ATTACHMENT 65001.10

INSPECTION OF ITAAC-RELATED INSTALLATION
OF INSTRUMENT COMPONENTS AND SYSTEMS

PROGRAM APPLICABILITY: 2503

65001.10-01 INSPECTION OBJECTIVES

01.01 To determine if construction activities for instrument components and systems (IC&S) are implemented in accordance with NRC requirements, the Final Safety Analysis Report (FSAR), construction specifications and drawings, industry standards, and licensee commitments and procedures.

01.02 To assess if the Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)-related IC&S function in accordance with the design basis.

01.03 To determine if the general records for the installation and testing of IC&S are consistent with NRC requirements, the FSAR, and licensee commitments and procedures.

01.04 To evaluate whether the appropriate quality assurance (QA) program requirements are implemented for the installation and testing of IC&S, and to ensure any identified problems are entered into the corrective action process.

65001.10-02 INSPECTION REQUIREMENTS AND GUIDANCE

This inspection procedure (IP) covers the inspection of the installation and testing of IC&S. The IC&S include field sensors, transmitters, indication displays, instrument and protection systems, logic and control devices, and annunciation. It does not include cabling, except when the cabling is an integral part of the instrument component, for example, thermocouple cabling.

The inspections for this IP shall be performed periodically on a frequency commensurate with construction progress, but generally, no less frequently than semi-annually. It is expected that the scope of those inspections will vary with construction progress, problems encountered, etc. Additional inspections should be implemented when and where conditions warrant. Not all the steps of this IP are required to be performed each time it is implemented. It may be appropriate for a particular inspection to implement only certain steps of this IP. Any construction activity that has been delayed for more than six months or has been subject to significant procedural, design, or personnel changes should be re-evaluated immediately after resumption of the work, testing, or after completing the changes.

02.01 Pre-Inspection Activities.

a. Inspection Preparation.

1. The inspector should develop a basic understanding of the instrument systems of the particular plant design, for example the AP 1000, and of the manual controls in the Main Control Room (MCR) and at the remote shutdown (RS) panels.

Guidance -The systems being referred to are the instrument systems that process the signals from field sensors and transmitters, actuate process components and systems, and provide displays including integral controls. The basic understanding of each system should include the following: (1) purpose, (2) the types of inputs and outputs, (3) the interrelation of one instrument system to another and to other plant safety systems, and (4) the types of hardware. The focus should be on those systems that have a large number of ITAAC associated with them. The inspector can use the FSAR, plant-specific design control document (DCD) or equivalent, construction drawings and specifications, and licensee/contractor information.

2. The inspector should understand the nature and types of ITAAC for IC&S residing in the "families" along row (10) of the ITAAC matrix.

   Guidance - The ITAAC in each of the IC&S "families" for the matrix can be further grouped based on their ITAAC acceptance criteria. The inspector should understand those subtleties since not all of the ITAAC will receive direct inspection.

3. The inspector should review the FSAR and licensee documentation for the installation and testing of IC&S.

   Guidance - The licensee should maintain clear and concise records of the installation and testing of IC&S, and those records should be in accordance with licensee procedures and NRC regulations. Where possible, the record reviews for this IP should be performed in conjunction with the inspection of installation and test activities. Any inadequacies that could lead to installation or test deficiencies and/or indicate inadequate management control should be identified. Records should be selected for review based on their association with ITAAC. Ascertain who is responsible for preparing, reviewing, and ensuring the accuracy of records to conduct interviews when necessary.

4. The inspector should check with NRO to determine whether the IC&S, actually purchased, are in accordance with the plant's design basis.

   Guidance - The majority of the IC&S were not actually defined down to the hardware level in the plant-specific DCD or equivalent. In most cases, the related ITAAC and Design Acceptance Criteria (DAC) defined the IC&S based only on performance. The actual hardware for the IC&S may not actually be selected until late in the application process for a COL or even after construction begins. NRO Instrumentation, Controls, and Electrical Engineering Branches 1 or 2 (ICE1or ICE2) should determine which IC&S are ready for inspection. That determination will be based on whether the appropriate design reviews were completed, contractors had the required QA programs, hardware and software for IC&S had the required life cycle reviews by the respective contractors, etc.

b. Selection of Process Variables and Components.

1. The inspector should select from one to three process variables for each of the systems in the first three substeps below and also one component from the instrument air system.

