

# NRC INSPECTION MANUAL

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## MANUAL CHAPTER 2920

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### CONSTRUCTION APPRAISAL TEAM INSPECTION PROGRAM

#### 2920-01 PURPOSE

The purpose of this chapter is to describe the methodology for performing the multidisciplined construction appraisal team (CAT) inspections at nuclear power plants under construction.

#### 2920-02 OBJECTIVE

The objective of the CAT inspection program is to determine through an integrated multidisciplined approach that (1) the facility is being constructed and the hardware is being installed in accordance with regulatory requirements and appropriate industry practices, and (2) the applicant's management and quality control programs are effective. The team inspections focus primarily on hardware installation and construction quality. Documentation is reviewed to the extent necessary to understand the applicant's programs to provide for final hardware installations of appropriate quality. Guidance for the development of facility-specific inspection plans is included. The results of the CAT inspection and evaluation provide an input for the assessment of the effectiveness of the regional implementation of the NRC construction inspection programs, and an input for the overview of INPO construction facility audits.

#### 2920-03 DEFINITIONS

03.01 Hardware: Foundations, structures, systems, equipment, and components.

03.02 Potential Enforcement Finding: An apparent noncompliance with specific regulatory requirements or deviation from specific commitments made by the applicant that are identified during the CAT inspection. Regional management of the applicable regional office is responsible for deciding the appropriate enforcement action to be taken in accordance with 10 CFR 2, Appendix C.

03.03 Inspector Observations: An item of concern identified during the CAT inspection that, while not related to specific regulatory requirements or applicant commitments, is a departure from appropriate engineering/construction practice and is significant enough that applicant management should take corrective action.

03.04      Applicant or Licensee: Utility that holds the construction permit.

03.05 Integrated Design Inspection (IDI): Multidiscipline inspection performed to assess the quality of design activities on a nuclear power plant project. The inspection provides a comprehensive examination of the design development and implementation for a selected plant system. An IDI may precede or follow a CAT inspection for a specific or replicate plant.

#### 2920-04 RESPONSIBILITIES AND AUTHORITIES

04.01 Director, Office of Inspection and Enforcement. Selects facilities to be inspected based on input from the NRC offices and the regions, and issues the results of inspections.

04.02 Director, Division of Inspection Programs, IE. Administers the CAT program.

04.03 Chief, Reactor Construction Programs Branch, IE. Implements the CAT program.

04.04 Regional Administrator. Determines the scope and schedule for applicant responses to the inspection report and determines final action on potential enforcement findings.

#### 2920-05 INSPECTION CONCEPT

05.01 The concept of CAT inspections at nuclear facilities under construction is based on concurrent inspections and subsequent evaluation of the installed hardware quality by a multidisciplinary team. The primary focus of the effort is on actual quality of in situ hardware with review of documentation to the extent necessary to identify the strengths and weaknesses of the applicant's programs. The functional areas that should be considered in the performance of this inspection are listed in 06.05c below.

05.02 The determination of the facility hardware quality and the effectiveness of the applicant's programs to provide for appropriate hardware quality is made generally by the following process:

- a. Define the scope and depth of the CAT inspections for a particular facility using criteria selected from the guidelines provided in Appendix 1 of this manual chapter. This definition should be based upon consideration of the facility's past inspection history and salient features. The scope of the inspection is defined during the planning and preparation phase, and appropriate revisions are made as the inspection progresses.
- b. Determine the quality of hardware as compared with that dictated by appropriate application of design, construction, and maintenance specifications. In addition, the adequacy of the specifications, on the basis of inspector observations, should be judged considering appropriate engineering/construction practices which may or may not be incorporated into the governing specifications such as regulatory guides, NRC staff positions, consensus standards

(e.g., ANSI, IEEE, ASME, ACI, and AISC), and NRC interpretations.

- c. The applicant's programs to provide for hardware quality should be compared with the criteria for effective programs to the extent necessary to understand the strengths and weaknesses of the applicant's programs. The criteria to be utilized are regulatory requirements, applicant commitments, and/or appropriate practices as discussed in 05.02b above. If the applicant is not committed to the appropriate engineering/construction practices and the applicant's program(s) is (are) inferior to the appropriate practice(s), this is identified as an observation of applicant program weakness.
- d. Verify that the construction programs including quality programs are implemented. This verification is performed during the site inspection by observations of installed hardware, work in progress, discussions with site personnel during the conduct of the inspection, and quality program reviews.
- e. Evaluate management involvement by discussions with management personnel and limited reviews of documentation, augmented by information obtained as a result of the efforts described in 05.02d above.
- f. Evaluate any program weaknesses identified by a preceding IDI which could be expected to affect installed and inspected hardware so as to be apparent in an inspection of hardware quality. Identify for any following IDI design-related construction problems which should be considered for followup during IDI.

