

ATTACHMENT 65001.16
INSPECTION OF ITAAC-RELATED ENGINEERING

PROGRAM APPLICABILITY: 2503

65001.16-01 INSPECTION OBJECTIVES

01.01 To evaluate the adequacy of the processes used for ITAAC engineering implementation.

01.02 To determine whether **design drawings, specifications, and** records reflect work accomplishment consistent with **the design basis, committed standards, and** approved procedures.

01.03 To verify the implementation of the quality assurance (QA) program related to **Engineering** activities and records control.

65001.16-02 INSPECTION REQUIREMENTS

This inspection procedure (IP) is intended to verify that design requirements are being controlled **and applied** in accordance with licensee procedures, to verify ITAAC-related engineering activities **are being conducted in accordance with the licensee's QA program and related engineering procedures**, and to verify that **the licensee's QA organization is reviewing and auditing engineering activities and records in accordance with the licensee's QA procedures**. The reviews and following steps in this IP apply to the ITAAC and associated design information for row 16 of the ITAAC matrix.

02.01 Design Procedures. **Review the licensee's engineering and QA procedures related to engineering design control and design change. Inspectors should select approximately 12 engineering design products for safety-related SSCs for use in the remainder of this inspection procedure. The engineering design products should, to the extent practicable, cover a range of different engineering disciplines (i.e. civil, electrical, mechanical, etc.). The number of engineering design products reviewed may vary depending on their complexity.**

Guidance. **Ensure that the work activities discussed in sections 02.02 through 02.06 below are being properly performed in compliance with the approved engineering procedures and applicable design documents such as specifications, drawings, and calculations.** Particular emphasis should be placed on those procedures that control configuration management. Engineering personnel should be appropriately trained in the applicable procedural and programmatic requirements. Obtain an understanding of QA procedures, as well as applicable codes, standards and Regulatory Guides, to confirm QA verification of engineering work and compliance with commitments. **Specifications, analyses, and other design documents** must be integrated to ensure adequate control and consistent practices.

02.02 Design Input. Review the ITAAC Matrix for the inspected facility to determine the ITAAC residing in “families” along Row (16) for “Engineering.” Select specific design criteria for inspection based upon those ITAAC. For the selected inspection criteria, verify that design inputs are identified and documented and that their selection was reviewed, **verified**, and approved by the responsible engineering group.

Guidance. Design inputs are crucial to ensuring that design activities are carried out in a correct manner. Consequently, design inputs must be identified and documented. Design inputs should consider the bases behind the **approved** design, **including safety function**, performance **requirements**, regulatory requirements, and applicable codes and standards. The inspector should also ensure that design inputs appropriately consider both normal operations and anticipated operational occurrences, maintenance, **and testing**, external events and postulated accident conditions. Ensure design inputs and assumptions are correctly selected, incorporated into the design, maintained, controlled and updated as required, and are readily available to the design organization. Any design inputs which deviate from **established industry** standards are identified, controlled and evaluated through effective design control procedures.

Verify that changes made to the design after initial approval remains consistent with the licensing basis, and that the changes were made consistent with licensee procedures and regulatory requirements. If the change is a departure from the licensing basis, verify that the departure was screened properly (i.e. per the approved COL) and, if applicable, a license amendment was obtained prior to implementation of the change.

02.03 Design Documents. Verify that a sample of the design documents address the following provisions:

- a. The design documents **provide sufficient details to adequately support implementation and facility construction; and are adequate to support proper operation of systems, components, and structures (SSCs).**

Guidance. The design of risk significant SSCs should be consistent with the risk analysis assumptions and should include the integration of human factors engineering with human reliability analysis and the results of any human-system interface reviews. **Additionally, the design documents should be properly controlled, updated, revised, and managed to ensure fidelity with the as-built SSC. The most current drawings should be available and be in use by the construction organization. Ensure that design change documents are consistent with related calculations and that the design change is consistent with the applicable design basis for the affected SSC.**

ITAAC acceptance criteria included in SSC design documents or licensee procedures, and their bases, should be reviewed to ensure consistency with the licensee’s Design Control Document (DCD) and the FSAR.

- b. Appropriate **codes and standards** are identified and documented in the design documents, and their selection is reviewed, **verified**, and approved.

