



# FIFTEENTH ANNUAL NATIONAL ENERGY DIVISION CONFERENCE

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## SESSION J - QUALITY PROGRAMS

### THE OPERATING REACTOR INSPECTION PROGRAM

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#### ABSTRACT

This paper describes the new concept for the Nuclear Regulatory Commission's (NRC's) operating reactor inspection program that was implemented on October 1, 1988. The NRC's philosophy is to move away from a program that is centered on a large number of inspection procedures toward a clearly defined fundamental program that is implemented at every nuclear facility and that provides NRC regional administrators with flexibility and options to deal with specific issues and problems. Other key elements of the new inspection program are (1) more flexibility for the regions in the application of inspection resources, (2) increased emphasis on team inspections, (3) provision for specific resources to respond to regulatory issues, and (4) a ready ability to focus on one or more specific areas of emphasis.

#### 1 BACKGROUND

The NRC inspection program historically has been constructed around a series of inspection procedures that provide for the routine examination of activities at an operating nuclear facility on a recurring schedule. The NRC inspection program is audit oriented; thus, it does not necessarily examine every activity or item, but verifies, through carefully selected samples, that they are being properly conducted or operated to enhance or ensure safety. Available resources determine the extent of the inspection sample. The inspection program is preventive in nature and is designed to anticipate and preclude significant events and problems by identifying

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## FIFTEENTH ANNUAL NATIONAL ENERGY DIVISION CONFERENCE



underlying issues. The inspection process, from a systems approach, monitors the licensee's operation and provides feedback to the licensee's plant management to allow it to take appropriate corrective actions. It is important to note, however, that implementation of the NRC inspection program does not supplant the licensee's programs or responsibilities; rather, it provides a feedback mechanism and an independent verification of the effectiveness of the licensee's implementation of its programs to ensure that operations are being conducted safely in accordance with applicable NRC requirements.

Our past experience indicates that licensee programs for controlling, inspecting, and auditing plant operations to ensure reactor safety are generally adequate when effectively implemented. The need for fine tuning existing programs or developing new programs in specific areas is now being recognized as a result of NRC's and industry's inspection and evaluation of licensee performance. Therefore, the NRC has continued to shift its inspection emphasis from assessing licensee compliance with the regulations to assessing the effectiveness of licensee implementation of plant operational and support activities to ensure nuclear safety.

Although each inspection activity provides some measurement of licensee performance, the NRC formally evaluates licensee performance through the implementation of the program described under NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance" (SALP). The SALP is an integrated agency effort to collect and evaluate available agency insights and other information on a plant-specific basis in a structured manner to better evaluate, determine, and understand licensee performance. The NRC inspection program is an integral and important input element to the SALP process. The current SALP functional areas for operating reactors are

- o Plant Operations
- o Radiological Controls
- o Maintenance/Surveillance
- o Emergency Preparedness
- o Security
- o Engineering/Technical Support
- o Safety Assessment/Quality Verification
- o Other (as may be needed)

The SALP rates licensee performance in each functional area in accordance with three performance categories, which are defined below:

Category 1: Licensee management attention and involvement are readily evident and place emphasis on superior performance of nuclear safety or safeguards activities, with the resulting performance substantially exceeding regulatory requirements. Licensee resources are ample and effectively used so that a high level of plant and personnel performance is being achieved. Reduced NRC attention may be appropriate.



## FIFTEENTH ANNUAL NATIONAL ENERGY DIVISION CONFERENCE



Category 2: Licensee management attention to and involvement in the performance of nuclear safety or safeguards activities are good. The licensee has attained a level of performance above that needed to meet regulatory requirements. Licensee resources are adequate and reasonably allocated so that good plant and personnel performance is being achieved. NRC attention may be maintained at normal levels.

Category 3: Licensee management attention to and involvement in the performance of nuclear safety or safeguards activities are not sufficient. The licensee's performance does not significantly exceed that needed to meet minimal regulatory requirements. Licensee resources appear to be strained or not effectively used. NRC attention should be increased above normal levels.

The cycles vary for the SALP from 12 to 18 months for each licensee, with the longer period allowed for a licensee with a Category 1 rating.

