

NRC INSPECTION MANUAL

DI

MANUAL CHAPTER 2512

LIGHT WATER REACTOR INSPECTION PROGRAM - CONSTRUCTION PHASE

2512-01 PURPOSE

To provide inspection requirements and policy for implementation of the inspection program during construction and major plant modifications.

The inspection of construction activities at Watts Bar Unit 2, following restart of construction in 2007, will be governed by Inspection Manual Chapter 2517, "Watts Bar Unit 2 Construction Inspection Program."

2512-02 OBJECTIVES

The primary objective of the construction inspection program is to ensure public health and safety through the evaluation of the adequacy of licensee performance during construction and major plant modifications. This is to be accomplished by determining licensee effectiveness in identifying conditions that may adversely affect operational safety and in achieving compliance with NRC requirements and licensee commitments. This determination should provide sufficient information to establish a basis for making recommendations relative to the issuance of an operating license (OL). Information for the above is to be obtained by direct observation of activities, personnel interviews, review of procedures and records, and by evaluation of licensee and contractor performance, including licensee involvement and control over licensed activities.

Another objective is to place more emphasis on direct inspection of work and hardware as compared to the review of procedures and records. The intent is to determine whether safety-related materials, components, structures, systems, and construction activities are technically adequate and are in accordance with NRC requirements and licensee commitments.

2512-03 DEFINITIONS

03.01 Licensee. Any individual, corporation, or association that is authorized to conduct activities under a license or construction permit issued by the NRC.

03.02 Construction Permit (CP). Authorization from the NRC to begin construction of a facility pursuant to 10 CFR 50.10.

03.03 Limited Work Authorization (LWA). Authorization from the NRC to an applicant to conduct certain construction activities pursuant to 10 CFR 50.10(e)(1) or 10 CFR 50.10(e)(3)(i).

03.04 NRC Requirements. NRC requirements include provisions of the Atomic Energy Act, NRC rules and regulations, conditions of a construction permit and Commission orders.

03.05 Licensee Commitments. Written statements made by the licensee providing information on how NRC requirements will be met relative to facility design and construction. Most of the commitments are contained in the SAR but may be elsewhere, such as in response to questions from NRR, in the SER, and in ASLB proceedings.

03.06 Quality Assurance (QA). Quality assurance comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to the physical characteristics of a material, structure, component, or system which provide a means to control the quality of material, structure, component, or system to predetermined requirements.

03.07 Quality Assurance Manual (QA Manual). Quality assurance manual refers to the aggregate collection of internal instructions and procedures established by each organization that has been delegated QA program responsibilities and whose objective is to ensure acceptable implementation of the QA program.

03.08 Review. A deliberate, critical examination.

03.09 Construction Milestones. Preselected construction events that are used to determine construction status and to aid in establishing inspection points in the inspection program. For the purpose of scheduling, the term "complete" means sufficiently complete so that other dependent activities can proceed. The following milestones are pertinent to the construction inspection program.

<u>Milestone</u>	<u>Milestone Event</u>
140	Application docketed
200	CP (or LWA) issued
209	Site preparation started
210	Site prepared
219	Safety-related structural concrete placement started
220	Reactor/containment building foundation completed
239	Installation of containment liner started
240	Containment structure and liner completed
249	Major component structures and supports started
250	Major component structures and supports completed
260	Reactor/containment building crane installed
269	Installation of safety-related components within reactor coolant boundary started
270	Reactor vessel installation completed
275	Installation of safety-related components within coolant boundary completed
279	Primary piping installation started
280	Primary piping installation completed
284	Electric cable installation started
285	Electric cable installation completed
294	Instrumentation installation started
295	Instrumentation installation completed
300	Cold-hydro test completed
309	In-service baseline inspection started
310	In-service baseline inspection completed
320	Hot-functional test completed
340	Operating license issued

2512-04 RESPONSIBILITIES AND AUTHORITIES

04.01 Director, Office of Inspection and Enforcement. The Director has responsibility and authority for:

- a. Overall direction of program development.
- b. Overall direction of the assessment of regional implementation of the established inspection program.

04.02 Director, Division of Inspection Programs. The Director has responsibility and authority for:

- a. Administration and control of inspection program development and revision.
- b. Administration and control of assessment of regional implementation of the established inspection program.
- c. Assessment of the effectiveness and uniformity of the established inspection program.

04.03 Regional Administrator. The Regional Administrator has responsibility and authority for overall direction of the implementation of the inspection program.

04.04 Director, Appropriate Regional Office Division. The Director has responsibility and authority for administration and control of the implementation of the inspection program.

