CAROLINA POWER & LIGHT COMPANY

BRUNSWICK STEAM ELECTRIC PLANT

POSITION PAPER

ON

REGULATORY GUIDE 1.97

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1.0 INTRODUCTION

This document states Brunswick's position on Regulatory Guide 1.97, Revision 2, "Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident" (referred to in this document as RG 1.97). In assessing RG 1.97, Brunswick used information contained in ANS 4.5, BWROG Emergency Procedure Guidelines, Brunswick's FSAR, and assessment of RG 1.97 done by the BWROG. Section 2.0 provides Brunswick's general position statement. Section 3.0 provides Brunswick's position statements on the generic RG 1.97 criteria. Section 4.0 details our position on each of the variables listed in Table 1 of RG 1.97. "Agreement" or "Concurrence" means Brunswick will provide/has provided the recommended range and category stated in RG 1.97 unless noted.

2.0 GENERAL POSITION STATEMENT

Brunswick concurs with the intent of RG 1.97, which is to ensure that necessary and sufficient instrumentation exists in a nuclear power station for assessing plant and environmental condition during and following an accident as required by 10CFR Part 50, Appendix A and General Design Criteria 13, 19 and 64.

3.0 BRUNSWICK'S POSITION STATEMENT ON RG 1.97 REGULATORY POSITIONS

The position statements given below correspond to the referenced paragraphs in Section C, "REGULATORY POSITION" of RG 1.97.

Paragraph 1.1: Brunswick concurs with this definition.

3.0 BRUNSWICK'S POSITION STATEMENT ON RG 1.97 REGULATORY POSITIONS (Cont'd)

Paragraph 1.2: Brunswick concurs with this definition.

Paragraph 1.3.1a: Brunswick is an operating plant licensed prior to RG 1.89, "Qualification of Class 1E Equipment for Nuclear Power Plants". Brunswick will commit to ensuring environmental qualification as required by NUREG-0588 where applicable and Memorandum and Order CLI-80-21. Additionally, Brunswick will only qualify equipment located in a harsh environment to these requirements. Thus equipment forming part of an instrumentation loop which is located in a mild environment may not be qualified by testing.

Seismic qualification of existing equipment will be in accordance with Brunswick's FSAR for the original plant design. New equipment will be seismically qualified in accordance with IEEE-344-75. An isolation device will be provided between IE and Non-IE portion of loops.

Paragraph 1.3.1b: A third channel of instrumentation for a Category 1 variable will be provided if a failure of one accident monitoring channel results in information ambiguity that would lead operators to defeat or fail to accomplish a required safety function, and if one of the following measures cannot be done:

1. Cross-checking with an independent channel that monitors a different variable bearing a known relationship to the failed monitoring channel.

2. Perturbing the measured variable to determine the failed channel by observing the response on each instrument.

3. Using portable instrumentation to validate correct channel.

3.0 BRUNSWICK'S POSITION STATEMENT ON RG. 1.97 REGULATORY POSITIONS (Cont'd)

Paragraph 1.3.1b: (Continued)

Category 1 instrumentation channels shall be electrically divisionalized and handled in accordance with Brunswick's FSAR design requirements for divisionalized channels and circuits. Generally, Brunswick is designed to IEEE-279-1971.

Paragraph 1.3.1c: All Category 1 instrument channels shall be powered from plant emergency power sources designed in accordance with Brunswick's FSAR criteria and commitments.

Paragraph 1.3.1d: Brunswick concurs.

Paragraph 1.3.1e: The quality assurance requirements invoked for the currently installed equipment were the Corporate Quality Assurance Program in effect at the time of purchase. As part of the implementation of this Regulatory Guide, Brunswick will ensure that the equipment associated with Category 1 instrument channels are on the plant's Q-List such that the current Brunswick Quality Assurance Program requirements will be invoked for future procurement, maintenance, and design change activities. Adherence to the requirements of the regulatory guides listed in this paragraph will be done if they are in the Brunswick QA program commitments. Refer to letter OQA-81-026 addressed to Mr. Eisenhut for details on the Brunswick QA program.