   (a) Reactor trip system

Guidance - Examples of process variables used for reactor trip (scram) initiation include neutron flux, core coolant temperature, pressurizer pressure, RCS flow rate, and reactor vessel water level. Associated and interrelated devices include signal processing and conditioning components, microprocessors, fiber-optic links, isolation devices, process sensors and transmitters, interlocks, bypasses, selector switches or soft control devices, resets, overrides, instrument tubing, racks, panels, and their supports. Actuation of the reactor trip system may be achieved through multiple means. For instance, instrument systems could provide automatic actuations, but manual actuations would be available from the MCR and RS panels.

(b) Engineered safety features actuation system (ESFAS)

Guidance - Examples of process variables used in the ESFAS include: containment pressure, pressurizer level and pressure, reactor coolant temperature, reactor vessel level, and high containment pressure. The FSAR should include the specific variables, as well as the logic and logic devices, used in the system. Associated and interrelated devices are the same as identified above for the reactor trip system. Actuation of the ESFAS may be achieved through multiple means similar to that of the reactor trip system.

(c) Safety-Related Display Information System

Guidance - The inspection should focus on displayed process variables that provide the information for the licensee's operators to initiate a safe shutdown, to address an accident or an event, and to prevent the potential release of radiation to the environment. The licensee should have procedures that indicate the manual actions taken by operators based on reliance on the available indication at the MCR or RS panels.

(d) Instrument Air System

Guidance - The inspector should focus on one major component (and associated items) of the instrument air system used for safety-related control components. The component selected should be crucial to the operation of the instrument air system like the following: compressor, dryer, volume tank, power source for compressor, etc.

2. The inspector should complete the inspection requirements of Subsections 02.02a through 02.02d for the IC&S pertaining to the process variables selected above. For the selected instrument air component, the inspector should perform only steps 02.02c and 02.02d.

No specific guidance.

02.02 Inspection Activities.

a. In-Process Installation. The inspector should observe and evaluate portions of the in-process installation activities of nine IC&S associated with the selected process variables by performing the following sub-steps:

Guidance - For the IC&S that are panel or rack-mounted, the following reviews may be expanded to take into consideration the panels, racks, and other IC&S mounted in those panels and racks.

All required documentation may not be received with the IC&S. If not, reviews and resolution of problems for receipt and storage of IC&S can be performed in accordance with Inspection Manual Chapter (IMC) 2504. The inspector should be aware of any problems identified by the licensee's QA organization for construction activities, and the inspector should verify that the licensee is taking the necessary actions to address those problems.

The inspector should select the IC&S for the process variables for the path from process sensors or transmitters to and including the signal processing and display IC&S. At least one of the selected IC&S should be an instrument system. If the inspector selects a total of nine process variables, then there could be one selected IC&S for each process variable. If less than nine process variables are selected, then some process variables will have more than one selected IC&S associated with them. Ideally, a selected IC&S should have only have one process variable associated with it, unless the IC&S is, for example, like a programmable controller which is designed to receive/transmit multiple signals. The inspector is allowed some latitude in the number of process variables selected both for the benefit of these inspections and for some assistance to the inspectors in selecting IC&S related to ITAAC.

1. The following licensee activities are controlled, inspected, and accomplished in accordanc8:00ame with the requirements of the procedures reviewed in accordance with IP 65001, Step 02.02.

   No specific guidance.

2. Verify the latest approved revisions of applicable construction specifications, drawings and/or procedures are available and used by the installers.

   Guidance - The inspectors should periodically check that the most recent revisions of the construction documents are used and that there are no missing or inappropriate approvals. The installation records should indicate the actual revisions of those documents used during the installation.

3. Ensure that the IC&S are as specified in regard to: type, range, proof pressure/rating, environmental qualification (EQ), seismic qualification (SQ), and material.

   Guidance - The ratings on the IC&S should agree with the construction specifications and contractor manuals, and the IC&S should be qualified for their environments per EQ and SQ reports. This applies to field-mounted and panel or rack-mounted IC&S and to the panels and racks. Even IC&S in a non-harsh environment must be rated to function in that environment. In addition, IC&S must have the appropriate ratings, for example, for surge withstand capability (SWC), electromagnetic interference (EMI), electrostatic discharge (ESD), and radio frequency interference (RFI). These ratings should be addressed in procedures, in addition, to them being in the construction specifications. All IC&S which operate in a harsh environment should be identified and described in the FSAR. A harsh environment is determined by high radiation, temperature, pressure, vibration, or humidity during or subsequent to an accident, such as, a loss-of-coolant accident (LOCA), or high-energy line break (HELB). Where EQ testing or other qualification provisions, such as SQ are specified, receipt inspection activities must verify that the required testing has been satisfactorily completed. The installation records should indicate that the proper IC&S, for the particular environment, were installed, and they should identify any discrepancies.