2512-05 PROGRAM POLICY

05.01 The licensee is ultimately responsible for the safety of the nuclear facility. The NRC ensures through an audit type of inspection program that this responsibility is carried out in an effective manner during the activities of plant construction and major modifications. The construction inspection program presented in this chapter is considered the minimum necessary to achieve an acceptable level of confidence as to the quality of construction at a facility.

05.02 The program is supplemented by other related programs such as the Vendor Inspection Program (MC 2700), and the Construction Appraisal Team Inspection Program (MC 2920). These programs can be used to assist in meeting the program objectives.

2512-06 PROGRAM REQUIREMENTS

06.01 Inspection Requirements. The inspection procedures (IPs) and Temporary Instructions (TIs) applicable during construction are provided in Appendices I and II.

- a. The procedures in Appendix I represent the inspection requirements that must be satisfied before an operating license is to be issued. Regional management should assure that the requirements of the program have been met through regional inspection, IE inspection, or otherwise dispositioned through allowable options of SALP.
- b. The TIs applicable to the construction phase and the expiration dates are listed in Appendix II.

06.02 Level of Effort. The amount of inspection effort required to ensure the same degree of confidence that construction is adequate will vary from site to site. Similarly, different types of construction activity at the same site may require various levels of effort to provide the same degree of assurance of quality work. Generally, an increase or decrease of inspection effort will be based on an evaluation of the licensee's performance, such as through the SALP program.

- a. For multiunit facilities, the construction inspection effort relative to the review of QA/QC procedures may be reduced for subsequent units when no substantive changes have been made to the QA program for subsequent units. This reduction may be accomplished in the detailed review of the QA/QC procedures established in the QA program. However, it should be noted that revisions to procedures that may have a significant adverse effect on quality should be examined for all units. Therefore, sufficient inspection is required to ascertain the adequacy of procedures common to each unit. Completion of construction inspection requirements relative to observation of work and review of quality records is required for each unit under construction.
- b. Inspection procedures within each major construction discipline include requirements to complete IP 35100, Review of QA Manual. Even though this procedure is referenced a number of times in construction inspection procedures, it is not intended that the inspection requirements of IP 35100 be repeated for a specific organization at the site if the same QA procedures and same personnel were previously examined. In general, the inspection requirements of IP 35100 need be completed only once for each site organization associated with a particular construction activity. It should be noted, however, that different aspects, requirements, and procedures of the QA program may apply to different activities performed by one contractor at the same site. For example, inspection and documentation procedures related to welding may be considerably different for reactor coolant pressure boundary pipe welding as compared to structural steel welding. If this is the case, parts of IP 35100 would be repeated. Generally, the various IPs indicate that changes to the QA Manual should be considered for review during scheduled followup inspections in each area. If the changes to the QA Manual for a contractor have not been reviewed for a relatively long period of time (e.g., over 2 years), the inspector should, as a minimum, determine whether any changes have been made and whether these changes are appropriate and adequate. It should be noted that IP 35100 is a reference procedure and is not to be used on Form NRC-766 to record an inspection effort. The procedure referencing IP 35100 is to be used for this purpose.
- c. Several procedures permit a reduction of effort for particular inspection areas based on previous inspection results. They also identify specific items for increased inspection based on a Category 3 SALP determination.

06.03 Program Scheduling. To adequately fulfill the requirements of this program, effective planning is required so that the various inspection requirements are completed in a reasonable time by properly qualified inspectors. For example, although the construction phase of the LWR inspection program is predominately applicable to facility construction and major facility modification, it does include certain associated design and procurement activities which occur at the site. Also, activities conducted under other programs of MC 2500 need to be considered.

Inspection of major construction activities will begin when a CP or LWA is issued. Some early construction activities such as soil boring, site preparation, ground water control, excavation, and concrete batch plant erection may precede the issuance of a CP or LWA. In addition, some of the pre-CP phase inspection activities (MC 2511) are performed concurrently with the construction inspection activities. Final activities of the construction

inspection program also overlap with the preoperational testing and operational preparedness phase activities (MC 2513) and may continue during the startup phase (MC 2514).

- a. Some of the procedures of Appendix I are keyed to milestones relating to the status of work activities at the construction site. Because NRC inspection activities must be coordinated with construction activities, the inspector must be cognizant of construction status for appropriate inspection planning. It should be noted that the proper sequence of certain construction and inspection activities also is important.
- b. In addition to listing the procedures associated with the NRC construction inspection program, Appendix I includes the frequency of inspection and the timeframe for initiation and completion of the various inspection procedures. This timeframe pertains to the actual work progress of that particular activity at the construction site and not to the overall construction status of the facility. Some inspection procedures, such as those pertaining to welding, are required to be used throughout most of the construction phase.
- c. Because team inspections are an effective inspection method, their use by the regional office is encouraged.