Paragraph 1.3.1f: Brunswick concurs with this position.

Paragraph 1.3.1g: Brunswick concurs with this position.

3.0 BRUNSWICK'S POSITION STATEMENT ON RG 1.97 REGULATORY POSITIONS (Cont'd)

Paragraph 1.3.2a: Brunswick's position on these criteria for Category 2 instruments are the same as given for paragraph 1.3.1a above. Instruments that are not part of a safety-related system will not be seismically qualified unless Brunswick's FSAR invokes seismic requirements for the associated system.

Paragraph 1.3.2b: Brunswick concurs with this position.

Paragraph 1.3.2c: Brunswick concurs with this position.

Paragraph 1.3.2d: Brunswick's position on quality assurance requirements for category 2 safety-related instruments is the same as stated for paragraph 1.3.1e above. For non-safety related category 2 instruments quality assurance requirements will be invoked consistent with the importance to safety of the instrument.

Paragraph 1.3.2e: Brunswick concurs with this position.

Paragraph 1.3.2f: Brunswick concurs with this position.

Paragraph 1.3.3a: Brunswick concurs with this position with the understanding that environmental qualification testing is not necessary in selecting equipment for the service environment.

Paragraph 1.3.3b: Brunswick concurs with this position.

Paragraph 1.4.a: Isolation devices will be provided between monitoring instrument channel and other user circuit only if the other circuit is designed to less stringent requirements.

3.0 BRUNSWICK'S POSITION STATEMENT ON RG 1.97 REGULATORY POSITIONS (Cont'd)

Paragraph 1.4.b: Brunswick believes the identification of instruments for post-accident monitoring falls into the realm of human factors engineering and must take into consideration all current activities such as control board review, new emergency guidelines and procedures. By incorporating these activities and RG 1.97 into an integrated project (SECY 82-111) the NRC has ensured that human factors engineering and integration is achieved. Brunswick will not commit to labeling the instruments but will develop a philosophy regarding instrument channel identification as part of the SECY-82-111 project. We believe this meets the intent of the guideline position.

Paragraph 1.5.a: Servicing, testing, and calibration procedures will be established and performed on a frequency necessary to maintain instrumentation capability. This frequency should be equal to or less than the interval between refuelings. If the frequency is longer than refueling intervals, a justification will be provided.

Paragraph 1.5.b: Brunswick concurs with this position.

Paragraph 1.5.c: The utilization of design features such as locked cabinets and seals to allow establishment of controlled access to equipment setpoint, calibration and other adjustments is not feasible at Brunswick. Brunswick does not usually endorse such design considerations, but relies on procedure controls and personnel training.

3.0 BRUNSWICK'S POSITION STATEMENT ON RG 1.97 REGULATORY POSITIONS (Cont'd)

Paragraph 1.5.d: Brunswick concurs with this position.

Paragraph 1.5.e: Brunswick concurs with this position.

Paragraph 1.5.f: Brunswick generally concurs with this position. However, several exceptions are specified in Section 4.0.

Paragraph 1.5.g: Brunswick concurs with this position.

Paragraph 1.5.h: Periodic checking, testing, calibration and calibration verification for protection instrumentation is in accordance with IEEE-338-1971, "Trial - Use Criteria for the Periodic Testing of Nuclear Power Generating Stations Protective Systems."

Paragraph 1.6: Brunswick's specific position on each variable is given in Section 4.0.

Regulatory Guide Section C.2

Paragraphs 2.1, 2.2, 2.3 and 2.4: Brunswick concurs with these positions.

Paragraph 2.5: Brunswick's position is outlined in our positions stated for paragraphs 1.3.1a through 1.3.3b, 1.4a, 1.4b and 1.6.

