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SCHWENCER,A. Licensing Branch 2

SUBJECT: Forwards revision to FSAR Sections 7.7 & 8.3.1.4,reflecting update to supply sys electrical separation task force activities,Revision 1 to electrical separation practices document also encl.

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December 28, 1982
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Responds to: N/A
Response required by: N/A

Docket No. 50-397

Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Schwencer:

Subject: NUCLEAR PROJECT NO. 2
FSAR SECTION 8.3, ELECTRICAL SEPARATION

Enclosed are sixty (60) copies of a revision to FSAR Sections 7.7 and 8.3.1.4, reflecting an update due to the Supply System Electrical Separation Task Force activities.

Also, enclosed is Revision 1 to the WNP-2 Electrical Separation Practices document.

Very truly yours,

DC Lovensin

for G. D. Bouchey
Manager, Nuclear Safety and
Regulatory Programs (370)

DCT;jw

Enclosures

cc: Mr. R. Auluck - NRC
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Insert "A" to Page 7.7-46d

The system is designed as follows:

a. All TDAS input circuits within raceways are identified and routed to Class 1E requirements up to a remote isolation device. From the isolation device to the remote multiplexer the circuits are considered to be Non-Class 1E.

b. Remote multiplexer outputs are transmitted to the computer via a fiber optic cable which is inherently an isolation device. The fiber optic cable, therefore, can be routed in any raceway without regard to separation criteria.

c. TDAS Class 1E input isolators are supplied from Non-Class 1E 24VDC current limiting power supplies. The power source to these power supplies is Class 1E and is provided with a Class 1E current interrupting device. The circuit to the power supply is routed as prime (see Section 8.3.1.4) for Division 1 and 2 isolators and as Class 1E for the Division 3 isolator. The power supply unit in the isolator is internally isolated from the Class 1E signal input circuit. Downstream of the power supply, the section of circuits are treated as Non-Class 1E.

d. Conformance to NRC Regulatory Guides

1. Regulatory Guide 1.75, Revision 2, Physical Independence of Electric Systems
IEEE Standard 279-1974.

The transient data acquisition system (TDAS) design ~~and components~~ complies with the requirements of Regulatory Guide 1.75, Revision 2. TDAS equipment is not required to be Class 1E except where interface with Class 1E or associated circuitry is required. Electrical/physical separation is provided by either maintaining physical separation of divisionalized components or by providing Class 1E isolation devices between safety-related and non-safety-related circuitry. Circuitry which becomes associated with safety-related equipment is protected using Class 1E isolation devices to prevent influence on Class 1E functions or sensitive control functions. Fiber-optic cables provide separation for circuitry downstream of the remote modules.

2. Regulatory Guide 1.89, Qualification of Safety-Related Electric Equipment
IEEE Standard 323-1974

Regulatory Guide 1.100, Seismic Qualification of Class 1E Electrical Equipment

All components of the transient data acquisition system are qualified according to the requirements of Regulatory Guide 1.100. All components which interface with ~~or become associated with~~ Class 1E circuitry are qualified according to the requirements of Regulatory Guide 1.89 and IEEE 323-1974 and IEEE 344-1975.

3. NUREG-0696, Functional Criteria for Emergency Response Facilities

Parameters identified in Regulatory Guide 1.97, Revision 2 and Regulatory Guide 1.23 are hardwired to the transient data acquisition system (TDAS). TDAS components are designed in a modular fashion with spare capacity. The system design allows the capability to expand. Physical separation or isolation devices prevent ~~interference~~ with safety-related or sensitive control functions. The TDAS components are powered from a highly reliable uninterruptable power source to assure system availability and that power fluctuations will not result in the loss of software or stored data.