06.04 Use of Inspectors. In accordance with the objectives of this program, the majority of the assigned inspector's time should be directed to hardware inspections as compared to the review of procedures and records. Inspection assignments should emphasize the early identification of problem areas.

The regional offices have the responsibility to assign inspection requirements to either the resident or regional inspectors consistent with the qualifications of the individual inspectors.

In general, the resident inspectors should provide some degree of direct verification of licensee construction performance for all activities while the regionally based inspectors should provide the necessary expertise to complete specialized, technical inspection requirements of the inspection program.

Comprehensive reviews of programs and procedures should be conducted as a result of an identified hardware problem with the objective of determining the underlying cause or generic implications of the problem. In following up identified problem areas the emphasis should be on focusing the licensee's efforts to arrive at long-term resolutions.

It is the prerogative of regional management to determine which program areas are to be emphasized by the assigned inspectors. There are a number of areas in which the inspectors can be utilized consistent with the status of construction and the MC 2512 program for the site. These are:

- a. A more in-depth MC 2512 program. As the MC 2512 program defines the required inspection effort to adequately assess plant construction, the additional effort of the assigned inspectors may be used to increase the scope of the routine inspection requirements for areas of construction assigned a SALP Category 3 rating. It is suggested that the effort be concentrated on the inspection procedures for observation of work and completed construction. The inspection requirements pertinent to previously identified problems or common construction problem areas may be emphasized or performed again. Inspection efforts should be more result-oriented and focus on programmatic issues when there are problems that indicate programmatic weaknesses. The inspectors should focus on problem areas to determine the root cause and to verify the implementation of broad corrective action.

- b. Review of reports for applicability of identified problem areas. The efforts of the regional or resident inspectors may be used in evaluating reports of previously identified problems or potential problems. The results of NRC and industry reports can be reviewed and inspections performed to determine applicability to the specific site. If the report is written against the specific site, the effort can be used in evaluating the adequacy of the licensee's corrective actions. The types of reports to consider include Construction Appraisal Team, SALP, INPO and consultant reports of licensee self-initiated evaluation of construction. These reports also can provide direction toward the determination of problem areas and their root cause.
- c. Allegation investigation and followup. As construction approaches completion, the resolution of allegations may require increased resources from the licensee and the NRC regional and resident inspectors.
- d. Craft and inspector training, qualification and performance. The inspector's efforts could be directed towards an in-depth coverage of the licensee's programs for training and qualifying their construction workers and inspectors. The licensee should be emphasizing that the job be done right the first time and discourage an attitude that quality control will catch the construction mistakes. The adequacy of the licensee inspector's performance and tools (checklists, acceptance criteria, inspection reports) could be reviewed in detail.
- e. Prevention and early identification of problems. Other efforts the inspectors could emphasize for the early identification and prevention of problems include:
 - 1. The licensee's preparation for safety-related construction activities could be reviewed. This is to ensure the timeliness of planning and program actions and the availability of resources for upcoming and current construction activity.
 - 2. Informal discussions with licensee and contractor working level personnel can be conducted to determine attitudes, demands of schedule, and individuals' perceptions of work quality to be used as problem indicators.
 - 3. A preliminary as-built review can be conducted six months before the formal NRC inspection to determine the licensee's level of readiness. This would include the status of procedures, adequacy of resources (numbers, skills, qualifications), and a sample of hardware for completeness.
 - 4. Periodic in-depth reviews of site management and performance could be conducted. An experienced, informed, effective and communicating management organization will help ensure problem identification and resolution and effective use of trending programs. Particular attention should be given to management's involvement in such areas as trending, diagnosing root cause of identified problems, and in effectively communicating the need for adequate corrective action.
 - 5. Early evaluations of system turnover programs could be performed. Emphasis should be given to the review of the licensee's program and procedures for control and turnover of systems from construction organizations to startup, testing, and operations organizations. The turnover process represents an important step in verifying the quality of construction completion and readiness for plant testing. Inspections in this area should ensure that the organizations' responsibilities are well defined, the construction and quality status of turnover systems is accurately recorded at turnover, and changes initiated to systems by startup or operations are properly documented, controlled, and appropriately inspected.

06.05 Major Plant Modifications. The regional offices are responsible for the preparation and implementation of a plan for the inspection of the safety-related aspects of major plant modifications. The plan should be based on the inspection requirements of this and other related manual chapters. It should be developed and maintained in a current status on the basis of licensee input on the scope of the effort, including applicable technical and quality commitments included in the SAR or SER, or supplements thereto. This planning effort also should review the licensee's program for control, protection, and requalification, as necessary, of safety-related items connected or adjacent to structures, systems, and components that will be temporarily removed or otherwise affected by the modification.