## 2920-06 PROGRAM GUIDANCE

06.01 Program Timetable and Scope. IE management will determine the frequency of the implementation of the CAT inspections and evaluations. The scope of the program at a particular facility is to accomplish a multidisciplined inspection of the overall quality of the facility's hardware and within a given discipline to focus primarily on potential areas of concern. The factors to be considered in the inspection plan development and implementation are delineated in enclosed Appendix 1 of this manual chapter. The planning, inspection, and reporting for each facility should be completed within an approximate 3-month period. This schedule provides about 2 weeks for team planning, two 2-week onsite inspection periods separated by a 1- or 2-week preliminary evaluation and plan reassessment period, and a 1-month period for documentation of inspection results.

06.02 Team Member Assignments. Inspector assignments to the CAT shall be based on the expertise needed to implement the scope of the inspection planned for a particular facility. Consideration will be given to assignments of IDI team members to the CAT, particularly

those who have or are expected to participate in an IDI on the same or a replicate plant.

#### 06.03 Regional Participation

- a. The applicable regional office will be given an opportunity to assign regional inspectors to the construction appraisal team. Regional personnel that are assigned to CAT will report to the Team Leader for direction during the conduct of the inspection. Input for the CAT inspection report from assigned regional personnel shall be provided directly to the Team Leader.
- b. The evening before the exit briefing the team will meet to review their findings. The regional office is encouraged to be represented at this meeting.
- c. The regional office is encouraged to be represented at the entrance and exit briefings with the applicant.

06.04 Information Acquisition. Before initiating the team planning phase for a facility inspection, the Team Leader, or his representative, will contact and/or meet with regional representatives and applicant representatives, as necessary, to identify and obtain information related to the factors identified in 06.05b below. The CAT inspectors should review the report from any preceding IDI, discuss relevant findings with the IDI Team Leader and members, and obtain specific information on any problems requiring further investigation during the CAT inspection.

In addition, the team should obtain information about the applicant's document control and filing system; design, construction, and maintenance criteria; and governing construction drawing and specification definition summaries for the various disciplines. This information must be available to the team for the efficient development of a meaningful facility-specific inspection plan. During this time, NRC inspection specialists and contractor personnel should participate in the preparation of the inspection plan.

#### 06.05 Inspection Planning and Preparation

- a. A key element for a successful team inspection is detailed planning and preparation. The objectives of planning and preparation are
  1. To identify those elements that are applicable to the specific facility inspection.
  2. To formulate a detailed inspection plan appropriate for the particular facility. The inspection plan should be a guide for performing inspections and should be revised based on the results of ongoing inspection activities.
  3. To make specific functional assignments to each team member.

4. To define inspection schedules.
  5. To familiarize the team members with the facility organization, procedures, specifications, and drawings that define construction and program requirements.
  6. To indoctrinate team members to the team concept. Before the start of the onsite inspection the Team Leader should conduct an indoctrination session for the team members on the concept of team inspections and discuss the broad schedule, inspection ground rules, and areas of assignment. As the team refines the elements of the inspection by defining priorities, inspector capabilities, and site status, detailed inspection assignments are made and parallel activities are identified. The inspection plan scope should be based on two 2-week periods on-site with a 1- or 2-week period separating the two for reassessing and revising the plan.
- b. The team member(s) assigned a functional area should develop an inspection plan for that area using Appendix 1 of this chapter as guidance. Appendix 1 may be supplemented as required by using applicable inspection procedures contained in the IE Manual. The team members will use the following materials in planning the details of and preparing for the onsite inspection:
1. Safety Analysis Report and facility design/construction specifications and drawings that define requirements and commitments.
  2. Inspection history - inspection reports and docket files provide an overview of regional activity and applicant performance and aid in developing priorities.
  3. Licensee reports - reports submitted by the applicant (such as 10 CFR 21 and 50.55(e) reports) provide indications of the effectiveness of the applicant's program.
  4. Applicant manuals - arrangements should be made to obtain the project manual, quality assurance manual, topical reports, and administrative control manuals, as required. These documents provide the basis of management controls at the site and define responsibilities, authorities, interfaces, and procedural aspects of project control.
  5. Contractual arrangements - the degree to which the applicant acts as his own A/E, use of separate A/E and multiple consultants, and constructor use of multiple contractors are primary inputs into the sample definition required to provide for evaluation of interface effectiveness and an adequate cross-section of the work of various contractors.