TDAS provides the equipment needed to gather, store, and transfer data helpful in assessing plant conditions. The

Insert "A" to Page 8.3-55

8.3.1.3.1 Class 1E Raceways, Cables, Equipment (Panels and Racks) and Enclosures

a. Class 1E cables routed within conduits need not be identified within the conduit.

b. Class 1E General Plant raceways ~~shall be~~ are uniquely identified with a color coded marker every 15 feet, at the beginning, end, at pull boxes, and discontinuities (walls, structures, etc.) as shown in Table ~~III~~ 8.3-25. Conduits containing cables operating above 600 volts also indicate operating voltage.

c. Class 1E cables routed in Division 1 through 7 raceways in General Plant Areas ~~shall be~~ are uniquely identified with a color coded marker every 15 feet and at their terminations as shown in Table ~~III~~ 8.3-25. These markers shall be provided on the cables up to the first termination within equipment and enclosures.

d. Class 1E cables routed in PGCC raceways ~~shall be~~ are uniquely identified with a color coded marker every 5 feet near the cable divisional marker as shown in Table ~~V~~ 8.3-26. These markers are provided on the cables up to the first termination within equipment and enclosures. PGCC longitudinal raceways shall be identified with a color coded marker every 5 feet. Each lateral raceway shall be identified at the longitudinal raceway lip centered above the lateral raceway.

e. Conduits in the periphery of the PGCC floor area are identified by metal tags which identify the cable number and division. Since these tags are not color coded, an additional color-coded marker shall be attached near the metal tag to identify the conduit divisional assignment.

f. Within enclosures and equipment Class 1E intruder circuits ~~shall be~~ are uniquely identified with a color coded marker at 12 ± 2 inch intervals as shown in Tables 8.3-25 and 8.3-26. ~~VIII. Additionally, to differentiate between cables and raceways, color coded wire markers are utilized as shown in Table IX.~~

g. Circuits that have been upgraded from Non-Class 1E to Class 1E and are already installed in raceways ~~shall be~~ are identified with a Class 1E color coded marker at terminations, pull boxes, and entrances and exits to raceways. Upgraded cables ~~shall be~~ are routed in Class 1E raceways. Cable installation records ~~shall be~~ are reviewed to provide assurance that these cables are routed in Class 1E raceways and installed to Class 1E requirements (cable installation parameters). Otherwise, megger and continuity tests shall be performed, termination and routing reinspected to Class 1E requirements, and documentation prepared verifying the upgrade.

h. Equipment and enclosures ~~shall be~~ are uniquely identified with two color coded markers; one marker with the identification number and a second with the assigned separation division of the residing components, cables, and wires. These markers ~~shall be~~ are color coded as shown in Tables ~~III, IV and V.~~ 8.3-25 and 8.3-26. Individual components located on or in equipment and enclosures require identification markers (not necessarily color coded), but need not have individual divisional separation markers. For example, an instrument rack ~~shall be~~ is uniquely identified with a color coded identification marker and a divisional separation marker. However, each separate instrument need not have a color coded identification marker or a divisional separation marker.

i. Within open faced instrument racks wiring from terminal boxes to individual instruments is routed in flexible conduits. These conduits need not be identified with a cable identification number or with a divisional separation marker.

j. Two different equipment, enclosure, and cable identification schemes exist within PGCC; one for those provided within the General Electric NSSS scope and the other for those provided within the Balance of Plant scope. Refer to Tables ~~II, VIII, and XIV for details of these schemes.~~ 8.3-26.

8.3.1.3.2 Prime and Associated by Proximity Circuit Raceways, Cables, Equipment and Enclosures

a. Prime cables routed in Division A and B raceways in General Plant Areas ~~shall be~~ are uniquely identified with a color coded marker every 15 feet as shown in Table ~~IV~~ 8.3-25 except as follows:

1) Prime cables routed in conduit need not be uniquely identified with the color coded marker.

2) Enclosed and open raceways ~~shall be~~ are identified every 15 feet, at discontinuities, at pull boxes, and at end points with the appropriate prime color coded marker. If Class 1E cables are also routed within the same enclosed raceway then the raceway will be identified as Division 1 through 7 and no prime marker is required.