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE

4.1 Plant-Specific Variables Considered by Brunswick to be Type A

RG 1.97 defines Type A variables as "those variables to be monitored that provide the primary information required to permit the control room operator to take specific manually controlled actions for which no automatic control is provided and that are required for safety systems to accomplish their safety functions for design basis accident events". Primary information is defined by RG 1.97 as "information that is essential for the direct accomplishment of the specified safety functions." (Variables associated with contingency actions that may be identified in written procedures are excluded from this definition of primary information.) The following paragraphs discuss each Type A variable by designating the safety function(s), operator action(s), and giving a measurement range for the variable. All type A variables are category one and have been or will be provided at Brunswick.

4.1.1 Variable A1 - RPV Pressure

The RPV Pressure gives the information needed for the operator to maintain core cooling and reactor coolant system integrity. Operator action calls for depressurizing the RPV to maintain a safe cooldown rate by any of several systems, such as HPCI, RCIC, ADS, and RWCU. The operator can also manually open one SRV to reduce pressure to below the SRV setpoint if any SRV is cycling. The range recommended for this variable is 0 to 1500 psig in accordance with FSAR Section 5.2.2.2 and FSAR Table 7.5.1-1.

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE (Cont'd)

4.1 Plant-Specific Variables Considered by Brunswick to be Type A

4.1.2 Variable A2-RPV Water Level

The RPV Water Level gives the information needed by the operator to restore and maintain RPV water level. The range recommended for this variable is -180 to +295 inches of water. The installed range will meet or exceed the recommended range.

4.1.3 Variable A3 - Suppression Pool Water Temperature

Suppression Pool Water temperature gives the information needed by the operator to maintain containment integrity and reactor coolant system integrity. Operator actions are: Operate available suppression pool cooling system when the suppression pool temperature exceeds the normal operating limit, maintain RPV pressure at a reduced pressure if the suppression pool temperature cannot be maintained below the heat capacity temperature limit, and attempt to close any stuck open relief valve. The recommended range for this variable is 30° to 230°F. The installed range will meet or exceed the recommended range.

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE (Cont'd)

4.1 Plant-Specific Variables Considered by Brunswick to be Type A

4.1.4 Variable A4 - Suppression Pool Water Level

Suppression pool water level provides information necessary for the operator to maintain containment integrity. Operator action calls for maintaining suppression pool water level within normal operating limits. If the suppression pool water level cannot be maintained below the suppression pool load limit, the operator is to maintain the RPV pressure below its corresponding limit. The range will be approximately minus ten feet, which is the mid-plane of the lowest ECCS suction line to a position six feet above normal water level. This range follows from NUREG-0737 Item II.F.1, Attachment 5.

4.1.5 Variable A5 - Drywell Pressure

Drywell pressure provides information necessary for the operator to maintain containment and reactor coolant system integrities. Operation action is to control primary containment pressure by containment pressure control systems. A range of minus 5 to plus 245 psig is provided and is in accordance with NUREG-0578. See PM 80-025, 026.

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE (Cont'd)

4.1 Plant-Specific Variables Considered by Brunswick to be Type A

4.1.6 Variable A6 - Drywell Temperature

Drywell temperature provides information necessary for the operator to maintain containment and reactor coolant system integrities. Operator action is to operate the drywell cooling system and those systems necessary to compensate reactor water level. The range recommended for this variable is 40° to 440°F. See Brunswick's FSAR section 6.2.1.1.1, page 6.2.1-4.

4.1.7 Variable A7 - Suppression Pool Pressure

The Suppression Pool Pressure gives the information needed by the operator to maintain containment and reactor coolant system integrities. The operator uses this information along with drywell temperature and suppression pool temperature to determine when to initiate the suppression pool and drywell sprays. A suitable range for this variable is minus 5 to plus 245 psig.

4.1.8 Variable A8 - Drywell and Suppression Pool Hydrogen, Oxygen Concentration

Containment Hydrogen and Oxygen concentrations provide information necessary for the operator to maintain containment integrity. Operator action is to initiate the combustible gas control system in the Containment Atmosphere Dilution (CAD) system in the Brunswick design. The ranges for these variables will meet or exceed the requirements of RG 1.97.