The basic structure of the previous operating reactor inspection program consisted of minimum, basic, and supplemental inspection programs. The general guidelines for their implementation were to conduct the minimum program at all operating plants, the minimum and basic programs at a SALP Category 2 plant, and the minimum program and appropriate elements of the basic and supplemental programs at a SALP Category 3 plant. Specialized team inspections and temporary instruction inspections also complemented the overall program. The previous program was generally effective in utilizing inspection resources. However, its implementation did result in the use of some inspection procedures that, in retrospect, need not have been utilized to arrive at an adequate determination on licensee performance. Therefore, coupled with the continuing goal to improve the effectiveness of the inspection program and the need to provide regional administrators with additional flexibility in allocating scarce inspection resources to focus on identified safety issues, the new operating reactor inspection program was developed and implemented.

## 2 INTRODUCTION

The NRC implemented its new inspection program on October 1, 1988. The inspection program applies to a licensee's facility when it has been issued an operating license or fuel loading authorization and remains in effect until the facility license is significantly modified to reflect a deactivated status, that is, retired in place or decommissioned.

The inspection program provides the framework for managing inspection resources without being totally prescriptive. The program provides flexibility to NRC headquarters and regions in the allocation of manpower to meet inspection objectives as they relate to importance to safety. At the same time, a minimum level of inspection effort at a facility is specified. The program places inspection emphasis on



areas of the licensee's activities that are most important to reactor safety and recognizes licensee performance in these areas as the basis to manage inspection resources.

Further, resident inspectors are expected to perform those inspections that emphasize direct observations of plant activities in progress and provide field verification of specific licensee activities such as testing and safety system lineups. The procedures to be used by the resident inspectors are designed to effectively utilize the site-specific knowledge of these inspectors for assessing the adequacy of the licensee's activities. Other inspection procedures will be used by regionally based specialist inspectors to assess the adequacy of licensee's activities that require special technical expertise and in-depth examination of activities. However, because the number of inspectors is limited, the NRC inspection program is designed to cover only a small representative sample of licensee activities in any one area. Thus, the inspection program provides for an evaluation of licensee performance for each plant activity based on the inspection findings resulting from examination of a selective sample. This includes determining whether an identified deficiency affects operational safety, represents an isolated case, or signifies a broader, more serious problem.

### 3 PURPOSE

The purpose of the operating reactor inspection program is to obtain sufficient information on licensee performance through direct observation and verification of licensee activities to ascertain (1) whether the facility is being operated safely, (2) whether the licensee's management control program is effective, and (3) whether regulatory requirements are being satisfied as well as to gather information to support SALP evaluations.

### 4 FUNDAMENTAL INSPECTION PROGRAM

The operating reactor inspection program consists of a fundamental inspection program and a number of additional programs. The fundamental program, which consists of the core inspection program and the mandatory team inspection program, is performed at all operating reactors. It requires licensee performance to be inspected in functional technical disciplines such as operations, radiological controls, maintenance, surveillance, environmental protection, physical security, and engineering. The additional programs, as discussed later, are performed on an as-required basis to follow up operational events and safety issues and to further investigate the root causes and corrective actions related to fundamental inspection program findings. Very few plants would be limited to only the conduct of the fundamental program; most would require more.

The inspection program generally emphasizes achieving a balanced look at a cross section of licensee activities important to plant



safety and reliability and of other licensee activities that may warrant additional attention. The overall content of this new inspection program is similar to previous programs; however, it now provides regional administrators greater flexibility in the application of inspection resources to deal with issues and problems at specific plants.