3) Cables that have been upgraded from Non-Class 1E to prime and are already physically installed in plant raceways ~~shall~~ are not ~~be~~ retrofitted with the prime color coded marker except at all terminations, pull points, and entrances and exits to raceways.

b. Prime cables routed in PGCC raceways ~~shall be~~ are uniquely identified with a color coded marker every 5 feet near the cable divisional marker as shown in Table ~~IV~~ 8.3-26 except as follows:

~~Circuits~~ that have been upgraded from Non-Class 1E to prime and are already physically installed in the PGCC raceways ~~shall be~~ are identified with the prime color coded marker only at entrances and exits to PGCC raceways and at terminations within enclosures.

c. Within Class 1E enclosures and equipment intruding prime circuits ~~shall be~~ are identified the same as Class 1E intruding circuits as ~~in II.B.4.c above~~ described in 8.3.1.3.1.

d. Within Non-Class 1E multi-divisional enclosures and equipment assigned to either Division A, B, XXX1, or XXX2, an intruding prime circuit ~~shall be~~ is uniquely identified as ~~in II.B.4.c above.~~ described in 8.3.1.3.1.

e. Proximity circuits ~~shall~~ have a unique color coded marker as described in Table ~~IV~~ 8.3-25.

f. Conduits which contain prime and proximity cables with a Division 1 through 7 compatibility ~~shall be~~ are identified with the appropriate divisional separation marker even if these conduits route to Non-Class 1E enclosures or equipment.

8.3.1.3.3 Non-Class 1E Raceways, Cables, Equipment and Enclosures

a. Non-Class 1E Division A and B raceways, excepting conduits, do not exist within the Reactor Building or the Cable Spreading Room. This requires that most Non-Class 1E cables be routed in Class 1E raceways; these cables become "Associated by Proximity". Division A and B conduits routed within these areas are designated with separation markers as shown in Table ~~III~~ 8.3-25. If cables within these conduits have a Division 1 or 2 "compatibility" are then the separation markers ~~shall be~~ in accordance with Class 1E requirements (see ~~Section II.D.4.b.~~ 8.3.1.3.1).

b. Within PGCC, raceways are designated Division 1, 2, 3, or Non-Divisional. No Division A or B raceways exist. Thus, Division A and B cables ~~shall be~~ are assigned to Division 1 and 2, respectively, or to a Non-Divisional raceway.

c. Non-Class 1E cables routed in open raceways are ~~shall be~~ uniquely identified as described in Table 8.3-25. ~~XIX.~~ Non-Class 1E cables ~~shall be~~ are tagged with color coded markers at their terminations, pull points, entrances and exits to raceways, and every 100 feet. Division A and B raceways are tagged every 100 feet, at discontinuities, entrances and exits to rooms, pull boxes, and end points.

d. Non-Class 1E cables routed in PGCC raceways are ~~shall be~~ uniquely identified with a cable I.D. marker every 10 feet and with a color coded cable separation marker every 5 feet as shown in Table ~~XX~~ 8.3-26.

e. The Non-Class 1E cables which wholly route in compatible Non-Class 1E raceways (Div. A or Div. B) are routed in accordance with cable routing criteria stated in Table 8.3-20. ~~V, VI and VII~~. Division markers for equipment/raceways and cables are color coded per Table ~~XXI~~ 8.3-25.

Table 8.3-19 indicates the voltage values expected at the various levels of the Class 1E portions of the auxiliary AC distribution system under a degraded (69% of nominal, based upon 4.16 kV voltage sensors) value of input voltage (2870 V).

It should be noted that critical (Class 1E) plant controls and vital instrumentation are supplied by redundant (Division 1 and 2) divisions of the 120/240 V AC Class 1E uninterruptible power supply system. This system supplies loads via inverters, with static transfer to an alternate AC supply in case of circuit faults or loss of inverter voltage. The alternate supply line voltage is regulated within ±10% of normal in accordance with the NSSS vendor's requirements. A manual bypass switch is provided for maintenance of the inverter or static switch.

Table 8.3-17 indicates the various monitors and alarms (annunciators/computer) provided to monitor system voltages.

8.3.1.3 Physical Identification of Safety-Related (Class 1E) Equipment

Each safety-related electrical ~~equipment~~ component or cable is tagged with an ~~equipment~~ identification number. In addition, a ~~division identification~~ color-coded marker is provided along with the ~~equipment~~ identification number which indicates the assignment to one of seven divisions (Divisions 1, ~~2~~, 3, 4, 5, 6, and 7). This division marker is inscribed with color-coded characters on a color-coded background as shown in Tables 8.3-25 and 8.3-26. Assignment of equipment to the seven divisions is given in Table 8.3-7.

except for upgraded cables as noted in section 8.3.1.4.2.3.

