to address issues and comments needing further clarification and/or explanation. On November 23, 2004, the EDO provided a formal response to this report in which he agreed with nine of the report's eleven recommendations. However, the EDO stated that Recommendation 3 is not appropriate under the current ROP philosophy and that Recommendation 5 would be better addressed through the agency's response to Recommendation 4. The EDO's transmittal letter and specific comments on this report are included as Appendix F.

This final report incorporates revisions made, where appropriate, as a result of the subsequent meetings and the agency's informal and formal written comments. Because OIG takes exception to the agency's comments regarding Recommendations 3 and 5, a point-by-point analysis is presented in Appendix G. Recommendation 5 has been retracted and will be addressed, as the agency requested, through the agency's response to Recommendation 4. However, upon submittal, OIG will evaluate the agency's proposed plan of action for addressing Recommendation 4 to ensure that the intent of Recommendation 5 is incorporated.

APPENDIX A

SCOPE AND METHODOLOGY

The reactor inspection and performance assessment program is mission-critical for NRC. Therefore, because all elements of the program must be effective and efficient in order for NRC to meet strategic and performance goals, OIG will be reviewing each of the elements of the ROP. In 2002, OIG reported on the Significance Determination Process, an important part of the baseline inspection program, and found that a number of improvements were needed. Review of another element of the ROP (e.g., performance indicators or the reactor assessment process) is included in OIG's future plans.

The scope of this review was limited to the ROP's baseline inspection program. The objectives were to determine whether the baseline inspection program:

(1) is based on a sound methodology,

(2) is carried out by sufficient, qualified staff, and

(3) is completed at all operating commercial nuclear power plants.

For the third objective, the auditors examined a sample of program results for CY 2002, the last full year of program operation at the time of this review.

To address the audit objectives, OIG reviewed relevant management controls and related documentation, including reviews of:

- Management Directive 8.13, *Reactor Oversight Process*
- IMC 0102, *Oversight and Objectivity of Inspectors and Examiners at Reactor Facilities*
- IMC 0307, *Reactor Oversight Process Self-Assessment Program*
- IMC 0308, *Reactor Oversight Process (ROP) Basis Document*

and conducted interviews with more than 100 individuals, including:

C 40+ headquarters and region senior managers,

C 7 of 14 ROP development team members,

C resident inspectors and licensee management at 11 nuclear power plants,

C region-based senior reactor analysts,

- representatives from the Nuclear Energy Institute,
- representatives from public interest groups,
- a State resident inspector,
- the NRC statistician, and
- Department of Transportation OIG audit staff

This audit progressed in two phases. OIG began its review of the baseline inspection program in August 2003. In response to an agency request in February 2004, OIG reviewed the agency's Operating Experience Task Force Report and subsequently issued a memorandum report in March 2004. OIG completed its full assessment of the baseline inspection program in May 2004.

This audit was conducted in accordance with generally accepted Government auditing standards and included a review of management controls related to the objectives of this audit. The major contributors to this report were Russ Irish, Team Leader; Cathy Colleli, Audit Manager; and Robert Moody, former Audit Manager.

APPENDIX B

DISCUSSION OF GUIDANCE ON PERFORMANCE AND OUTPUT MEASURES

Planned Accomplishments

At least as early as October 1998, NRC established guidelines for ***internal*** output measures for Planned Accomplishments.[25] A model was provided which suggested establishing metrics for:

- effectiveness [the accomplishment of the desired result]
- efficiency [accomplishing the desired result without wasting resources]
- quality [degree of excellence]
- quantity [how many]
- timeliness [performance of the activity within defined milestones]

NRC offices were required to establish, at a minimum, an effectiveness metric at the Planned Accomplishment level if there were no performance plan output measures for that accomplishment. For the period subject to this review, there was no performance plan output measure specifically defined for effectiveness in the baseline inspection program.

Operating Plan

The NRR FY 2004 Operating Plan describes the planning, budgeting, and performance management process as implemented by NRR. The process is directed toward achieving organizational effectiveness by:

- Setting strategic direction
- Determining Planned Accomplishments and resources by identifying critical activities necessary to achieve outcomes
- Measuring and monitoring performance against measures and targets
- Assessing performance

[25] NRC defines a Planned Accomplishment as a level of discrete activity below the program level, where FTE and budgetary resources can be identified.