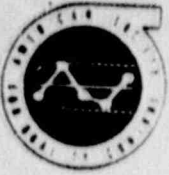
#### 4.1 Core Inspection Program

The core inspection program ensures a balanced look at a cross section of plant activities considered important to maintaining safety, to confirm adequate licensee performance, and identify potential operational problems in the early stages. The identification of a problem in the early stage will generally result in additional followup inspection activities. When problems with licensee performance are identified, followup inspections will focus on examination of root causes and failures in licensee management controls (including quality programs) that allowed the problems to occur. The core inspection must be completed at every plant at a prescribed interval by the resident and regionally based specialist inspectors. Specifically, in-depth examination of specialty areas, such as radiological controls, environmental protection, and physical security, will be performed by regionally based specialists. The inspection procedures for the core inspection are based on (1) the safety significance of the area to be inspected, (2) the need to ensure that all SALP areas are inspected at every plant, (3) the limitations imposed by available resources, (4) an appropriate balance of resources between the various parts of the overall inspection program, and (5) the general and plant-specific perspectives developed from probabilistic risk assessments. The results of core inspections provide the minimum basis for assessing plant performance by focusing the inspection process on functional technical disciplines that affect plant safety and reliability. Emphasis is placed on observation and evaluation of ongoing facility operations and supporting activities affecting or ensuring the safety function of facility structures, systems, and components as well as the effectiveness of the licensee's program implementation. On the other hand, these inspections minimize the review of detail content in program descriptions and related procedures.

The effectiveness of the procedures currently included in the core inspection program will be reviewed periodically and revised as necessary to ensure that safety-related problems can be identified early.

The inspection procedures used in the core inspection program are listed in Appendix A according to their principal SALP category along with the frequency of their performance.

Although it is not possible to address the scope of the individual inspection procedures in this paper, the inspection program



elements relevant to quality assurance are addressed briefly. First, it is the NRC view that licensee performance in all areas of plant operations is directly linked to the effectiveness of its quality assurance program. As such, all inspection procedures in the operating reactor inspection program provide a measure of the effectiveness of licensee quality assurance programs. Individual inspection procedures require the NRC inspector to pursue the licensee's identification of the root cause and planned corrective action for each finding. The program also provides for followup review of each licensee response to an NRC-identified noncompliance or deviation and for a followup inspection of those matters requiring significant licensee attention. In particular, Inspection Procedure 92702, "Followup on Corrective Actions for Violations or Deviations," requires that during the review and inspection followup for an NRC finding the inspector evaluate the adequacy of the licensee's planned corrective action, root cause determinations, evaluation of generic implications, and actions taken to determine the need to change the governing quality assurance program policy and procedures. In addition, Inspection Procedure 35502, "Evaluation of Licensee Quality Assurance Program Implementation," requires NRC inspectors to perform a periodic summary evaluation of the effectiveness of the licensee's quality assurance program by reviewing licensee performance in all areas of plant operations before the SALP so that problems can be identified early. This evaluation is performed to determine whether NRC-identified findings, operational events, and other information on plant experience indicate a fundamental weakness in the structure or implementation of the overall quality assurance program. Where such weaknesses are believed to exist, the inspection program requires that a special regional initiative inspection be performed to focus on the perceived problem areas. This effort is planned to take place shortly after the midpoint of the licensee's SALP cycle so that the results of that effort and licensee corrective actions, if required, will be available as input to the forthcoming SALP report.

#### 4.2 Mandatory Team Inspection Program

Periodically, one or more subject areas (e.g., plant configuration control, maintenance, or emergency operating procedures) are selected for specific team inspection emphasis in the fundamental inspection program. The selection is based on the NRC identification of an emerging safety concern or an area requiring increased emphasis because of a history of longstanding or recurring problems.

The division within the NRC's Office of Nuclear Reactor Regulation (NRR) that has technical responsibility in the selected area of emphasis is responsible for establishing the specific inspection instructions, providing necessary technical support, monitoring program completion, assessing results, and issuing any NRC summary technical reports. The appropriate NRC regional office is responsible for scheduling and performing the inspection, preparing the inspection report, and initiating appropriate enforcement action.



The program is completed using the team inspection concept. The team leader is generally an experienced regional office inspector and the team consists of regional, resident, and NRR personnel. Normally, the program for each selected area of emphasis will be completed for all plants within one to two years. The regional administrator is allowed discretion to defer or change the scope of the inspection in those cases where a recent inspection may have already adequately inspected the selected area of emphasis. The area currently selected for a mandatory team inspection is maintenance.