4. Verify that the mounting hardware and supports are of the type and material specified and are properly located.

   Guidance - Anchorage and supports are pertinent to IC&S, such as, analog equipment, racks, and panels. For some of the supports and anchorages, the inspector should directly measure or otherwise independently verify that the requirements pertaining to certain items, such as equipment and support locations and bolt sizes, are as specified. The installation records should indicate that the proper supports were installed and located per the drawings, and they should describe any discrepancies.

   (a) During installation of equipment, anchorage holes are sometimes drilled in concrete structures. Indiscriminate cutting of reinforcing steel should not be allowed.

   (b) The inspector should ensure that proper welding requirements are specified and controlled. AWS D1.1, Structural Welding Code, is usually specified for welding of supports. Instrument tubing welds are generally in accordance with ASME Boiler and Pressure Vessel Code, Section III. Construction specifications and drawings should specify the welding requirements to be used.

5. The IC&S are installed at the proper location and orientation by qualified craft personnel using suitable equipment and tools.

   Guidance - "Qualified craft personnel" means those employees who achieved suitable proficiency to do their assigned tasks by training and/or previous experience, and who understand the installation procedures, drawings, and specifications necessary for their work. The licensee must have qualification records that indicate the craft personnel's experience and education relevant to IC&S, such as electronic and digital components. Panels and racks used to mount IC&S are to be located in the correct locations in the plant. The locations of panel-mounted IC&S, even though verified based on factory-acceptance testing, can be checked against the contractor's drawings. The installation records should identify the craft personnel who performed the work and the independent reviewer who verified the work, and they should contain signoff blocks to indicate who performed or verified a particular step in the work or test procedures. The installation records should also indicate that the IC&S including racks and panels were mounted at the correct locations.

6. Verify that the required identification is properly maintained or established on the IC&S.

   Guidance - For field-mounted IC&S, their identification should be attached to them. Panel or rack-mounted IC&S and the panel or rack should be correctly identified. The installation records should indicate that the IC&S were identified in accordance with the construction drawings and specifications.

7. Licensee/contractor inspections are performed, or scheduled to be performed, before "covering up" the work to be inspected.

   Guidance - This is applicable, for example, to the supports for field-mounted components, like racks and panels. The installation records should indicate that each step of the installation was inspected by the licensee before proceeding to subsequent steps that could cover up the work just performed.

8. Inspection activities are timely and properly completed by qualified personnel.

   Guidance - The observations of QA inspection activities include in-process and final inspections. "Timely and properly completed" means performing the proper inspections at the specified frequency and sequence. Two or three QA inspectors are to be interviewed to determine whether they are familiar with the quality requirements associated with the IC&S being inspected, what construction specifications and other criteria are used to determine acceptance, how their inspection results are recorded, etc. The inspector should determine the effectiveness of IC&S inspection personnel and of management systems for indoctrination, training, and qualification of personnel. The installation records should indicate that the required QA inspections were properly performed, recorded, reviewed, and evaluated by qualified personnel.

9. Installed IC&S are adequately protected from any damage due to adjacent construction activities.

   Guidance - It is important to ascertain whether installed IC&S or conditions exist where prohibited. For example, IC&S for the ESFAS must be located so they are not exposed to potential hazards, such as, high pressure piping or flammable material. The inspection records should identify the potential hazards to the IC&S being installed, and they should indicate how the licensee protected and/or reported which IC&S are in need of protection.

10. The corrective actions undertaken for problems identified during the installations are effective.

    Guidance - The inspector should select 1 or 2 problems that are more significant than a missing screw or an improperly labeled component. The effectiveness of any corrective actions is determined by whether the problems are recurring or not. The licensee should determine the root causes of the problems, and the corrective actions should address the root causes not the problems themselves. When the corrective actions are not effective, the inspector informs both the licensee and NRC management. The inspection records should indicate what corrective actions were required for problems encountered during the installation of the IC&S.

11. The records of the in-process activities are in accordance with licensee procedures and NRC regulations.

    Guidance - The records should be all the installation records including those suggested in the guidance for the proceeding steps of the in-process work activities.

b. Completed Work. The inspector should observe and inspect the completed installation of the IC&S and associated items selected in Section 02.02a by performing the following sub-steps.