The Operating Plan defines success for all Planned Accomplishments and includes planning templates for each accomplishment discussed in the plan. Each template establishes the measures of success and targets for NRR management.

For the baseline inspection program, there is one Planned Accomplishments Code, #103-140 - *Baseline Inspections,* which includes both Leadership and Operational measures and targets. Baseline inspection program performance results for measures in the Operating Plan are reported in the *NRR Rainbow Report,*[26] along with other performance statistics. OIG reviewed the baseline inspection program's performance measures and targets to determine whether they:

< tie to the NRC's mission and represent essential components of the program

< provide useful information to managers for decision-making

< provide a basis for comparison against a baseline of performance

< are clearly understandable in terms of measures and comparisons

< reflect the most important aspects of performing the activity

Inconsistencies in baseline inspection program objectives

In contrast to the objectives defined for the baseline inspection program in IMC 2515, Appendix A, the NRR Operating Plan planning template for Planned Accomplishments Code 103-140 describes the "Purpose" of the baseline inspection program's Planned Accomplishment as:

> To collect information providing objective evidence that power reactors are operated safely and do not pose an undue risk to the public, to identify declining safety performance, and to identify safety-significant issues that may have generic applicability.

The planning template "Purpose" statement actually reflects the objectives of the *Light-water Reactor Inspection Program–Operations Phase*, which encompasses all aspects of the inspection effort at power reactors, not just the baseline inspection program.[27]

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[26] The NRR Rainbow Report is available at http://nrr10.nrc.gov/rainbow/rbooks.html.

[27] Complete Light-water Reactor Inspection Program objectives are provided in NRC IMC 2515.

The stated Purpose of the baseline inspections Planned Accomplishment should be aligned with the objectives of the program. If this is not done, performance measures and targets may not be developed in alignment with program objectives.

OMB Guidance

In the President's Budget for FY 2004, OMB[28] describes its initiative to implement performance budgeting throughout the Federal government in 2005 as follows:

> The agency should develop a 'performance budget,' organized like its Strategic Plan that matches resources with outputs and justifies resources requested by the effectiveness at influencing the desired outcomes.

As OMB describes for budgeting purposes, NRC must link the performance of day-to-day activities, like baseline inspections, to long-term, higher level performance goals in order to build a solid foundation for managing program performance and achieving performance and strategic goals.

Strategic Plan - Goals and Performance Measures

The NRC has developed strategic goals consistent with its mission. These strategic goals are supported by performance goals, which represent outcomes the NRC plans to achieve over the period covered by the FY 2004-FY 2009 Strategic Plan. In NRC's Strategic Plan, Performance Goal 1[29] is: *Ensure protection of public health and safety and the environment*. There are several performance or outcome measures associated with this goal.[30]

Planning Template Performance Measures

Item #6: In accordance with OMB's guidance, NRR's operating planning template Item #6: *Tangible Contribution,* asks What is the tangible contribution to the outcome goals...in the core activity from doing this work?

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28 Office of Management and Budget Circular No. A-11, *Preparation, Submission, and Execution of the Budget*, revised July 16, 2004.

29 NUREG-1614, Vol. 3, *U.S. Nuclear Regulatory Commission Strategic Plan, FY 2004-FY 2009*, dated August 2004.

30 (1) No more than one event per year identified as a significant precursor of a nuclear accident, (2) No statistically significant adverse industry trends in safety performance, (3) No events resulting in radiation overexposures from nuclear reactors that exceed applicable regulatory limits, (4) No more than three releases per year to the environment of radioactive material from nuclear reactors that exceed the regulatory limits, and (5) No breakdowns of physical security that significantly weaken the protection against radiological sabotage or theft or diversion of special nuclear materials in accordance with abnormal occurrence criteria.

(What will success look like or what will we measure to know that this activity was successful? Specific quantitative terms.) Planning template item #6 asks how baseline inspections contribute tangibly to the agency's outcome goals. Item #6 also asks for a specific quantitative measure of baseline inspections success. The response to item #6 is:

> Provides information to allow management to make decisions regarding licensee safety performance. Maintained safety is reflected in a technically credible basis for reactor performance assessments, as reflected in inspection reports and performance indicator information. Public confidence is supported by a stable, predictable, and understandable process.