All Class 1E cables external to the power generation control complex (PGCC) prefixed by 1, 2, 3, 4, 5, 6, or 7 are tagged every 15 feet and at their terminations with a unique identifying ~~number~~ (cable number). Non-Class 1E cables, as well as cables associated by proximity to Class 1E cables, are identified with a unique cable number at their terminations, pullpoints, entrance and exit to raceways, and every 100 feet. Non-Class 1E cables that are powered from Class 1E are identified every 15 feet (except in conduit). In addition to the cable numbers, color coded division identifiers are provided either as part of the cable marker or as a separate marker. See Table 8.3-25.

except for upgraded cables as noted in section 8.3.1.4.2.3.

Prior to cable installation, conduit is similarly tagged with a unique conduit number, in addition to the division marking characters shown in Table 8.3-25, at 15 foot intervals, at discontinuities, at pull boxes, at points of entrance and exit of rooms, and at origin and destination equipment. Conduits containing cables operating above 600 volts are also tagged to indicate the operating voltage.

Trays are tagged prior to cable installation with unique tray node identification numbers, and the division marking characters indicated in Table 8.3-25, supplemented by another character (H, P, C, S, R) which indicates the voltage level (6.9 kV, 4.16 kV, Control, Signal, RPS) of the cables contained in the tray. Non-Class 1E tray sections (a tray section is defined by two adjacent nodes) that contain prime cables (see 8.3.1.4.1.13.c) are identified with an additional prime marker. Trays containing cables operating above 600 volts are tagged to indicate the operating voltage level.

Switchgear, transformers, distribution panels, batteries, chargers, and other electrical equipment are tagged with the equipment number indicated on the single line diagrams (e.g., SM-8-85, MC-8A, etc.) as well as the division marking characters indicated in Table 8.3-25.

Safety-related cables within the power generation control complex (PGCC) and under floor PGCC raceways are tagged with identification numbers every 10 feet, and division markers every 5 feet. The tagging characteristics are shown in Table 8.3-26.

Cable routing information is provided in Tables 8.3-8, 8.3-20, 8.3-21, and 8.3-22. This illustrates the computer program used for identification and routing of cables in trays. Routing information for cables in conduits is provided in raceway layout drawings. Table 8.3-9 indicates sample cable routing schedules. Actual cable tray drawings for the

reactor, control and radwaste buildings are shown in Figures 8.3-9 through 8.3-14, inclusive.

A list of Class 1E components and equipment (see 8.3.1.4.1.1 for definition) is provided to facilitate identification of safety-related components and their circuits.

~~Class 1E circuits and associated circuits within equipment enclosures are not uniquely identified. They are identified with the same division as the equipment except that all intruding divisional circuits and prime circuits are identified by an additional checkered marker as shown in Tables 8.3-25 and 8.3-26.~~ striped

Insert "A"

8.3.1.4.3.6.2 Modular Floor Sections

The modular floor section is a latticed floor constructed of steel "I" beams and rectangular steel tubes forming longitudinal and laterial ducts. These ducts interconnect the control panel modules (which are bolted on the modular floor section) and the termination cabinet (see Figures 8.3-31 and 8.3-35). The network, including transition and extension ducts, provides divisional separation with the use of vertial and/or horizontal barriers and fire stops. Miniducts (Figure 8.3-40) are of similar construction to the floor ducts and are utilized for divisional separation within the longitudinal ducts. Cables in the miniducts are routed in flexible metallic conduit X OR WRAPPED IN SILTEMP TAPE.

Fire protection is provided in a accordance with the PGCC Licensing Topical Report, NEDO-10466A and Amendment No. 19 Fire Protection Evaluation, to the FSAR. Products of combustion and thermal detectors are provided in the floor section longitudinal ducts. These detectors are monitored on the respective PGCC module fire control panel and on the main control room fire control panel where zoned alarms are grouped by floor section. Products of combustion detectors will prealarm, to allow a manual response through quickly removable floor plates. Thermal detectors will automatically release Halon 1301 through a distribution system into each of the floor sections longitudinal cable ducts. Fire stops and penetration seals are located in the ducts that access the termination cabling and in the ducts that access the control panels (see Figure 8.3-37). Floor plates consist of an aluminum honeycomb core, 1-1/16" thick. A final floor covering of fire retardant vinyl-asbestos floor tile that meets federal specification SS-T-312 is provided for the finished PGCC floor.

