NUCLEAR ENERGY BUSINESS GROUP • GENERAL ELECTRIC COMPANY
SAN JOSE, CALIFORNIA 95125

GENERAL ELECTRIC

APPLICABLE TO:
PUBLICATION NO NEDO-10466-A
T.I.E. NO —
TITLE POWER GENERATION CONTROL COMPLEX DESIGN CRITERIA AND SAFETY EVALUATION
ISSUE DATE February 1979

ERRATA And ADDENDA SHEET

NO 2
DATE April 1981

NOTE Correct all copies of the applicable publication as specified below.

ITEM	REFERENCES (SECTION, PAGE, PARAGRAPH, LINE)	INSTRUCTIONS (CORRECTIONS AND ADDITIONS)
01	Letter, Tedesco to Sherwood	Insert letter from Tedesco to Sherwood immediately in front of title page.
02	Pages 3-7 & 3-8	Replace with new pages 3-7, 3-8 and 3-8a. NOTE: Brackets have been drawn in right-hand margin to indicate length of revision.

MFN 030-81

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FEB 11 1981

Dr. G. G. Sherwood, Manager
Safety and Licensing
General Electric Company
175 Curtner Avenue
San Jose, California 95114

Dear Dr. Sherwood:

SUBJECT: ACCEPTANCE FOR REFERENCING OF TOPICAL REPORT NEDO-10466A-ADDENDA NO. 1 INCLUDING REVISION

Reference: GE letter dated January 12, 1981 to R. L. Tedesco, Subject: "Revision to Addenda No. 1 to General Electric Company Licensing Topical Report NEDO-10466A, "Power Generation Control Complex Design Criteria."

The Nuclear Regulatory Commission has completed its review of Addenda No. 1 dated December, 1979 to the General Electric Company Licensing Topical Report entitled "Power Generation Control Complex Design Criteria and Safety Evaluation" dated February, 1979 as augmented by the referenced letter which committed to additionally include in the addenda a summary of process controls for factory cable crimping.

As a result of our reviews, we find the Licensing Topical Report NEDO-10466A dated February, 1979 including the Addenda No. 1 dated December, 1979 as augmented as committed in the referenced letter is acceptable for referencing in license applications to the extent specified and under the limitations in the report and the topical report evaluation.

We do not intend to repeat the review of the safety features described in the topical report and found acceptable in the attachment. Our acceptance applies only to the features described in the topical report, the addenda and the referenced letter.

In accordance with established procedures, it is requested that General Electric Company publish an approved version of the addenda augmented as committed in the referenced letter or an approved version of the report incorporating the augmented addenda. The approved version should include this letter as well as the July 13, 1975 approval letter and its enclosure.

Should Nuclear Regulatory Commission criteria or regulations change such that our conclusions as to the acceptability of the report are invalidated, General Electric Company and/or the applicants referencing the topical report will be expected to revise and resubmit their respective documentation or submit justification for the continued effective applicability of the topical report without revision of their respective documentation.

Sincerely,

Robert L. Tedesco, Assistant Director
for Licensing
Division of Licensing

Using Figure 3-12 to trace the cable routing, it can be seen that the first field/control room interface is at the termination cabinet (View A). At this point, cables to and from the field are routed on cable ladders in the rear of the cabinet and fan out to horizontal rows of terminal strips on the fore-and-aft walls. The cable ladder are in each bay can accommodate as many as twenty-one 1.5 inch diameter cables.

Cables to-and-from the PGCC floor sections enter the T/C through the lower 12-inch space at the bottom of the cabinet (View B), run up the front cable ladder (View C), and fan out to the termination modules on the side walls (View D). The cables are factory fabricated in the proper length and then permanently installed by strapping them to the cable ladder so that each connector is physically adjacent to its proper mating connector when the cable ladder is in place.

From the T/C, all cables enter their respective panel module through one of four longitudinal raceways in the floor section (View B). The routing between the longitudinal raceway and the panel area is accomplished via the lateral raceway.

3.5 PGCC ASSEMBLY AND SITE INSTALLATION

3.5.1 Fabrication and Assembly

The hardware manufacturing cycle for the major components of the PGCC varies considerably. Figure 3-13 shows the sequence of operations necessary to produce a factory tested PGCC.

The termination cabinets are fabricated and tested in a shorter cycle and shipped to the site for early installation. The rest of the equipment is fabricated, tested, staged (assembled in a control room configuration), factory tested and then shipped to the site.

3.5.2 Quality Assurance Procedures

Each instrument and assembly included in a PGCC is procured and/or manufactured, inspected, tested, and accepted under the approved General Electric Quality System. This system is described in the BWR Quality Assurance Program Description (NEDO-11209-04A) which covers the 18 Criteria of 10CFR50 Appendix B and has been approved by the NRC. The Nuclear Control and Instrumentation Department (NC&ID) Nuclear Quality Assurance Procedure Manual (NEDE-10967) implements this system throughout NC&ID quality assurance activities.

Detailed procedures for authorizing changes are included in the GE QA system. Further, in addition to internal surveillance and audits, the entire NC&ID Quality Assurance System is subject to periodic Nuclear Energy Business Group audits, multiple customer (utility) and architect engineer audits, and periodic NRC inspections under the License, Contractor and Vendor Inspection Program. Thus the stability of the system is assured, and any changes can be accomplished only by properly documented and approved revisions to the controlling documents.