## 5 ADDITIONAL PROGRAMS

### 5.1 Regional Initiative and Reactive Inspections

#### Regional Initiative Inspections

The fundamental inspection program constitutes an adequate level of inspection only at the top performing plants in the country (i.e., plants with SALP Category 1 ratings in most areas). All other plants require additional inspection effort based on their performance in various SALP functional areas. Approximately 150 procedures categorized by SALP functional area are available for regional initiative and reactive inspections. These 150 procedures contain more specific inspection requirements covering essentially all licensee activities and are used as necessary to focus more inspection resources on those plants with identified problems in licensee performance.

Within the realm of the new operating reactor inspection program, each regional administrator has been allocated discretionary inspection resources to implement planned regional initiative inspections. The following type of information provides the basis for ascertaining the need to perform regional initiative inspections:

- o results of core and mandatory team inspections
- o recommendations of the resident inspector and regional management
- o SALP ratings
- o recent events or interactions with the licensee
- o results of probabilistic risk assessments

#### Reactive Inspection

A reactive inspection is generally an unplanned, onsite inspection that is initiated almost immediately in response to an event or incident and before a licensee event report is issued to require review and inspection under the guidelines of the core inspection program. The resident inspectors provide the major onsite NRC presence for direct observation and verification of licensee activities and hence are the primary onsite inspectors for the NRC reactive inspection effort resulting from a site event or incident. The resident



inspector usually will perform the greater part of the initial event-related inspection effort, but may be augmented by other inspectors depending on the type of event and expertise required. Reactive inspections also are performed to review allegations and include the activities of the special NRC augmented inspection team (AIT) inspection when initiated in response to a plant event of high safety significance. In addition, these inspections may be conducted to follow up on findings from other inspections that require immediate attention.

### 5.2 Special Team Inspection Program

The special team inspection program provides an independent, in-depth, and balanced assessment of licensee performance by in-depth examinations to assess the adequacy of specific functional technical activities that ensure safe operations. These inspections are conducted by both headquarters and regional offices. Plants selected for inspection by headquarters will be based on plant performance information that is reviewed by NRC senior management. Special team inspections directed by regional offices as part of the regional initiatives program are encouraged whenever it is necessary to conduct an in-depth or multidisciplined examination of licensee activities. Special team inspections include, but are not limited to, a safety system functional inspection (SSFI), a safety systems outage modification inspection (SSOMI), and an operational safety team inspection (OSTI).

An SSFI is an in-depth engineering examination of the design configuration, maintenance, testing, and operation of a selected reactor system, its components, and its supporting systems. The inspection is performed by reviewing a "vertical slice" of a particular safety system and following the potential generic significance of the findings to other systems.

An SSOMI also is an in-depth engineering examination of system functionality, but it is oriented toward the safety significance of modifications that have been made to safety systems during a particular plant outage. This inspection focuses on how the modifications may have altered the original design considerations and safety margins, on the quality of the installation, on the modified systems, and on the adequacy of full functional testing of the modified systems.

An OSTI is an in-depth review of plant operational programs, including maintenance, operations, surveillance testing, corrective actions, management oversight, and licensee safety reviews. The inspection typically includes about 72 hours of round-the-clock in-plant inspection coverage, with emphasis placed on observation of control room and surveillance activities. If appropriate, some aspects of an SSFI or SSOMI may be added to the scope of this inspection.





## FIFTEENTH ANNUAL NATIONAL ENERGY DIVISION CONFERENCE



The teams for the special team inspections may consist of NRR personnel, resident and regionally based inspectors, and contractors. The SSFI and SSOMI are dependent to some degree on the availability of highly specialized and experienced NRC and contractor personnel.

### 5.3 Safety Issues Program

As concerns arise with specific safety issues, they may be addressed solely through the NRR license review process and communications issued to the licensee. If the concern is of a generic nature with a high degree of safety significance, it may be appropriate to initiate a special inspection effort under the safety issues program. When it is determined that a safety issue addressed in a bulletin or generic letter requires inspection followup, requirements and guidance for the inspection are issued in a temporary instruction.

## 6 PROBABILISTIC RISK ASSESSMENTS

A new element of the inspection program includes increased emphasis on the use of probabilistic risk assessment (PRA) information in the inspection process. The results of a PRA provide information relative to plant design, operation, and safety that may not have been explicitly identified previously. This information enhances understanding of weaknesses and strengths of specific plant hardware and operational activities.