When it is necessary to route cables between PGCC sections which are not directly connected by floor ~~raceways~~ ducts, it is permissible to route these cables through the cable spreading room; a special set of raceways has been allocated for this use. The cables and raceways shall be considered part of PGCC and therefore are identified the same as those in PGCC.

Insert "A" to 8.3.1.4.3.7, Page 8.3-58c

The justification for this configuration is provided below.

The coil-to-contact relays used for isolation included General Electric types HMA, HFA and CR105 and Agastat type GP. The relays are used for 125VDC or less applications. The justification for this type configuration is the following:

a. The circuits are all control circuits which are low energy.

b. Wire insulation is fire retardant complying with the requirements of IEEE 383-1974.

c. Each circuit is provided with Class 1E over-current protective devices to isolate faults.

d. These circuits are not allowed to bridge directly between redundant Class 1E raceways.

e. Fire loading inside panels is a minimum.

f. Wire insulation within these relays is rated at 600 V minimum Type Class A or H while the control circuit voltage carried by this wiring is 125 VDC maximum. In addition, the isolation capability of the relay units during hi-pot testing is 2500 V minimum (coil-to-contact, coil-to-ground or coil-to-coil).

8.3.1.4.3.6.3 PGCC Cable Assembly and Routing

The cable assembly within the power generation control complex is designed around the following variables: engineered system designation, circuit signal classification, PGCC separation classification based on power supply, and finally, the origination/destination which provides the routing and length (see Table 8.3-21). Each PGCC cable is precut, assembled (with lugs and connectors at either end as required) and installed in the panel/floor module shipping section. Special cable and routing requirements are shown on Table 8.3-22. The cable jacket and conductor insulation for the cables within the PGCC is either Raychem Flamtrol, General Electric Vulkene/Geoprene, or Tefzel. The fire suppression system has been provided to limit any off-gasing/smoke that could result from a cable fire.

Cable routing consists of two categories: field interface terminations (fits) and system interface terminations (sits). Fits cables are routed between termination cabinets and PGCC control panels, while sits cables are routed between PGCC control panels and do not interface with BOP field cable (see Figure 8.3-30).

8.3.1.4.3.7 Separation Within Panels

Separation of wiring in panels and instrument racks for redundant divisions of Class 1E circuits is accomplished by mounting redundant equipment on physically separated panels or control boards wherever practicable. Where locating control devices on separate panels is considered prohibitive for manual operation of equipment for optimum equipment arrangement, and where no single credible event in a single panel could disable two sets of redundant control circuits, both devices are located in the same panel. Where control devices of redundant systems are mounted in the same panel, physical separation (six inches), barriers, or isolation devices are provided. Wherever wiring of two redundant divisions exists in a single panel section, separated or isolated terminal boards and wiring preclude the possibility of fire propagation from one division of wiring to another. This separation is adequate since the material used in the construction of panel board, devices, and wiring are of a fire retardant nature.

In a few instances it is necessary for a single device such as a relay to be connected to wiring from redundant safety divisions. In such cases the intruding division wiring is routed immediately away from the device to attain the required 6" separation or to the extent where a barrier can be installed.

Insert "A"

Insert "A" to Page 8.3-59

8.3.1.4.3.8.2.4 Periphery of PGCC

A modular floor raceway system is not provided in this area. Cables in this floor area are routed in grounded flexible conduit with 3 feet horizontal separation maintained between redundant Class 1E flexible conduits. Where this distance cannot be maintained, one of the redundant divisions is routed in rigid conduit. The redundant conduits do not touch (a barrier may be used to physically separate the two conduits).

8.3.1.4.3.8.2 Specific Areas

8.3.1.4.3.8.2.1 Cable Spreading Room

Within the cable spreading room, the minimum separation distance between open trays of redundant divisions is one foot between trays separated horizontally and three feet between trays separated vertically. A fire detection and extinguishing system is present. Where these distances cannot be maintained, fire barriers are installed.

Within the cable spreading room, the minimum separation clearance between conduits and open trays of redundant divisions is one-inch free air space when the conduit is below or to the side of the open tray and three-feet free air space when the conduit is located above the open trays.