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE

4.2 Brunswick's Position on RG 1.97 Type B Variables

RG 1.97 defines Type B variables as those that provide "information about the accomplishment of plant safety functions". Key variables under type B are those variables which most directly indicate the accomplishment of a safety function.

Each variable is discussed in the following paragraphs and where this variable is covered under another variable type, it is indicated.

4.2.1 Variable B1 - Neutron Flux

Brunswick agrees with the regulatory guide.

4.2.2 Variable B2 - Control Rod Position

Brunswick is in agreement with RG 1.97 and indication is provided to monitor this variable.

4.2.3 Variable B3 - RCS Soluble Boron Concentration

Brunswick concurs with the ability to obtain a sample of reactor core coolant. Sampling will be done through the Post-Accident Sampling System. Analysis will be performed in accordance with NUREG-0737, Item II.B.3.

4.2.4 Variable B4 - Coolant Level in Reactor

Refer to variable A2, paragraph 4.1.2.

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE (Cont'd)

4.2 Brunswick's Position on RG 1.97 Type B Variables

4.2.5 Variable B5 - BWR Core Thermocouples

Not required at this time per Supplement 1 to NUREG-0737.

4.2.6 Variable B6 - RCS Pressure

Refer to variable A1 paragraph 4.1.1.

4.2.7 Variable B7 - Drywell Pressure

Refer to variable A5, paragraph 4.1.5.

4.2.8 Variables B8 - Drywell Sump Level

The Brunswick plant design does not require continuous measurement of drywell sump level. A LOCA signal will prevent operation of the sump pumps and will close containment isolation valves to eliminate the possibility of radioactive materials leaking outside the primary containment. During and after a LOCA, the drywell sumps overflow to the suppression pool. Measuring sump level after an accident would not accomplish anything.

4.2.9 Variable B9 - Primary Containment Pressure

Total primary containment pressure is monitored by the combination of drywell pressure and suppression pool pressure. Refer to variable A5, paragraph 4.1.5 and variable A7, paragraph 4.1.7.

4.2 Brunswick's Position on RG 1.97 Type B Variables

4.2.10 Variable B10 - Primary Containment Isolation Valve Position

Brunswick provides position indication for all isolation and containment boundary valves except check valves and manually operated valves.

4.3 Brunswick's Position on RG 1.97 Type C Variables

RG 1.97 defines Type C variables as "those variables that provide information to indicate the potential for being breached or the actual breaching of the barriers to fission product releases. The barriers are (1) fuel cladding, (2) primary coolant pressure boundary, and (3) containment." Key variables under Type C are "those variables which most directly indicate the accomplishment of a safety function." Each variable is discussed in the following paragraphs and where this variable is covered under another variable type, it is indicated.

4.3.1 C1 - Radioactivity Concentration or Radiation Level in Circulating Primary Coolant.

Brunswick does not intend to continuously monitor the radioactivity level of the primary coolant. During normal operation the Radiation Monitoring System provides indication of breach. During accident conditions the Post-Accident Sampling System will provide local indication of radioactivity concentration in the reactor coolant while samples are being taken for analysis.

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE (Cont'd)

4.3 Brunswick's Position on RG 1.97 Type C Variables

4.3.2 Variable C2 - Analysis of Primary Coolant

Brunswick concurs and will provide a system that meets the requirements of NUREG-0737 Item II.B.3.

4.3.3 Variable C3 - BWR Thermocouple

See variable B5, paragraph 4.2.5.

4.3.4 Variable C4 - RCS Pressure

The requirements for the variable are met by variable A1, paragraph 4.1.1.

4.3.5 Variable C5 - Primary Containment Area Radiation

See Variable E1, paragraph 4.5.1.

4.3.6 Variable C6 - Drywell Drain Sumps Level

See discussion for variable B8, paragraph 4.2.8.