The answer to item #6 does not provide specific quantitative terms for measuring baseline inspections' tangible contribution to the outcome goals and does not describe what should be measured to know that baseline inspections were successful.

Items #7 & #9: Planning template items #7 and #9 ask for other performance measures, at the leadership and operational levels, respectively, that should be used to ensure that this Planned Accomplishment is in control. The table presented in Appendix C shows the results of OIG's analysis of the specific leadership and operational performance measures and targets. At the operational level, management should include, when possible, measures for each of the performance categories: effectiveness, efficiency, quality, quantity, and timeliness. It is important to have clear drivers or targets in each area to ensure the program effort is not "pushed" in any one direction at the expense of others.

Effectiveness

October 1998 Operating Plan guidance from the Office of the Executive Director for Operations stated that:

> A major area targeted for improvement in the FY 1999 operating plans is the establishment of effectiveness metrics. All other metrics are superfluous if the program is not achieving its desired results or outcome. Effectiveness is also at the heart of self assessment. Therefore, effectiveness metrics are a required element for the FY 1999 operating plans.

Annual Review of Baseline Inspection Procedures

IMC 0307 was issued and currently requires certain staff, called inspectable area leads,[31] to monitor and report on the effectiveness and efficiency of inspection activities and program objectives within their assigned areas of responsibility. One of the primary objectives of this annual review is a critical 'big picture' evaluation of "all of the inspectable areas together to justify retaining them in the baseline inspection program, or determine if the addition of a new inspectable area is warranted."

In accordance with IMC 0307, multiple inspectable area leads[32] recently completed the CY 2003 annual reviews of their assigned baseline procedures.[33] They did not identify the need for any significant changes to the inspection program overall (i.e., either the addition or removal of inspection procedures). While there were a couple of procedures that were revised, the staff mainly recommended minor adjustments to levels of effort (i.e., hours), clarification of the definition of a sample, or how many samples constitutes completion.

Although references to "effectiveness" appear in the individual procedures, as noted by the focus group, and as seen in the NRR Operating Plan, the agency has not defined what effectiveness means for the baseline inspection program. As a result, the agency cannot properly evaluate the effectiveness of the procedures, and thereby, the program. When a senior NRR executive was asked why there was no definition of "effectiveness," he said this issue has been on his radar because he too realized the "effectiveness" of the baseline inspection program had never been measured. Another executive said that as a first step, NRR is putting interim graded measures into effect, but NRR needs to get closer between the operating plan and their strategic goals.

Quality Measures

In addition to effectiveness, "Quality" metrics should be developed. Monitoring only other types of measures and targets can drive performance in another direction at the expense of quality. For example, there is no measure showing whether inspectors do quality inspection work, a critical component of baseline inspection program success. Such a measure might, for example, reflect the quality of inspection samples chosen.

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31 An "inspectable area lead" is a person in the Division of Inspection Program Management of NRR assigned responsibility to oversee and manage the use of individual baseline inspection procedures or attachments to those procedures.

32 For CY 2003, there were approximately 11 different NRR staff members serving as Inspectable area leads.

33 The annual review did not include the physical protection procedures which were covered under a current NRC temporary instruction.

Inconsistency in Performance Measure Guidance

IMC 2515, section 04.07, *Baseline Inspection Program Completion* states that:

> Baseline Inspection Program completion for an ROP annual inspection cycle is defined to be not more than four (4) inspection procedures not completed, per Region. This 16 inspection procedure allowance per year nationwide equates to an annual completion rate greater than 99.5%.

IMC 2515 thus defines the performance target for completion of the baseline inspection program as 99.5% completion. However, the completion performance target in the FY 2004 Operating Plan is 100%.