   Guidance - For the IC&S that are panel or rack-mounted, the following reviews may include the panels or racks and other equipment mounted in those panels and racks.

1. The activities reviewed in the following sub-steps should be controlled, inspected, and accomplished in accordance with the requirements of the procedures reviewed in IP 65001, Step 02.02.

   No specific guidance.

2. Seismic requirements are met for the selected IC&S.

   Guidance - This is especially important for IC&S that are sensitive to movement and vibration, such as digital components, instrument lines, and panels. IC&S, with seismic requirements, should be exactly located and orientated per the construction drawings. The selected IC&S requiring SQ, as indicated by the DCD or FSAR, should still be seismically bounded by the tests or analyses of the licensee or contractor for their as-built locations. Any changes should be reviewed and documented in the installation records by the licensee.

3. The specified IC&S and associated items are the ones installed.

   Guidance - Sometimes similar IC&S are put in identical cases. The IC&S should be exactly the ones specified by the construction drawings and specifications. This is a followup to the check performed during the installation, and the IC&S usually will be the same unless changed out due to a design or field change. The installation records should indicate any IC&S replaced and specify the reasons.

4. IC&S are correctly and permanently identified.

   Guidance - The identification of an IC&S should be in agreement with the construction drawings and specifications and should be appropriate for its location. The same identification should be on the IC&S, installation records, calibration records, and inspection records. Panels and racks should be uniquely identified. For a variety of reasons, the identification of IC&S may have been disturbed. This is a final verification that the identification is still correct, and the installation records should indicate that and identify any changes.

5. Cleanliness requirements are maintained or otherwise satisfied.

   Guidance - The cleanliness of an IC&S should meet the construction specification or contractor's manual and should be appropriate for its environment. This is especially true for digital and electronic IC&S. The installation records should indicate that the contractor's requirements were met and, if not, should provide a justification and an alternate course of action.

6. Installed IC&S are adequately protected from adjacent construction activities and other plant equipment.

   Guidance - Temporary protection during construction is usually required, especially from overhead construction activities such as welding and concrete placement. Permanent protection to prevent inadvertent damage during plant operation and maintenance should be provided. This is especially important for safety-related instrument tubing, sensors, transmitters, and controllers that may be damaged by an event or accident during which they are supposed to function. The as-left installation should be in

accordance with the contractor's requirements. The installation records should indicate any potential risks and the means of protection.

7. IC&S have the required physical separation and electrical independence between redundant counterparts.

   Guidance - 10 CFR 50.55a(h) requires protection and safety systems to meet the Institute of Electrical and Electronic Engineers (IEEE) standard 603-1991 for combined license (COL) applications docketed after May 13, 1999. This is achieved by maintaining physical separation and electrical independence between the IC&S utilized in the channels/trains of those systems. Identical IC&S, but not the same IC&S, are allowed to be used in the redundant channels/trains of a protection or safety system if the contractor has analyzed for all potential common-mode failures. However, the IC&S (sensors, software, microprocessors, signal processing equipment, displays, operating system and programming language) used in one protection or safety system must be different from the IC&S used in its backup protection or safety system. The degree of redundancy required in the design basis of the IC&S must not be compromised by the as-built installation. Access to installed software should be controlled to prevent changes to provisions that prevent common-mode failures. Electrical independence also includes being powered by the right power source. The installation records should indicate any deviation between the design basis and the as-built installation.

8. Safety-related protection systems and normal plant control systems are adequately separated and isolated from each other.

   Guidance - Safety functions are to be independent of normal plant control functions, especially safety functions that provide protection against control malfunctions. Isolation devices or gateways are used to isolate safety systems from non-safety control, data communication, and display systems. The latter can be demonstrated by reports but may be verified for a sample of IC&S in the field. Safety functions take precedence over non-safety functions and should be available even if non-safety functions are disabled during an accident or event. The installation records indicate any deviation between the design basis and the as-built installation.

9. The EQ of IC&S is maintained.

   Guidance - This check determines for any design changes, such as, the location of IC&S that the EQ of that IC&S is maintained. The EQ of the selected IC&S as indicated in the DCD or FSAR should also still be bounded by their appropriate tests or analyses so that those qualifications are still maintained for their as-built installations. The installation records should indicate any deviations from the design basis that could possibly invalidate the EQ of the affected IC&S.