The regional offices should forward a copy of the program plan for inspection of major modifications, and of any significant changes thereto, to the IE Director, Division of Inspection Programs.

2512-07 PROGRAM MANAGEMENT

07.01 Implementation. The regional offices are responsible for the implementation of the inspection program described in this chapter and related appendices. The inspection program is intended to provide the framework for managing the inspection effort without being totally prescriptive. Not all sample sizes and frequencies of periodic inspections are explicitly specified, and the timeframe when certain inspection activities are to be performed is not rigid. In addition, inspectors are encouraged to independently pursue any area of safety significance. Independent inspection effort will be reported against the inspection procedure that most closely describes the activity being reviewed.

Although this inspection program contains the minimum inspection requirements, situations may arise where parts of the program cannot be completed or otherwise satisfied by related programs referenced in this chapter. In such cases, regional management shall review, approve, and document such modifications to the program. This usually should be part of the SALP process.

07.02 Inspection Findings. As stated in Title 10 CFR and in MC 2500, NRC inspectors perform a basic mission in determining whether a licensee meets current regulatory requirements and commitments. Identifying specific instances where a licensee fails to meet such requirements and commitments, although important, has frequently in the past resulted in correction of symptoms rather than correction of underlying causes of licensee problems. Inspection findings should result in the early identification and resolution of problems, their root causes, and generic implications.

Because of limited inspector resources and the minimum baseline aspect of the program, the inspection procedures cover only a small sample of licensee activities in an area. Thus, it is important that an inspector evaluate whether a noted noncompliance or deficiency represents an isolated case or may be symptomatic of a broader, more serious problem in that area. To provide the perspective to perform this evaluation, the inspector should:

- a. Keep currently informed of deficiencies, audit findings, and plant problems identified by the licensee's own organization or by his contractor's organization.
- b. Ascertain whether additional NRC inspection effort is merited in the area under consideration.

Where the evidence indicates a symptomatic problem, action should be taken to require the licensee to demonstrate to the NRC that it has not lost control of that area. Regional management should be consulted whenever such action appears appropriate to the

individual inspectors. Enforcement action, if warranted, should be in accordance with IE Enforcement Actions policy.

2512-08 INTERFACE WITH RELATED PROGRAMS

08.01 Construction Appraisal Team (CAT) Inspection Program. The CAT program uses integrated, multidisciplined inspections to determine if a facility is being constructed in accordance with regulatory requirements and if the applicant's management and quality control programs are effective. The inspections are focused primarily on hardware installation and construction quality. Although specific responsibilities are provided by MC 2920, the IE/region interfaces are summarized here:

- a. IE will solicit the region to provide an inspector who will participate as an active team member. The resident inspector at the selected facility, although not assigned as a team member, should attend the daily CAT briefing meetings and the exit meeting with the licensee.
- b. The regional offices have the responsibility for followup action on the potential enforcement actions described in the CAT inspection reports.
- c. The appropriate regional management will be sent recommendations on the extent to which the CAT effort satisfied the inspection program requirements of this manual chapter.
- d. The CAT inspection results will be used in the assessment of regional performance of the construction inspection program described in this manual chapter.

08.02 Licensee Contractor and Vendor Inspection Program (LCVIP). General policies for Vendor Program/region interfaces are described in MC 2700. Changes, as they occur, will be addressed in a revision of MC 2700.

08.03 Systematic Assessment of Licensee Performance (SALP) Program. The SALP program (NRC MC 0516) is a comprehensive, periodic appraisal by the NRC staff of power reactor licensees. It is designed to improve licensee performance, improve the NRC regulatory performance by determining which areas need increased inspection emphasis, and to provide a basis for management allocation of NRC resources. The regional offices have the responsibility to adjust their expenditure of inspection resources based on the rated performance of the licensee, and the inspection procedures provide the flexibility for the regional offices to increase or decrease the amount of inspection consistent with the SALP evaluation.

08.04 Security and Safeguards Inspections. The Security and Safeguards inspection activities, as judged appropriate by regional management, will be conducted as an earlier effort of the program set forth in IE MC 2513. Selected portions of preoperational safeguards inspection activities, such as barriers for alarm stations and vital areas, should be conducted as early as practical during construction and installation of security features. Such early onsite examination is intended to preclude the existence of later identified problems which may not be resolved due to completed work. Some of these early reviews may be possible during onsite accompaniment of licensing reviewers.

END

Appendices