3.5.2.1 Integrated Test Performed at Factory The PGCC integrated test verifies the compatibility and proper interaction of all systems circuits in the control room equipment. (Field installed devices such as termination cabinets and local racks are not available for this test since they have already been shipped to the field.) The integrated test is performed by assembling and interconnecting all of the panel modules. After the analog equipment is calibrated, signal inputs from the local and rack mounted devices are simulated at the termination cabinet end of the panel module cables. All operator-initiated control functions are actuated and the simulated signals varied over the normal range to simulate all modes of plant operation. This allows the verification of all visual responses (i.e., recorder pen response, closure or dropout of relay, actuation of annunciator, etc.) resulting from input signal variation or control function change. All control outputs to plant devices are monitored at the termination cabinet end of the panel module cables to verify proper response by the control circuits when the input signals are varied or the controls are actuated.

As a result of this comprehensive test of the control room portions of the systems, product quality and reliability are verified.

3.5.2.2 Customer Involvement G.E. encourages participation in the testing by utility representatives. This testing takes place approximately three months prior to shipment of the PGCC. Participation in the testing allows the utility personnel to obtain detailed familiarization with the PGCC equipment.

3.5.2.3 Added Factory Process Controls to Date Several process control elements have been modified or added to the cable fabrication process in order to improve the control of crimp strength. These include:

(1) Pico power crimpers are factory serviced on a fixed four-month schedule.

(2) Cable operator training has been upgraded with the addition of a full-time training specialist, preparation of video tapes of fabrication operations, qualification testing of crimp operators and regular annual retraining of all operators.

(3) Two crimp samples are prepared by the operator at the beginning and end of each shift for every hand and power crimper used that day. These samples are pulled to destruction immediately by a QC inspector and the values recorded. If one or more values at the start of the shift are below MIL-SPEC limits, that tool is impounded until it is repaired or scrapped. If one or more values at the end of the shift are below MIL-SPEC limits, that tool and all cables crimped by it during the shift are impounded. The tool would be repaired or scrapped and the cables would be pull tested at those values to assure acceptable crimp strength.

(4) In-process sample pull tests of crimps were added at the same values used in the field test. This is done several times per shift on 10% of in-process accessible cables (i.e., not yet closed up in an assembled connector). If nonconformances are found, the responsible Process Control Engineer is contacted to determine investigative and corrective actions.

(5) The in-process inspection performed by QC has been increased in both scope and frequency. This includes, but is not limited to, actions related to crimp strength.

3.5.2.4 Controls to Assure Crimping Process Will Not Change GE has implemented a system for controlling the crimping process. Discussion in previous paragraphs has covered actions by Shop Operations, Manufacturing Engineering and Quality Assurance to implement this system. These actions, including improved operator training/qualification, regular tooling factory service, destructive and in-process pull testing, will remain a permanent part of GE PGCC cable fabrication and inspection. While minor changes and improvements can be expected over a period of time, it is assured that crimp quality in the future will continue to be as good as or better than at present.

3.5.3 Packing and Shipping

A PGCC panel module (floor section 27-feet long, 8-feet wide, 4-foot deep with its associated 7-1/2 foot high control cabinets) can be crated as shown in Figure 3-14 to form a shipping package 8-feet wide, 9-feet high and 34-feet long. This package falls within the limits set for normal sized truck shipment within the continental U.S. so no special licenses are necessary when the PGCC sections are transported. The PGCC cables are coiled on the floor section and crated for shipment as part of the assembly. Because they are shipped with the panel module, in most cases cables are left connected to their associated panels after factory test. Thus only one end of each cable has to be connected during field installation. The complete panel module assembly is crated for protection from the atmosphere and from pilferage during shipment. The crating consists of plastic or waterproof canvas covered with plywood. Desiccant materials are placed within each control cabinet during shipment.

3.5.4 PGCC Installation

3.5.4.1 Installation Manual To ensure that the PGCC equipment is properly installed an Installation Manual (Reference 23) is furnished. It contains sections providing the following information:

Equipment Description
Handling
Installation
Final Assembly Check List

3.5.4.2 Plant Design Features During the construction phase, temporary openings must be left in the building wall for installation of the termination cabinets and panel module assemblies. These openings should be at least 30-feet wide and 10-feet high (sideway entry) or 10-feet wide and 10-feet high (lengthwise entry). Temporary openings left for the panel module assemblies are large enough to admit the termination cabinets.

The primary mounting of PGCC equipment to the building floor is made through the use of embedded steel beams. The details of this installation are illustrated in the installation manual. This document also defines floor flatness tolerances, welding locations, bolt tie-downs, and bolt preloads.

3.5.4.3 Mechanical and Electrical Installations

3.5.4.3.1 Termination Cabinets These cabinets are shipped to the plant site approximately nine months prior to the panel module assemblies and are installed by welding to embedded floor steel at sixteen (16) locations, eight (8) in front and eight (8) in the rear of the cabinet (Figure 3-16).

3.5.4.3.2 Panel Module Assemblies Panel module assemblies are moved into place by using a special dolly, metal casters, or air casters (Figure 3-15). Four leveling jacks are provided to lift the floor section to permit removal of the dolly or casters. These same jacks are used to level the floor section on the floor. One end of the floor section will be bolted to the main structure of the termination cabinet and the other end welded to an embedded steel beam. Each floor section is also welded to steel beams embedded in the building floor at 10 locations beneath two longitudinal ducts (see Figure 3-16).

3.5.4.3.3 Cable Installation After mechanical mounting of the panel modules, intermodule wiring can begin. Intermodule cables and flexible conduit are shipped crated and secured to the panel module floor. All cabling which connects to the T/C is strapped to cable ladders which have been temporarily secured to the floor section for shipment. When the panel modules and the termination cabinets are in place, the cable ladders are installed in the termination cabinets and the appropriate connections made.

After all cables are installed and preoperational tests completed, wireway penetrations into termination cabinets and panels are fire stopped to provide the additional fire barrier protection.