10. Digital IC&S, such as microprocessors, have hardware and software configuration management plans.

    Guidance These plans address the functional requirements, documentation and review, verification and validation, problem reporting, factory and installation tests, training, etc. A number of ITAAC are concerned with whether these plans exist and are in compliance with the applicable standards and regulations. These plans identify the controls put in place for the integrity of the hardware and software for their entire life cycles from

inception through factory testing and shipment. The inspector is not performing a design review, but just verification that these plans exist and address the key, high-level requirements in accordance with the pertinent IEEE documents invoked by the licensee's design basis and the acceptance criteria of the associated ITAAC. The licensee's records should indicate that the licensee performed audits at the contractor's facility and verified that the contractor followed the hardware and software QA and configuration management's plans. The inspector can check whether these plans include any site requirements, and whether the licensee followed them. Any identified discrepancies should be recorded in the installation records and should be reported to the inspector's management and the ICE1 or ICE2 branches in NRO.

11. Displays on MCR panels and at other panels used by operators are mounted at the correct locations.

    Guidance - The displays should be mounted correctly and should function in accordance with contractor specifications. The installation records of the licensee should indicate the results of this review in regard to which displays were located correctly and were functional.

12. The completed installations of instrument systems conform to their elementary layouts.

    Guidance - For 1 or 2 safety-related instrument systems, the inspector verifies any of the following which are applicable for one channel/train: integral dedicated controls and displays; inputs from sensors and transmitters; and outputs to IC&S, safety systems, like Reactor trip and ESFAS, non-safety related systems, and MCR and RS panels for controls and displays. This is not a detailed check, just a fundamental check that the system has the required types of inputs, outputs, displays, and controls. The installation records indicate any deviations of the installed systems from their elementary layouts.

13. Any purely instrument cables, integral to their associated IC&S, such as thermocouples, meet their design characteristics.

    Guidance - Thermocouple cables, for instance, should have the required shielding, insulation, and sheaths. The licensee's records should indicate any deviations of the cables from their design basis.

14. All IC&S are properly grounded, and cables are arranged to minimize electrical noise.

    Guidance - The grounding of IC&S should be in accordance with the design basis and meet all contractor's requirements. This mainly applies to IC&S mounted and cables routed in the field since the contractor will comply with these requirements for the contractor's panels and racks. IEEE standard 1050 provides good insights on how to ground IC&S, and how to route cables to minimize electrical noise. The installation records should address any grounding and electrical noise concerns.

15. Instrument sensing lines are installed in accordance with ANSI/ISA-67.02.01.

    Guidance - This standard prescribes a number of requirements for installation of instrument sensing lines. Proper sloping of the lines to preclude gas entrainment is of particular concern. Gas entrainment can

make pressure and level instruments, particularly level instruments, unacceptably inaccurate.

16. Status of completed installation, any maintenance required, and readiness for construction testing is indicated or otherwise documented.

    Guidance - The installation records should indicate the justification for proceeding to construction and operational testing, and they should state if any maintenance is required.

17. The records of the completed activities are in accordance with licensee procedures and NRC regulations.

    Guidance - The records should be all the installation records including those suggested in the guidance for the proceeding steps of the in-process work activities.

c. As-built Verification. When IC&S and associated items, selected in Section 02.02, are completely (or essentially) installed and inspected, select the latest revision (as-built, if available) of their design and/or installation drawings, construction specifications, and other applicable installation documents. Compare the actual installation with the drawings, specifications, and other installation documents. Do not duplicate any reviews conducted of the completed installations in the previous section.

Guidance - Determine whether the IC&S and associated items are correctly installed in accordance with approved drawings, construction documentation, and changes, such as design and field changes. As this inspection requirement is to verify "as-built" systems, a new sample should be selected if it is found that extensive rework is in progress for the IC&S of the original sample. However, the NRC inspector should verify that those changes are properly handled in accordance with established procedures. When reviewing the installation for a IC&S, the inspector may expand the review to cover the panel or rack, if applicable, in which the IC&S is mounted so that panel or rack's location, configuration, and installation are inspected. Obviously, the inspection requirements associated with as-built verification cannot be done until the work to be inspected is essentially complete. Consequently, this inspection requirement should be scheduled during later periodic inspections. Before doing this step, perform the next two substeps.

1. Verify the number and status of outstanding design changes on the selected drawings or related specifications.

   Guidance - The design changes should be properly verified and approved in accordance with the licensee's QA program. For the design changes, the inspector should determine if the licensee followed its procedures and whether the changes met their intended purpose.