8.3.1.4.3.8.2.3 Power Generation Control Complex (PGCC)

The physical configuration of the PGCC control room assembly does not allow for general area raceway spatial separation in accordance with 8.3.1.4.3.8.1. Structural and spatial separation has been provided in the PGCC as described in 8.3.1.4.3.6.2 for divisionally redundant raceways. The PGCC raceways are also provided with an automatic fire suppression system.

8.3.1.4.3.8.2.2 Cable Chase And Other Areas Of Cable Congestion

The use of fire retardant cabling and automatic sprinkler systems permit opposite sides of the cable chase to be utilized to route cabling of redundant divisions.

Fire protection, as described in 9.5.1 and 8.3.3, is installed in areas of large concentrations of cables and other areas to alarm if a fire occurs. Wherever an open wireway penetrates a firewall or fire floor slab, a fire retardant self-extinguishing silicone foam fire stop is provided to prevent the spread of fire through the wall or floor. All vertical runs have solid tray covers on the outermost tray at floor or slab penetrations. The fire stops are rated for 3 hours, or are rated equivalent to the wall or floor slab rating, whichever is less.

Insert "A"

Fire stops are used where any raceway penetrates the slab into the control room, where any raceway penetrates designated fire zones, or where any raceway penetrates areas where an ambient pressure difference exists. In addition, fire stops are provided where any open vertical raceway penetrates floor or ceiling slabs. Both the penetration and the trays themselves are sealed with fire resistant material.

8.3.1.4.3.8.2.5 Class 1E Underground Duct System

Class 1E equipment located remotely from the plant (e.g., equipment located at the ultimate heat sink) is serviced by divisionally separated Class 1E underground duct systems and manholes. See 8.3.1.4.2.1.4.f. Separation distances between redundant divisions within manholes is similar to enclosures. See 8.3.1.4.3.7.

8.3.1.4.3.8.2.6 NMS Cabling Under Reactor

The neutron monitoring system cabling in the area immediately underneath the reactor is not completely routed in totally enclosed raceway nor separated in accordance with Figures 8.3-29a through 8.3-29d due to space limitations and the need for cable flexibility.

8.3.1.4.3.8.2.7 Class 1E Cabling In Turbine Generator Building

a. Class 1E main steam turbine sensing and turbine generator building leak detection instrumentation, instrument racks, cabling and raceways are located in the turbine generator building, a non-Category I structure. This equipment provides trip signal input to the RPS system in the event of a turbine trip or generator load rejection. Sufficient diverse backup signals exist within the RPS such that scram is not prevented because of the loss of these turbine generator building signals. Refer to 7.2.

b. Main steam tunnel high radiation sensing instrumentation and associated cabling and raceways are located in the turbine generator building, a non-Category I structure. This equipment provides RPS trip and containment isolation signals in the event of main steam line high radiation. Routing has been analyzed and supports designed such that equipment remains functional during SSE loading.

Insert "A" to Page 8.3-60b

8.3.1.4.4.1.6 Analysis for Category 3A Non-Class 1E Circuits

The cables in this category consist of data logging and display type instrumentation circuits such as inputs to the analog process computer. These circuits are low energy circuits that are connected to Class 1E signal circuits through current limiting resistance units or current limiting power supplies such that a fault in the non-Class 1E portion of the circuit does not affect operation of the Class 1E circuit. These circuits are not identified or separated as prime circuits downstream of the current limiting units. Downstream of the current limiting units these circuits are reviewed to assure that direct bridging between redundant division raceways does not occur. Additionally, the justifications for category 1A apply.

8.3.1.4.4.1.7 Analysis for Category 3B Non-Class 1E Circuits

The non-Class 1E cables in this category are connected to Class 1E power and supply important non-Class 1E loads such as emergency lighting and fire protection circuits. Protection is provided by isolating the circuit through two series Class 1E overcurrent devices. These circuits are not identified or separated as prime circuits downstream of the second overcurrent device. As in 3A above, these circuits are reviewed to assure that direct bridging between redundant division raceways does not occur. Additionally, justifications b, c, d, e, f, and g of category 1A apply.