IMC 0307 - Inspection Program Metrics

IMC 0307 also includes the inspection program metrics used in the annual reactor oversight process self-assessment. There are 11 inspection program metrics in IMC 0307. Of those, the following are also reflected in the performance measures reviewed above from the NRR Operating Plan for the baseline inspection program:

< Percentage of inspection findings documented in accordance with requirements

< Completion of baseline inspection program

< Inspection reports are timely

< Analysis of inspection hours

None of the other seven metrics provides a direct measure of baseline inspection program performance. Therefore, while IMC 0307 provides metrics beyond those in the Operating Plan, none change the results of the above review. For example, there are also no measures of effectiveness or quality in IMC 0307.

APPENDIX C

FY 2004 Operating Plan Baseline Inspection Program Performance Measures

Planned Accomplishment Code 103-140

Type of measure	What to measure	Target	OIG Evaluation
Leadership Team Measures and Targets			
Outputs	Extent of program completion at each operating power reactor annually	100% (as defined in IMC 2515 and 0306)	Quantity measure - In the absence of a quality measure, the emphasis on outputs/quantities could compromise quality.
Resources used	Budget (Total hours expended versus budget)	± 20% (monitoring only until appropriate levels are determined)	This measure should be used for trending.
Other	Adequacy of site coverage	100% of power reactor sites staffed in accordance with policy.	Quantity measure - shows compliance with guidance. However, this is a secondary measure related to the output measure above. That is, if the above output target isn't met, this could be a cause.
Operational Team Measures and Targets			
Outputs	Baseline program inspection	100% (as defined in IMC 2515 and 0306)	Quantity measure - In the absence of a quality measure, the emphasis on outputs/quantities could compromise quality.

Type of measure	What to measure	Target	OIG Evaluation
Productivity	Total hours expended implementing baseline inspections per region and per single-, dual-, and triple-unit site	Within 20% of estimate for single-, dual-, and triple-unit sites and within 10% of estimate per region	Efficiency measure - This measure provides efficiency information which is useful to management for budgeting and performance monitoring.
	Hours expended for direct inspection effort on baseline inspections as a function of total baseline hours per region (BI/BI+BIP+BID)	(This measure used for trending and monitoring only)	N/A
	Regional variance (per site average)	Within 20%	Clarify - is this related to the measure directly above this one?
	Overtime contribution to direct inspection effort (non-reg hrs/total hrs)	(This measure used for trending and monitoring only)	N/A
Quality	Inspection report findings are documented in accordance with program guidance in IMC 0612	90% of findings in the audited report sample are properly documented	Indirect Quality measure - This shows compliance with guidance and reflects the quality of report writing rather than the quality of the actual inspection finding.
	Ratio of qualified inspectors to total number of inspectors	Annual average of monthly ratios > (TBD)%	Indirect Quality measure - provides assurance that inspectors are qualified to perform good inspection work.
Timeliness	issuance of inspection reports	90% of reports issued within time limits (30 days/45 days)	Indirect timeliness measure - good information but doesn't directly measure whether inspections themselves are performed timely.
Resources used	Budget (Total hours expended versus budget)	± 20% (monitoring only until appropriate levels are determined)	This Efficiency measure should be used for trending purposes.

At the operational level, management should include, when possible, measures for each of the performance categories: effectiveness, efficiency, quality, quantity, and timeliness. It is important to have clear drivers or targets in each area to ensure the program effort is not "pushed" in any one direction at the expense of others.

APPENDIX D

DETAILS OF OIG'S REVIEW OF CY 2002 BASELINE INSPECTION PROGRAM COMPLETION

Program responsibilities

NRC's four regions constitute the agency's front line in carrying out its mission to protect the health and safety of the public by ensuring the safe operation of nuclear power plants. The regions track their accomplishments in these areas against performance metrics established jointly by headquarters and regional managers. For example, according to IMC 2515, each regional office is responsible for developing annual site-specific baseline inspection plans. However, NRR senior managers are responsible for the overall program direction, the revisions to the program, as well as overseeing regional implementation.

Reporting of inspection results

Baseline inspection results are reported in formal reports, in accordance with the guidance and requirements of IMC 0612. Two of the objectives of inspection reports are: (1) clearly communicate significant inspection results in a consistent manner to licensees, NRC staff, and the public, and (2) provide inspection results as one input into the Operating Reactor Assessment Program of the ROP.