Guidance. Ensure that the applicable codes and standards, as identified in the UFSAR, are properly incorporated into the design documents with the correct edition year. Ensure that any regulatory guides that are applicable to the activity and committed to in the UFSAR are properly incorporated into the design documents.

- c. The design documents address the methods, materials, parts, equipment, and processes, essential to the function of an SSC.

Guidance. Procedures that control the content and distribution of listed materials, parts, equipment, and processes that are essential to the function of an item should require that they are properly identified and used for design, procurement, construction and operations activities. Commercial grade items must be identified with the acceptance criteria defined for such items to be verified.

02.04 Design Analysis. Verify that a sample of design analyses is subject to the following:

- a. Calculations are controlled and identified by subject, originator, reviewer, approver and date such that they are readily retrievable. Changes posted to the calculations are easily retrievable and were subjected to the same rigor of the original approval.
- b. Documentation includes the objective, inputs and their sources, background data, assumptions, and computer inputs and conclusions.

Guidance. Design packages should contain information sufficient so that a technically qualified person could verify the results without recourse to the originator. **Computer code names and versions (i.e. revisions) should be identified.**

- c. Computer program acceptability has been previously verified or the results verified with the design analysis for each application. Ensure that any programs used for analysis or calculations have been properly verified in accordance with QA program requirements.

Guidance. Computer program verification should show that the program produces correct solutions for the encoded mathematical model within defined limits for each parameter employed. The inspector should verify the encoded mathematical model produces a valid solution to the physical problem for the particular application.

02.05 Design Verification. Ascertain whether a sample of the design products of engineering are subject to the following:

- a. Design verification is performed by methods which include, but are not limited to, any one or a combination of design reviews, alternate calculations, and qualification testing. If utilized, qualification testing should demonstrate the adequacy of performance under conditions that simulate the most adverse design conditions. **Verify the design provides reasonable assurance that the SSC is capable of continuously meeting the ITAAC acceptance criteria.**

Guidance. The inspector should use judgment and consider that the extent of design verification should be a function of the importance to safety, the complexity of the design, the degree of standardization, the state of the art, and the similarity with previously approved designs. Some of the documents that could require design verification by the licensee or its contractors are the following: seismic analyses, various software plans required from development to installation and testing, equipment qualification reports, ASME Code stress reports, pipe break analyses, and human factors analyses and plans. **As an example of an SSC requiring seismic margin analysis, verify that the engineering analysis report : (1) includes related fragilities and high confidence low probability of failure (HCLPF) analysis, (2) provides adequate information consistent with the requirements of FSAR Tier 2 Chapter 19, and the guidance of DC/COL-ISG-03, "Probabilistic Risk Assessment Information to Support Design Certification and Combined License Applications," and DC/COL-ISG-020, "Seismic Margin Analysis for New Reactors Based on Probabilistic Risk Assessment," (3) uses the methodology, assumptions, modeling, and material properties which comply with relevant requirements of FSAR Chapter 19 and consistent with applicable provisions of SRP Sections 3.7, 3.8, and 19 as well as DC/COL-ISG-03 and DC/COL-ISG-020 guidance, and (4) has the HCLPF values evaluated in the analysis equal to or greater than the review level earthquake.**

b. Design verification is performed by any competent individual or group other than those who performed the original design. **In most cases, the verifier** may be from the same organization.

02.06 Audits. Verify that a sample of the audits performed on design documents ensure the effectiveness of the design control program.

Guidance. The inspector should review at least the last QA audit report of the design program and any other surveillances or audits which may have been conducted. The **Inspector** should determine if there were any significant findings, and if so, the adequacy of the corrective actions which were taken.

65001.16-03 RESOURCE ESTIMATE

Resource estimates are currently under development for this inspection procedure. This document will be revised to add this information as it becomes available.

65001.16-04 REFERENCES

NUREG 0700, Rev. 2, "Human System Interface Design Review Guidelines."
NUREG 0711, "Human Factors Engineering Program Review Model."

END

Attachment:
Revision History for IP 65001.16

Attachment 1 - Revision History for IP 65001.16

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment and Feedback Resolution Accession Number
N/A	10/03/07 CN 07-030	Initial Issuance. Researched commitments for 4 years and found none.	N/A	N/A
N/A	ML14098A240 06/20/14 CN 14-013	Periodic Update	N/A	ML14098A241