8.3.1.4.4.1.8 Analysis for Category 3C Non-Class 1E Circuits

The non-Class 1E cables in this category connect to non-Class 1E TDAS loads and are powered by an inverter which is fed from a Class 1E 480 VAC power supply. The cables of this category are not designated or separated as prime circuits downstream of the inverter. Protection of the Class 1E power supply feeding the inverter is provided by a Class 1E overcurrent device and the current limiting characteristic of the inverter. As in 3A above, these circuits are reviewed to assure that direct bridging between redundant division raceways does not occur. Additionally, justifications b, c, d, e, f, and g of category 1A apply.

Insert "A"

8.3.1.4.4.1.6 Analysis for Category 3A Non-Class 1E Circuits

The cables in this category consist of data logging type instrumentation circuits such as inputs to the analog process computer. These circuits are low energy circuits and are connected to Class 1E signal circuits through Class 1E current limiting resistance units such that a fault in the non-Class 1E circuit does not affect operation of the Class 1E circuit.

8.3.1.4.4.1.7 Analysis for Category 3B Non-Class 1E Circuits

The non-Class 1E cables in this category are connected to Class 1E power and supply important to non-Class 1E loads (such as emergency lighting) and are not identified or separated as prime circuits. The justification for this Category is similar to Category 2B. Additional protection is provided by isolating the circuit through two Class E overcurrent devices in series. See 8.3.1.2.1.1

8.3.1.4.4.1.8 Analysis for Category 3C Non-Class 1E Circuits

The non-Class 1E cables in this category connect to non-Class 1E loads and are powered by inverters (1N-1 and 1N-2) which are fed from Class 1E batteries. The cables of this category are not designated as prime circuits and are not separated as associated circuits. Protection of the Class 1E power supply feeding the inverter is provided by Class 1E overcurrent devices (see 8.3.1.2.1.1 and 8.3.2.2.1.1) and the current limiting characteristic of the inverter.

8.3.1.4.4.2 Categories of Associated Circuit Treated as Class 1E

The following categories of associated circuits exist and are illustrated in Figures 8.3-43D and 8.3-43E.

Category 4A: Associated instrumentation and control circuits that are connected to non-Class 1E power and routed in Class 1E raceways and/or enclosures and have a continuing section in a non-Class 1E raceway (Category 1A).

Category 4B: Associated power circuits that are connected to non-Class 1E power and routed in Class 1E raceways and/or enclosures and have a continuing section in a non-Class 1E raceway (Category 2A).

Category 4C: Associated instrumentation and control circuits that are supplied Class 1E power are routed in Class 1E raceways, are not isolated on accident