2. Determine whether there are any discrepancies between the as-built installation and construction documentation due to in-process changes, such as field changes. If field changes are involved, determine whether the licensee has properly controlled and documented these changes for engineering review, approval, and subsequent incorporation into the as-built drawings.

   Guidance - Field changes may be made to instrument systems during construction that are different from the original (SAR) design. Such changes will result in the accumulation of various types of design change documents.

Since these changes reflect as-built conditions, they should be adequately controlled and available for future evaluations.

d. Construction and Operational Testing. The inspector should observe construction and operational testing of a combination of four IC&S associated with the process variables selected in the Section 02.02 by performing the following substeps below:

Guidance - This section combines construction and operational testing. The first is the preliminary testing, which is performed to verify that components and systems are correctly installed and operational. Operational testing is a verification that components and systems operate in accordance with their design criteria. This section will not further differentiate between the two but the following steps will address both. One of those IC&S in the selected sample should be an instrument system. The sample can be increased as deemed necessary by the construction inspection staff (CIS). For the IC&S that are panel or rack-mounted, the following reviews could be expanded to take into consideration other IC&S mounted in those panels and racks.

1. The test activities, reviewed in the following sub-steps, should be controlled, inspected, and accomplished in accordance with the requirements of the procedures reviewed in IP 65001, Step 02.02.

   No specific guidance

2. Test and calibration personnel adhere to any special handling or removal requirements.

   Guidance - Test and calibration personnel should be knowledgeable in the special care and handling that should be exercised when readying sensitive IC&S for testing. The inspector should be especially mindful of those injudicious actions that could cause the systems or components to operate in a manner uncharacteristic to their test specifications or design basis.

3. The latest revision of applicable procedures and/or specifications are available at the test location and used by personnel performing the testing and calibration.

   Guidance - The inspector should periodically check that the latest test procedure is being used during the test. The inspector should review the specified calibration requirements and procedures before observing these activities. If special requirements are specified, such as density compensation during liquid level instrument calibration, the inspector should determine whether those requirements are met. All testing should be in accordance with licensee commitments and contractor's recommendations.

4. Properly identified, traceable, and calibrated measuring and test equipment are used.

   Guidance - If calibration activities are in progress, determine whether the most recently approved calibration information is being used, and whether there is compliance with the required procedures. The values of instrument ranges and zero set points are sometimes changed after receipt of the instruments at the site. The inspector should assure himself (by selective sampling) that current data are used for checking and calibrating instruments, and that these changes are within the limits of the instrument components involved.

5. IC&S are able to obtain the desired set point, degree of accuracy, and/or tolerance specified or otherwise noted.

   Guidance - As these inspection requirements cannot be done until testing and calibration activities are in progress, inspection in this area should be scheduled accordingly. For digital IC&S, the setpoints or tuning parameters embedded in the software should be treated like any other setpoint. A download of setpoints and coefficients by the licensee could be compared to IC&S requirements documentation.

6. Required testing and calibration results are recorded during the activity, not after the work has been completed.

   Guidance - Final calibration and trip settings should be done during the final testing of the system or component.

7. The power, grounding, and shielding, if applicable, are in accordance with the design basis and NRC SER.

   Guidance - Test signals may be utilized to test if the systems and components are powered from the correct power division. Grounding and shielding of electronic and digital systems and components should be carefully addressed and be in accordance with the contractor's recommendations.

8. Automatic and manual actuations and responses of IC&S are per the design basis.

   Guidance - The following pertain to the responses of IC&S to either simulated or actual signals or inputs. Whether the signals are actual or simulated is not really pertinent to whether the IC&S perform in accordance with the design basis. The inspector can check for any of the following:

   (a) After the required input, instrument systems actuate process IC&S and safety systems, such as, ESFAS.

   (b) The manual actuation of process IC&S is performed from operator stations like the MCR or RS panels.

   (c) Safety-related displays provide the correct information.

9. IC&S are adequately identified as having been tested or calibrated.

   Guidance - The licensee in some fashion should indicate what IC&S have been tested and whether there are outstanding concerns that could possibly invalidate the tests as conducted.

10. Personnel performing the testing and calibration are properly qualified.

    Guidance - "Qualified test personnel" means those employees who have achieved suitable proficiency to do their assigned tasks by appropriate training and/or previous experience and who understand the test procedures, drawings, and specifications necessary for the testing to be conducted.