Baseline performance goal

For the CY 2002 ROP3, the scope of this review, the definition of completion was performance of 100% of all required inspection procedures at each plant. In an April 21, 2003 paper to the Commission, the EDO reported that the ROP3 baseline inspection program was completed by the end of CY 2002 in all regions, including all annual and biennial inspections. Subsequently, the agency reported to Congress that the baseline inspection program was completed for CY 2002 (i.e., per IMC 2515, 100 percent of required procedures completed).

Completion requirements

To determine that the objectives of the inspection procedures have been met, each baseline procedure contains specific inspection requirements. There are more than 40 inspection procedures, each with a specific minimum sample size and/or level of effort prescribed. (See Appendix E

for a full list of baseline procedures.) The inspection activities and minimum sample sizes must be completed to provide an adequate assessment for each cornerstone. Completion status is to be documented in the NRC's Reactor Program System.

To test baseline completion for CY 2002, OIG selected a judgmental sample of 12 operating nuclear power plants, 11 of which were reviewed as part of this audit. Generally, the inspection cycle dates for ROP3 encompassed inspections performed from December 30, 2001 through December 28, 2002.[34]

Region I	Region II	Region III	Region IV
1. Beaver Valley	4. Browns Ferry	7. D.C. Cook	10. Arkansas One
2. Peach Bottom	5. Farley	8. Braidwood	11. San Onofre
3. Vermont Yankee*	6. St. Lucie	9. Kewaunee	12. Palo Verde

(*although Vermont Yankee was originally selected for review, time constraints prevented auditors from including this plant as part of the audit)

Results of Review

For those plants sampled, the regions completed the majority of the baseline inspection program for CY 2002. However, the following chart shows the missed or incomplete procedures which were not properly identified to headquarters.

[34] The inspection cycle dates for Region II plants varied slightly and began as early as December 16, 2001 and ended as late January 4, 2003, depending on the plant.

Results of CY 2002 Baseline Inspection Program Completion Sample

Region(s)	Procedure No.	Procedure Title	Condition	Cause
I	71114.06	*Drill Evaluation*	incomplete sample	double-counted procedures
II	71111.14	*Personnel Performance During Nonroutine Evolutions and Events*	incomplete sample	ambiguous language
II	71151.00	*Performance Indicator Verification*	incomplete sample	misinterpretation of guidance
II	71114.06	*Drill Evaluation*	incomplete sample	double-counted procedures
III	71111.23	*Temporary Plant Modifications*	incomplete sample	lack of documentation
IV	71111.04	*Equipment Alignment - Semiannual*	intent not met	both inspections in same quarter
IV	71114.04	*Emergency Action Level & Emergency Plan Changes*	incomplete sample	inaccurate documentation
IV	IP 71114.06	*Drill Evaluation*	incomplete sample	double-counted procedures
IV	71151	*Performance Indicator Verification*	no evidence of completion	lack of documentation
IV	71152	*Identification and Resolution of Problems*	no evidence of completion	lack of documentation
I, II, III, IV	71121, 71122, & 71130 Series	*Radiation Protection and Physical Security Protection*	unable to discern actual sample sizes	weak or inconsistent supporting documentation

Conclusion

All four regions reported to headquarters that 100% of the ROP3 baseline inspection program was complete for CY 2002. Subsequently, NRC reported to Congress that this performance measure was fully completed at all reactor sites in the CY 2002 inspection cycle. However, NRC inspection program records for the 11 operating nuclear power plants sampled were not sufficient to allow independent verification that all CY 2002 required baseline inspection samples were completed. For example, inspection reports did not always provide sufficient

documentation necessary to ensure the intent of the procedures were met. Also, for a number of procedures it was extremely difficult to determine from a review of inspection report documentation that at least the required minimum sample sizes were complete. [emphasis added]

Similar to those reported to each region during OIG's Regional Reviews, areas in the inspection reports needing improvement include:

– the number of samples were not clearly identifiable, especially in the Radiation Safety and Physical Security areas

– language used did not describe the required inspection activities necessary to support that the intent of the procedures was met

– reports did not identify whether the inspection satisfied an annual, biennial, or triennial inspection activity or if it is a semi-annual or "partial" inspection

– no indication that an inspection was conducted by a specialist, as required

Managers rely on data from the baseline tracking tools, like the RPS, to determine completion status and they expect their inspectors to enter samples accurately. However, within OIG's limited sample, numerous data reliability and validity issues were identified with the RPS data. Because of the limited nature of the sample, the extent of the inaccuracies in RPS is unknown.