6. Construction status - stage of completion will dictate the scope and types of inspections and evaluations appropriate for a particular discipline.
  7. Organization charts - provide the inspectors with an overview of the management interfaces, communication channels, and the identification of management personnel. Each inspector must develop an understanding of the organization and identify those managers and supervisors to be contacted.
  8. NRC staff positions/interpretations/regulatory guides (RGs) - current NRC (NRR or IE) staff positions/interpretations/RGs define the most recent NRC positions and should be considered in the detailed planning and the determination of acceptability of the applicant's program.
  9. Consensus standards - ANSI/ASME/IEEE/ACI/AISC standards shall be used as applicable.
  10. Regional management and inspector impressions of construction adequacy in the various disciplines.
  11. IDI reports that are specific to, or a replicate of, the plant where the CAT inspection will be conducted. In particular, the system(s) inspected by any preceding IDI should be considered in the CAT hardware sample selected for each functional area. The intent is for the CAT and any related IDI to provide for an in-depth vertical sample examination of a particular system from design through construction. Duplication of effort should be avoided.
- c. The planning and preparation stage should result in an initial inspection plan which will ensure that the objectives of this chapter are met. It is the responsibility of the Team Leader to integrate each team member's proposed plan/schedule/activities into an overall plan and to coordinate the inspection activities.

The inspection plan should be formulated to address the following functional areas as a minimum:

1. Civil/structural construction, including design change control
2. Mechanical construction, including design change control
3. Electrical: power, instrumentation, and controls, including design change controls
4. Welding and nondestructive examination (NDE), including design change controls

5. Traceability and maintenance and storage (both in-place and preinstallation)<sup>1</sup>
  6. QA/QC inspector effectiveness and corrective action systems<sup>1</sup>
  7. System turnover from construction to operation (only at sites that have established the turnover mechanism)<sup>1</sup>
- d. The depth of NDE performed by or under the direction of the CAT will be dictated by the particular circumstances at a facility. In special situations and as dictated by relative importance to completion of the overall inspection scope, limited destructive or semidestructive examinations may be conducted under the direction of the CAT, as approved by the Chief, Reactor Construction Programs Branch. Such needs must be presented to the applicant as soon as they are identified to provide for their timely completion. Also, such examinations may require additional contractor assistance, which requires as much advance notice as possible.
  - e. The initial inspection plan may be revised as the inspection progresses to focus on more meaningful areas. The Team Leader is responsible for arranging/directing changes to the initial inspection plan.

#### 2920-07 INSPECTION CONDUCT AND DOCUMENTATION

07.01 General. All team members should be dedicated for the duration of the inspection. Each day, the Team Leader should conduct a coordination meeting of all team members to discuss the day's activities and findings. As a result of such meetings, team members may be given additional assignments or their effort may be redirected.

At the beginning of the inspection the applicant should be asked to appoint representatives as points of contact for each of the functional areas, as appropriate. It is the responsibility of the inspector assigned to each of the functional areas to apprise the applicant's representatives of the progress of the inspection on a daily basis through informal<sup>2</sup> contact. This will expedite the exit meeting conducted by the Team Leader at the end of each onsite period.

#### 07.02 Entrance and Exit Interviews

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<sup>1</sup> These areas overlap with areas 1, 2, 3, and 4. The inspectors assigned areas 5, 6, and 7 and the inspectors assigned areas 1, 2, 3, and 4 will decide "who inspects what" during the preparation phase.

<sup>2</sup> Only requests for information may be given the applicant's representative in writing without the approval of the Team Leader. All other information given the applicant in writing must be approved by the Team Leader. It is important to ensure that information requests do not include any information about inspection results or findings.



- a. An entrance interview between senior applicant management and all CAT members shall be held before starting the onsite inspection. The regional office is encouraged to be represented at this meeting. IP 30703, "Management Meeting - Entrance and Exit Interviews," should be used as guidance when conducting the entrance interview.
- b. An exit interview shall be held between senior applicant management and the CAT Team Leader at the conclusion of each of the 2-week inspection periods. Individual CAT members will participate at the discretion of the Team Leader. IE management also may attend the exit interviews. The regional office is encouraged to be represented at these meetings. The designated Team Leader for any IDI scheduled to follow the CAT inspection should be invited to attend the final exit interview. For a plant where an IDI is not scheduled to follow a CAT and CAT findings indicate that a limited IDI for the on-site design function may be warranted, the IDI Team Leader also should be invited to attend the final exit. IP 30703 should be used as guidance when conducting the exit interviews.