11. The records of the testing activities are in accordance with licensee procedures and NRC regulations.

Guidance - The records should be all the testing records including those suggested in the guidance for the proceeding steps of the testing activities.

02.03 Additional Inspections. Additional inspections may be conducted in the areas covered above when warranted based on the licensee's performance in the installation and testing of IC&S as determined by the CIS with the approval of their supervision. In these cases, particular consideration should be given to an expanded sample of items to be inspected under any of the Sections 02.02a, 02.02b, 02.02c, and 02.02d.

Findings from this inspection activity should address each functional area as being satisfactory, being unresolved and requiring resolution, or being in violation and requiring correction. When significant inadequacies are identified indicating weakness within the responsible organization, the inspector should inform his supervision within the CIS. The issue should also be addressed at the appropriate level of licensee management.

02.04 Prevalent Problems and Concerns. The inspector should be alert to problems of a generic nature, such as:

a. Inadequate work quality because of rapid turnover of craft and/or inspection personnel.

b. Poor attitude toward quality work.

c. Lack of cooperation between craft and inspection personnel.

d. Inadequate identification and control of similar IC&S, especially during removal and replacement for calibration, modification, or repair.

e. Field changes made without proper authorization, and conversely, use of outdated drawings and/or installation specifications or procedures. Additionally, limits may not be set on the time or number of changes that can exist before they are incorporated into the as-built record and affected design documents. Without such controls it is difficult for the licensee to adequately evaluate the effect of successive changes on the overall design and, as a result, ensure that final as-built design records correctly represent the completed installation.

f. Unauthorized removal, modification, and replacement of instrument IC&S.

g. Failure to meet separation criteria.

h. Inadequate documentation relative to status of EQ.

65001.10-03 RESOURCE ESTIMATE

The resource estimate for this IP is approximately 2000 hours of direct inspection effort over the course of construction.

65001.10-04 REFERENCES

04.01 General.

Facility FSAR, Chapters 1, 3, 4, 5, 6, 7, 8, 15, and 17, including pertinent codes and standards referenced in the FSAR

04.02 NRC Regulations.

10 CFR 50, Appendix A - General Design Criteria for Nuclear Power Plants, Criteria 2, 4, 17, 19, 20, 21, 22, 23, 24, and 25

10 CFR 50, Appendix B - Quality Assurance Criteria for Nuclear Power Plants

Generic Letter (GL) 83-28 - Required Actions Based on Generic Implications of Salem ATWS Event

GL 95-02 - Use of NUMARC/EPRI Report TR-102348, Guideline on Licensing Digital Upgrades

Information Notice (IN) 83-83 - Use of Portable Radio Transmitters Inside Nuclear Power Plants

NUREG-0493 - A Defense-in-Depth and Diversity Assessment of the RESAR-414 Integrated Protection System

NUREG-0700 - Human-System Interface Design Review Guideline

NUREG-0711 - Human Factors Engineering Program Review Model

NUREG-0800 - Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, Chapter 7, and Controls

NUREG-0800 - Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, Chapter 13.2, Training

NUREG-0800 - Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, Chapter 13.5, Plant Procedures

NUREG-0800 - Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, Chapter 18, Human Factors Engineering

NUREG/CR-3270 - Investigation of Electro-magnetic Interference (EMI) Levels in Commercial Nuclear Power Plants

NUREG/CR-4640 - Handbook of Software Quality Assurance Techniques Applicable to the Nuclear Industry

NUREG/CR-6303 - Method for Performing Defense-In-Depth and Diversity Analyses of the Reactor Protection System

Regulatory Guide (RG) 1.11 - Instrument Lines Penetrating Primary Reactor Containment

RG 1.22 - Periodic Testing System Actuation Functions

RG 1.28 - Quality Assurance Program Requirements (Design and Construction)

RG 1.29 - Seismic Design Classification

RG 1.30 - Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment (ANSI N45.2.4/IEEE 336)

RG 1.38 - Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants (ANSI N45.2.2)

RG1.39 - Housekeeping Requirements for Water-Cooled Nuclear Power Plants (ANSI N45.2.3)

RG 1.53 - Application of the Single-Failure Criterion to Nuclear Power Plant Protective Systems (IEEE 279 and IEEE 379)

RG 1.58 - Qualification of Nuclear Power Plant Inspection, Examination and Testing Personnel (ANSI N45.2.6)

RG 1.63 - Electric Penetration Assemblies in Containment Structures for Light-Water-Cooled Nuclear Power Plants