Cable Separation Category as Shown on Cable Separation Marker

Circuit Categories

Intruder Cable

TABLE 8.3-26

AMENDMENT NO. 23
February 1982

DIVISION MARKERS FOR EQUIPMENT, RACEWAYS, CABLES, & WIRES IN PGCC

PGCC DIV. SEP. CLASS	~~SAFETY CLASS~~ CLASS 1E			CABLE MARKERS: CABLE SEP. CATEGORY AS SHOWN ON CABLE ID MARKER	CABLE MARKERS: CABLE SEPARATION MARKER LETTERING COLOR	PRIME CABLES (NON-CLASS 1E CABLES PWRED FROM CLASS 1E SOURCES) HAVE AN ADDITIONAL CHECKERED MARKER	PGCC RACEWAY/EQUIP. SEP. MARKER-LETTERING COLOR IS BLACK	PGCC ~~RACEWAY~~/~~EQUIP.~~/CABLE SEP. MARKER BACKGROUND COLOR	EXTERNAL TO PGCC INTERFACES WITH DIVISIONAL SEPARATION CLASS SHOWN ON TABLE 8.3-25	~~WIRE~~ MARKERS (1): IF CABLE INTRUDES INTO A PANEL (IN PGCC) OF A DIFFERENT DIV. THEN THE INTERNAL PANEL WIRING, WHICH IS ELECTRICALLY CONNECTED, SHALL BE IDENTIFIED WITH STRIPED MARKER TAPE
	CLASS 1E	~~SAFETY~~ CLASS	NON-CLASS 1E							
ESS 1	X			RPS-A1	RPS I	Red	N/A	Div 1	Yellow	4	Yellow/White
	X			Div-1A	Div I	Black				
	X			RPS-B1	RPS I	Red				
	X			Div-1B	Div I	Black				6
	X			ESS I	~~Div~~ I	Black				
NSS	X			NSS I	~~Div~~ I	Black				
SI, CI	X			~~Div-1~~	Div I	Black				
		X		XXXI	N/A	N/A	Red/White			~~For Prime Cables Only~~
		X		Div A	N/A	N/A	Red/White		A,B, 1	~~Yellow/White~~
		~~X~~		~~Div B~~	~~N/A~~	~~N/A~~	~~N/A~~			~~N/A~~
RPS 2 ESS NSS	X			RPS-A2	~~RPS~~ II	Red	N/A	Div 2	Blue	5	Blue/White
	X			Div-2A	Div II	~~Black~~ White				
	X			RPS-B2	RPS II	Red				7
	X			Div-2B	Div II	~~Black~~ White				
	X			ESS II	~~Div~~ II	~~Black~~				
	X			NSS II	~~Div~~ II	~~Black~~				2
	X			~~Div C~~	Div II	~~Black~~				
SII, CII		X		XXXII	N/A	N/A	Green/White			~~For Prime Cables Only~~
		X		Div B	N/A	N/A	Green/White		A,B, 2	~~Blue/White~~
		~~X~~		~~Div A~~	~~N/A~~	~~N/A~~	~~N/A~~			~~N/A~~
3	X			ESSIII	ESSIII	White	N/A	Div 3	Green	3	Green/White
		X		XXXIII	N/A	N/A	Blue/Yellow			
SI/CIII DivIII	X			~~Div~~	ESSIII	White	N/A			
			X	XXX III	N/A	N/A	N/A	N/A	~~White~~	A,B,1,2	N/A
			X	XXX II						
			X	Div A						
			X	Div B						

(1) Each panel or bay shall be identified with the appropriate divisional marker to show the residing Division of the internal wires. Note that the internal wires in a Division 1 panel that are compatible with the various Division 1 cable separation categories will not be identified. Similarly for Division 2 & 3 panels.

XXX III

Yellow
Blue
Green
Yellow
Blue

PGCC RACEWAY/ EQUIP. MARKER BACKGROUND COLOR
Yellow
Blue
Green
White

Q. 031.026
(7)

Describe the installation, operation, and removal of the "Startrec" computer system which is used for startup testing of GE boiling water reactors, including the following topics: (a) specifications and qualification testing of electrical isolators; and (b) separation criteria for permanent and temporary wiring.

Response:

The Transient Data Acquisition System (TDAS) to support start-up transient testing will no longer be the GE STARTREC computer system. A re-evaluation of the WNP-2 data acquisition needs has led to the implementation of a permanent installation.

The WNP-2 TDAS control unit and analysis computer will be located in the main control room. Analog and digital signals will be isolated and conditioned in divisionalized remote units in the cabinet where they originate. Multiplexing and digitizing of all data will take place in these remote units before the data is transmitted over fiber-optic links to the control unit.

All signals originating from safety-related divisionalized equipment will be physically and electrically isolated such that faults occuring in the TDAS equipment cannot propagate back into safety-related circuits. The isolation devices will be qualified to the standards of Class 1E equipment and meet the intent of Regulatory Guide 1.75 concerning isolation devices.

All TDAS input circuits within raceways are identified and routed to Class 1E requirements up to a remote isolation device. From the isolation device to the remote multiplexer the circuits are considered to be Non-Class 1E.

Remote multiplexer outputs are transmitted to the computer via a fiber optic cable which is inherently an isolation device. The fiber optic cable, therefore, can be routed in any raceway without regard to separation criteria.

TDAS Class 1E input isolators are supplied from Non-Class 1E 24VDC current limiting power supplies. The power source to these power supplies is Class 1E and is provided with a Class 1E current interrupting device. The circuit to the power supply is routed as prime (see Section 8.3.1.4) for Division 1 and 2 isolators and as Class 1E for the Division 3 isolator. The power supply section of the isolator is internally isolated from the Class 1E signal input circuit. Downstream of the power supply, the circuits are treated as Non-Class 1E.