The exit interview will be used to summarize the findings and to convey the significance thereof to senior applicant management. The results of the inspection shall be openly and freely discussed, but the results or findings shall not be given the applicant in writing. This will ensure that preliminary information is not provided "via draft reports" before the final report is issued.<sup>2</sup>

#### 07.03 Inspection Documentation

The team will prepare an inspection report for issuance by the Director, IE, or his representative, that documents inspection activities and findings identified during the inspection. The inspection report and related transmittal correspondence should be transmitted within about 1 month after completion of the onsite inspections.

The CAT inspection concept employed in this procedure includes an evaluation of overall hardware and construction quality and a determination of applicant program effectiveness. Therefore, in addition to using specific requirements and commitments as a basis of evaluation, the inspector may be using other criteria for which explicit regulatory requirements may not exist, such as regulatory guides, staff positions and interpretations. Consequently, in addition to inspection findings, which are potential enforcement findings, the report may contain other observations which of and by themselves, add up to perceived strengths or weaknesses. If it is found that the hardware quality or the applicant's program does not meet these criteria, the finding is considered as an observation of weakness or inadequacy. The hardware quality or the applicant's program could exceed requirements, commitments, and these other criteria, so that this program element is superior. In this situation, it would be considered as an observation of strength.

- a. Inspection Report. The cover page to the report will conform to IE MC 0610. The body of the report will identify the scope and results of the inspection. In addition, to identifying potential enforcement findings, each major inspection topic area discussed will include the other observations of perceived strengths and weaknesses discussed above. The topic areas addressed should include as a minimum the functional areas listed in 06.05c above.

The potential enforcement findings together with the other appropriate observations, provide the basis for evaluation of facility hardware quality and the effectiveness of the applicant's system of controls. The report should identify as clearly as possible the perceived reasons that caused the weakness or strength to exist and should not just repeat the weakness or strength.

- b. Transmittal Letter.<sup>3</sup> The transmittal letter will generally conform to the example contained in Appendix 2 of this manual chapter.
- c. Appendix A - Executive Summary.<sup>3</sup> The Executive Summary should summarize the significant overall conclusions and the scope and results of the CAT inspections and evaluations.
- d. Appendix B - Potential Enforcement Findings.<sup>3</sup> This appendix summarizes any apparent noncompliances with specific regulatory requirements or deviation from specific commitments made by the applicant that are identified during the CAT inspections. Explicit references to the detailed section of the inspection report are made for complete descriptions of the bases for the potential findings. These are referred to the appropriate regional office for review and necessary action.
- e. Appendix C - Inspector Observations.<sup>3</sup> This appendix summarizes items of concern identified during the CAT inspections. These items, while not related to specific regulatory requirements or applicant commitments, are departures from appropriate engineering/construction practices and are significant enough that applicant management should take corrective action. Explicit references are made to the detailed section of the inspection report for complete descriptions of the bases for these items. This appendix may not be required for all CAT inspection reports.
- f. Distribution. The CAT report will be sent to the appropriate Regional Administrator at the same time it is sent to the applicant. After proprietary clearance the report will be distributed using the region's standard distribution for the inspected facility. In addition, the report will be sent to all utility executives using distribution list 1S, and to

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<sup>3</sup> Specific detailed examples of these items are obtained by referring to previous CAT inspection/evaluation reports.

other interested NRC organizations using distribution list IE01.

- g. Input to Regional Assessments. The Team Leader shall be responsible for the preparation of the assessment documentation as required by IE Office Procedure 0200.
- h. Construction Inspection Program (MC-2512) Credit. Each inspector who was assigned inspection responsibility in a functional area shall provide the Team Leader a listing of the extent to which the CAT effort has served to satisfy the MC-2512 program requirements. This information will be sent to the appropriate regional management by the Director, Division of Inspection Programs.
- i. INPO Overview. The overview of the INPO activities related to facility construction will be conducted in accordance with the NRC/INPO Coordination Plan attached to the April 1983 letter from W. Dircks (NRC) to E. Wilkinson (INPO).
- j. Program Changes. Each team member shall provide recommendations (if any) to the Team Leader for construction inspection program changes. The Team Leader shall provide the recommendations (as appropriate) to the Chief, Reactor Construction Programs Branch.

2920-08 LIST OF APPENDICES

- 1. Guidance for Inspection Plan Development.
- 2. Sample CAT Inspection Report Transmittal Letter.

END

Appendix 1  
Appendix 2

## APPENDIX 1

### GUIDANCE FOR INSPECTION PLAN DEVELOPMENT

#### A. PURPOSE

To provide guidance in developing an inspection plan for conducting a CAT inspection.