RG 1.75 - Physical Independence of Electric Systems

RG1.89 - Qualification of Class 1E Equipment for Nuclear Power Plants

RG 1.97 - Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environ Conditions During and Following an Accident

RG1.100 - Seismic Qualification of Electric Equipment for Nuclear Power Plants

RG 1.118 - Periodic Testing of Electric Power and Protection Systems

RG 1.151 - Instrument Sensing Lines

RG 1.152 - Criteria for Programmable Digital Computer System Software in Safety-Related Systems for Nuclear Power Plants

04.03 American Society of Mechanical Engineers (ASME).

ASME NQA-1-2004 - Quality Assurance Requirements for Nuclear Facility Applications

04.04 Electric Power Research Institute (EPRI).

EPRI Report TR-102323 - Guide to Electromagnetic Interference (EMI) Susceptibility Testing for Digital Safety Equipment in Nuclear Power Plants

04.05 International Electrotechnical Commission (IEC).

IEC 880 - Software for Computers in Safety Systems of Nuclear Power Stations

04.06 Institute of Electrical and Electronic Engineers (IEEE).

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IEEE- 7-4.3.2-2003 - IEEE Standard Criteria for Digital Computers in Safety Systems of Nuclear Power Generating Stations

IEEE 279-1971 - Criteria for Protection Systems for Nuclear Power Generating Stations

IEEE 323-2003 - Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations

IEEE 336-2005 - Guide for Installation, Inspection, and Testing for Class 1E Power, Instrumentation, and Control Equipment in Nuclear Facilities

IEEE 338-1987 - Standard Criteria for Periodic Surveillance Testing of Nuclear Power Generating Station Safety Systems

IEEE 344-2004 - Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations

IEEE 379-2000 - Standard Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems

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IEEE 420-2001 - Standard for the Design and Qualification of Class 1E Control Boards, Panels, and Racks Used in Nuclear Power Generating Stations

IEEE 518-1982 - Guide for the Installation of Electrical Equipment to Minimize Electrical Noise Inputs to Controllers from External Sources

IEEE 603-1998 - Standard Criteria for Safety Systems for Nuclear Power Generating Stations

IEEE 730-2002 - Standard for Software Quality Assurance Plans

IEEE 741 -1997 - Standard Criteria for the Protection of Class 1E Power Systems and Equipment in Nuclear Power Generating Stations

IEEE 828-2005 - Standard for Software Configuration Management Plans

IEEE 829-1998 - Standard for Software Test Documentation

IEEE 830-1998 - Recommended Practice for Software Requirements Specifications

IEEE 1012-2004 - Standard for Software Verification and Validation Plans

IEEE 1016-1998 - Recommended Practice for Software Design Descriptions

IEEE 1028-1997 - Standard for Software Reviews and Audits

IEEE 1050-2004 - Guide for Instrumentation and Control Equipment Grounding in Generating Stations

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IEEE 1228-1994 - Standard for Software Safety Plans

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ISA RP3.2 - Flange Mounted Sharp Edged Orifice Plates for Flow Measurement

ISA 7.0.01-1996 - Quality Standard for Instrument Air

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ISA 67.04.01-2006 - Setpoints for Nuclear Safety Related Instrumentation

ISA 67.06.01-2002 - Response Time Testing of Nuclear Safety-Related Instrument Channels in Nuclear Power Plants

ANSI/ISA 67.14.01-2000 - Qualification and Certification of Instrumentation Control Technicians in Nuclear Facilities
ANSI/ISA S75.01.01-2002 - Flow Equations for Sizing Control Valves

ISA 75.08.01-2000 - Face-to-Face Dimensions for Integral Flanged Globe-Style Control Valves Bodies: ANSI Classes 125, 150, 250, 300, and 600

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04.09 Military Standards (MIL-STD).

MIL-STD-461, Revision E - Requirements for Control of Electromagnetic Interference Characteristics of Subsystems and Equipment

MIL-STD-462, Revision D - Electro-magnetic Interference Characteristics Measurement

MIL-STD-1399 - Interface Standard for Shipboard Systems, Section 401, DC Magnetic Field Environments

END

Attachment 1: Revision History for IP 65001.10

Attachment 1

Revision History for IP 65001.10

Commitment Tracking Number	Issue Date	Description of Change	Training Needed	Training Completion Date	Comment Resolution Accession Number
N/A	10/20/08 CN 08-029	Researched commitments for 4 years and found none. Initial issuance to support ITAAC related Inspections under 10CFR52.	N/A	N/A	N/A