NRC has developed plant-specific risk-based inspection guides (RIGs) for some plants. These guides are now being made available to assist inspectors in selecting the most risk-significant components, procedures, operator actions, and maintenance or surveillance activities for their inspection efforts. To the extent that plant-specific risk information is available, this information is considered, along with information on plant experience, in planning the scope of inspections to be conducted under any of the program elements discussed above. In addition, at the discretion of the regional administrator, a newly developed PRA team inspection procedure may be used to conduct a regional initiative inspection to assess the safe and reliable operation of high-risk systems.

## 7 RELATED PROGRAM ACTIVITIES

Other related activities include the regional use of the mobile laboratories. Regional offices use the mobile nondestructive examination laboratory and the mobile radiochemistry laboratory, as required, to support planned and reactive inspection activities.



## 8 INSPECTION PLANS

To facilitate managing inspection resources and tracking the implementation of the inspection program, regional offices are required to develop site-specific inspection plans. These plans are based on the core and mandatory team inspection programs and incorporate other specific inspection activities (e.g., regional initiatives or special team inspections) to define an overall inspection program for each facility. A region-wide master inspection plan (i.e., the integration of individual site or unit plans) also is developed to project the planned inspection activities and available resources for all sites for the next 12 months. The master plan provides for a summary of the fraction of regional resources allocated to each program area for each site and is the basis for the allocation or significant reallocation of resources among the sites. The inspection plans are living documents and are reviewed periodically, adjusted, and documented to reflect shifts in plant performance and safety concerns.

## 9 CONCLUSION

This program ensures that the resources available for the reactor inspection program are efficiently and effectively allocated to enhance reactor safety and to provide an incentive for licensees to achieve a high standard of performance.

We believe once the commercial nuclear power industry fully understands the resource implications of the new NRC inspection program, licensees will further strive to achieve a SALP Category 1 level of performance for all aspects of plant operations.



FIFTEENTH ANNUAL NATIONAL ENERGY DIVISION CONFERENCE



APPENDIX A

FUNDAMENTAL INSPECTION PROGRAM PROCEDURES

Numbers	Functional Area: Inspection Procedure Title	Inspection Frequency
<u>Plant Operations:</u>		
64704	Fire Protection/Prevention Program	Every other SALP Cycle (SC)*
71707	Operational Safety Verification	Daily (D)/Weekly (WK)/Monthly (M)
71710	Engineering Safety Feature (ESF) System Walkdown	Semiannually (S)
93702	Onsite Followup of Events at Operating Power Reactors	When required (W)
<u>Radiological Controls:</u>		
83729	Occupational Exposure During Extended Outages	W
83750	Occupational Exposure, Shipping and Transportation	SC
84750	Radioactive Waste System; Water Chemistry Confirmatory Measurements and Radio- logical Environmental Monitoring	SC
<u>Maintenance/Surveillance:</u>		
61726	Monthly Surveillance Observations	M
62703	Monthly Maintenance Observations	M
73753	Inservice Inspection	Every other SC
<u>Emergency Preparedness:</u>		
82301	Evaluation of Exercises for Power Reactors	Annually (A)
82701	Operational Status of the Emergency Preparedness Program	SC
<u>Security:</u>		
81700	Physical Security Program for Power Reactors	SC

\* The SALP is once each 12 to 18 months.



# FIFTEENTH ANNUAL NATIONAL ENERGY DIVISION CONFERENCE



Numbers	Functional Area: Inspection Procedure Title	Inspection Frequency
	<u>Engineering/Technical Support:</u>	
37700	Design, Design Changes and Modifications	Every other SC
37828	Inspection of Modifications	SC
	<u>Safety Assessment/Quality Verification:</u>	
30703	Management Meetings - Entrance and Exit Interviews	W
35502	Evaluation of Licensee Quality Assurance Program Implementation	SC
40500	Evaluation of Licensee Self-Assessment Capability	SC
90712	In-Office Review of Written Reports of Nonroutine Events at Power Reactor Facilities	W
92700	Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities	W
92702	Followup on Corrective Actions for Violations and Deviations	W
	<u>Other:</u>	
TI 2515/XX	Mandatory Team Inspection - For Selected Area of Emphasis	Once every 1-2 years