#### B. SCOPE

This planning guidance is intended for all areas covered by the CAT inspection:

1. Civil/structural construction, including design change control
2. Mechanical construction, including design change control
3. Electrical: power, control and instrumentation construction, including design change control
4. Welding and NDE, including design change control
5. Material traceability, maintenance, and storage (both in-place and preinstallation)<sup>1</sup>
6. QA/QC inspector effectiveness and corrective action systems<sup>1</sup>
7. System turnover from construction to operation (only at sites that have established the turnover mechanism)<sup>1</sup>

This inspection will focus on components, systems, and hardware important to safety to determine conformance to engineering design, regulatory requirements, and applicant commitments. The CAT inspectors will concentrate on "hands on" inspections of selected components, systems, and hardware to evaluate quality and conformance to specifications. To the extent necessary to evaluate deficiencies observed in the hardware, the applicant's construction, inspection and QA procedures, and documentation controlling on-going and completed work will be reviewed.

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<sup>1</sup> These areas overlap with areas 1, 2, 3, and 4. The inspectors assigned areas 5, 6, and 7 and the inspectors assigned areas 1, 2, 3, and 4 will decide "who inspects what" during the preparation phase.

## C. PLAN PREPARATION

### 1. Background Review

In preparing the plan for these inspections the following information should be reviewed:

- a. Recent inspection reports (last 6 months)
- b. 10 CFR 50.55(e) reports
- c. Allegations/investigations
- d. FSAR requirements and commitments
- e. National standards (ASME, AWS, ANSI, IEEE, etc.) committed to by the licensee
- f. Construction, inspection, and QA procedures
- g. Drawings
- h. The IDI report for the same plant or one of similar design.

Each inspector should review these documents or portions of documents applicable to his assigned technical area. Items a through c should be reviewed for the purpose of guiding or focusing the inspections. The inspectors should not spend excessive amounts of time in areas that the region has recently identified as a problem area in the inspection reports. Inspection efforts in these areas should be limited to seeing if the problems continue in present work and that corrective action is being taken on previously identified defective work. Areas identified in 10 CFR 50.55(e) reports should be treated in the same manner.

Allegations should not be pursued. These are the responsibility of the Regional Office and/or Office of Investigations.

Items d through g should be reviewed principally to identify licensee commitments and physical characteristics to be used during the hands on inspections (dimensions, tolerances, accept/reject criteria materials heat treatment, etc.)

### 2. Sample Selection

The following guidance on selecting samples for inspection is prioritized in descending order of importance:

- a. The sample size selected in each area inspected should be representative of the installed and inspected hardware.

- b. The samples selected should be representative of the different contractors and vendors, shop, field, and site work.
- c. Sample should be selected from different buildings on the site and if it is a multiunit site, from those units still under construction.
- d. A sample should be selected, in all disciplines, of hardware associated with the system(s) inspected by any preceding IDI.

D. IMPLEMENTATION

- 1. Inspect samples of completed installation, after licensee QC inspections, to determine work conformance to design drawings, specifications, site procedures, and FSAR requirements.
- 2. Observe ongoing work and interview crafts and QC personnel as to work skills, knowledge of procedures and requirements, and compliance with design and procedural requirements.
- 3. Review procedures and QA/QC documentation to the extent necessary to evaluate causes of deficiencies observed in hardware or documentation.

END

APPENDIX 2

SAMPLE CAT INSPECTION REPORT TRANSMITTAL LETTER

Docket Nos. 50-(number)

ATTN: (Utility Executive)

Gentlemen:

SUBJECT: Construction Appraisal Inspection 50- (Report No.)

This refers to the construction appraisal inspection conducted by the Office of Inspection and Enforcement (IE) on (dates) at (location). The construction appraisal team (CAT) was composed of members of IE. The team was provided technical assistance by a number of highly qualified contractor personnel. This inspection covered construction activities authorized by NRC Construction Permit CPPR-(no.).

The enclosed report identifies the areas examined during the inspection. Within these areas, the effort consisted of detailed inspection of selected hardware after quality control inspections, a comprehensive review of your quality assurance program, examination of procedures and records, observation of work activities, and interviews with management and other personnel.

Appendix A to this letter is an Executive Summary of the results of the inspection and of the conclusions reached by this office.

(Short statement of key conclusions)

Appendix B to this letter contains a list of potential enforcement actions based on CAT inspector observations. These have been referred to the Region (no.) Office for review and necessary action.

Appendix C to this letter contains a list of CAT inspector observations relating to matters which, while not specific regulatory requirements, are considered to be of sufficient importance to quality construction to warrant (utility name) management attention and appropriate action.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosures will be placed in the NRC Public Document Room. No reply to this letter is required at this time. You will be required to respond to these findings after a decision is made regarding appropriate enforcement action.