APPENDIX E

BASELINE INSPECTION PROGRAM INSPECTION PROCEDURES

Procedure #	Procedure Title
71111	**Reactor Safety - Initiating Events, Mitigating Systems, Barrier Integrity**
71111.01	Adverse Weather Protection
71111.02	Evaluation of Changes, Tests, or Experiments
71111.04	Equipment Alignment
71111.05	Fire Protection
71111.06	Flood Protection Measures
71111.07	Heat Sink Performance
71111.08	In-service Inspection Activities
71111.11	Licensed Operator Re-qualification Program
71111.12	Maintenance Rule Implementation
71111.13	Maintenance Risk Assessments and Emergent Work Control
71111.14	Personnel Performance During Non-routine Evolutions and Events
71111.15	Operability Evaluations
71111.16	Operator Workarounds
71111.17	Permanent Plant Modifications
71111.19	Post Maintenance Testing
71111.20	Refueling and Outage Activities
71111.21	Safety System Design and Performance Capability
71111.22	Surveillance Testing
71111.23	Temporary Plant Modifications
71114.01	Exercise Evaluation
71114.02	Alert Notification System Testing
71114.03	Emergency Response Organization Augmentation
71114.04	Emergency Action Level and Emergency Plan Changes
71114.05	Correction of Emergency Preparedness Weaknesses and Deficiencies
71114.06	Drill Evaluation
71121	**Occupational Radiation Safety**
71121.01	Access Control to Radiologically Significant Areas
71121.02	ALARA Planning and Controls
71121.03	Radiation Monitoring Instrumentation
71122	**Public Radiation Safety**
71122.01	Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems
71122.02	Radioactive Material Processing and Transportation
71122.03	Radiological Environmental Monitoring Program and Radioactive Material Control Program

Procedure #	Procedure Title
71130	**Physical Protection**
71130.01	Access Authorization Program (Behavior Observation Only)
71130.02	Access Control (Search of Personnel, Packages, and Vehicles: Identification and Authorization)
71130.03	Response to Contingency Events (Protective Strategy and Implementation of Protective Strategy
71130.04	Security Plan Changes
	Other Baseline Procedures
71150	Discrepant or Unreported Performance Indicator Data
71151	Performance Indicator Verification
71152	Identification and Resolution of Problems
71153	Event Followup

APPENDIX F

AGENCY COMMENTS

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APPENDIX G

DETAILED OIG ANALYSIS OF AGENCY COMMENTS

Recommendation 3: Develop and implement guidance for documenting, tracking, and trending informal inspection issues.

Staff comments: Programmatic documentation, tracking and trending of minor findings, which includes what the OIG audit report calls informal inspection issues, is not appropriate and not required under the current Commission-approved Reactor Oversight Process (ROP) philosophy of a risk-informed approach. The inspection program was developed to be objective and includes guidance for establishing a minimum threshold for documenting and assessing inspection findings. Commission emphasis in Staff Requirements Memoranda for SECY-99-007A and SECY-00-0049 was to limit documentation and analysis of findings of lower safety significance. The resources saved from not having to programmatically document minor findings are intended to be directed toward areas where there may be findings of greater risk significance. Redirecting limited inspector resources toward formal monitoring of minor findings which are less than very low risk significance would detract from the intended safety focus of the baseline inspection program.

Although minor findings are not documented in inspection reports, the ROP explicitly allows minor findings to be conveyed to a licensee verbally for appropriate resolution. The feedback received from NRC regional managers indicates that this communication process is working well.

In summary, the additional resources required to develop and implement formal tracking and trending of minor inspection findings do not justify the benefit from such a program. Additionally, it would be contrary to the Commission's direction to use a risk-informed approach to focus agency and licensee attention on issues of risk significance.

We request that OIG consider retracting this recommendation

OIG Response:
The staff correctly states that SECY-99-007A and SECY-00-0049 provide the Commission's direction for a risk-informed ROP with emphasis on documenting information at a defined threshold based on risk significance. It is also correct that the ROP allows information falling below the designated threshold to be communicated verbally to licensees. OIG does not dispute that the verbal communication process works well. The issue is not the disposition of minor "findings" but rather those issues which fall below the threshold defined in the ROP as reportable in inspection reports.

NRC officials stated that they view informal issues as very important to improving plant operations. Licensee officials stated that they appreciate NRC inspectors bringing informal issues to their attention and that they viewed discussion of informal issues as being proactive and predictive of potential performance problems at their plants. In fact, several agency and licensee officials viewed informal issues as more important to improving plant operations than those formal inspection findings identified in NRC inspection reports.

The staff's assertion that this recommendation would result in "redirecting" inspector resources towards formal monitoring is misleading. It is important to note that OIG is not taking exception with the direction given by the Commission in the cited SECY papers. However, the reality is that regardless of whether the threshold is met for formal documentation, agency inspectors and managers are already expending varying levels of time and energy to track and trend informal issues. Similarly, licensees already take action to correct informal issues in virtually all cases.

OIG believes it is important that the agency recognize the current situation as reflected in the report; specifically, the inconsistent guidance provided by agency managers and the ad hoc nature used by staff to handle this type of information. This information would be much more useful to the agency if it were consistently managed and could be analyzed for trends. Therefore, OIG stands by its recommendation in order to resolve the inconsistent disposition of informal issues.

Recommendation 5: Establish performance measures and targets which demonstrate the quality of baseline inspections.

Staff comments: The staff disagrees with this recommendation. From discussions with OIG staff, we understand this issue to be focused at the quality of individual inspections.

The quality of day-to-day inspection activities is the responsibility of regional management, who employ a variety of tools to assess inspection quality, such as daily telephone discussions with inspectors, debriefs with inspectors after inspections, review of draft inspection reports, consideration of integrated licensee performance, and periodic site visits. In addition, licensees are afforded opportunities during their management interactions with NRC management to express concerns regarding the effectiveness of NRC inspectors at their sites. We do not believe that defining "quality" as it pertains to inspection activities is amenable to quantification through metrics and

targets. The one suggestion proposed by OIG to illustrate a possible staff response to this recommendation (after-the-fact revisitation of how an inspector selected his/her inspection sample) would not be consistent or objective.

We believe this recommendation is better viewed as subsumed within the intent of recommendation 4 of the OIG audit. In accepting recommendation 4, the staff intends to clarify what is meant by effectiveness within the context of the ROP, and to demonstrate that the performance measures and targets (i.e., metrics), which are used by the ROP self-assessment process, comprehensively monitors measurable ROP outcomes. The quality of program activities (including inspection) can be inferred from these measurable ROP outcomes. The quality of the work of individual inspectors is best assessed via the existing NRC Performance Appraisal System.

Based on this information, the staff recommends that OIG remove this recommendation from the draft OIG report.

OIG Response:
The most critical aspects of evaluating an activity, like baseline inspections, would be an assessment of that activity's effectiveness and quality, but OIG acknowledges the difficulty in identifying quantitative "quality" measures. While OIG agrees with the agency that the appropriate mechanism for assessing the quality of an inspector's individual work is the NRC Performance Appraisal System, quality performers are only one facet of how effective the inspection program is overall. As OIG explained to senior NRR managers, the quality of other parts of the program need evaluation as well, such as a quality assessment of the areas identified to receive baseline inspections and the quality of samples selected in the ROP for mandatory inspection.

As the report identifies, there are weaknesses in the agency's process for self-assessing the effectiveness and quality of the inspection program. The agency accepted the report's Recommendation 4 to define effectiveness as it pertains to the ROP and, in doing so, proposes to demonstrate that the metrics used in the self-assessment process will comprehensively monitor measurable outcomes. It is the agency's contention that the "quality" of inspections can be inferred from these measurable outcomes. OIG accepts the agency's premise under a presumption that the conduct of high quality inspection activities would be necessary to deem the overall baseline program as "effective." However, upon its submittal, OIG will carefully evaluate the agency's proposed plan of action for addressing Recommendation 4 to ensure that the intent of this recommendation is incorporated.

Therefore, OIG agrees to retract this recommendation at this time.