4.3.7 Variable C7 - Suppression Pool Water Level

Refer to variable A4, paragraph 4.1.4.

4.3.8 Variable C8 - Drywell Pressure

Refer to variable A5, paragraph 4.1.5.

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE (Cont'd)

4.3 Brunswick's Position on RG 1.97 Type C Variables

4.3.9 Variable C9 - RCS Pressure (0 to 1500 psig)

Refer to variable A1, paragraph 4.1.1.

4.3.10 Variable C10 - Primary Containment Pressure

Refer to variable A5, paragraph 4.1.5 and Variable A7, paragraph 4.1.7.

4.3.11 Variable C11 - Containment & Drywell Hydrogen Concentration

Refer to variable A8, paragraph 4.1.8.

4.3.12 Variable C12 - Containment & Drywell Oxygen Concentration

Refer to variable A8, paragraph 4.1.8.

4.3.13 Variable C13 - Containment Effluent Radioactivity - Noble Gases

Refer to variables E4 and E5, paragraph 4.5.4 and 4.5.5.

4.3.14 Variable C14 - Radiation Exposure Rate

Not required at this time per Supplement 1 to NUREG-0737.

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE (Cont'd)

4.3 Brunswick's Position on RG 1.97 Type C Variables

4.3.15 Variable C15 - Effluent Radioactivity - Noble Gases

Refer to variables E4 and E5, paragraph 4.5.4.

4.4 Brunswick's Position on RG 1.97 Type D Variables

Type D variables as stated in the RG are, "those variables that provide information to indicate the operation of individual safety systems and other systems important to safety. These variables are to help the operator make appropriate decisions in using the individual systems important to safety in mitigating the consequences of an accident." Key variables that are type D are defined as "those variables that most directly indicate the operation of a safety system." These variables are discussed in the following paragraphs and where the variable has been covered under another variable type, it is indicated.

4.4.1 Variable D1 - Main Feedwater Flow

Brunswick is in agreement with RG 1.97 concerning this variable. At the Brunswick plant there is a minor range deficiency on the high end of 0.212%. This is a negligible value. The "110% of design value" stated in the RG is considered a guideline. Brunswick will use the current value of 12,000,000 #/hr, for high end monitoring.

4.4.2 Variable D2 - Condensate Storage Tank Level

Brunswick concurs with RG 1.97.

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE (Cont'd)

4.4 Brunswick's Position on RG 1.97 Type D Variables (Cont'd)

4.4.3 Variable D3 - Suppression Spray Flow

Brunswick does not concur with RG 1.97 on this variable. For the Brunswick design RHR flow can be used to monitor the operation of primary containment related systems. Also, the following parameters give indication that the safety system is accomplishing its task:

Drywell Pressure - A5, B7, C8, D4, B9, C10
Drywell Temperature - A6, D7
Suppression Pool Pressure - A7
Suppression Pool Temperature - A3, D6.

RHR flow and the above list of variables provide adequate information to monitor operation of primary containment related systems.

4.4.4 Variable D4 - Drywell Pressure

Brunswick concurs with RG 1.97 on this variable.

4.4.5 Variable D5 - Suppression Pool Water Level

Refer to variable A4, paragraph 4.1.4.

4.4.6 Variable D6 - Suppression Pool Water Temperature

Refer to variable A3, paragraph 4.1.3.

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE (Cont'd)

4.4 Brunswick's Position on RG 1.97 Type D Variables (Cont'd)

4.4.7 Variable D7 - Drywell Atmosphere Temperature

Refer to variable A6, paragraph 4.1.6.

4.4.8 Variable D8 - Drywell Spray Flow

Brunswick's position on this variable is the same as that discussed under D3, paragraph 4.4.3.

4.4.9 Variables D9 - MSIV Leakage Control System Pressure

These systems are not included in the Brunswick plant design. Brunswick does not intend to add these systems.

4.4.10 Variable D10 - Primary System Safety Relief Valve Positions Including ADS or Flow Through or Pressure in Valve Lines

Brunswick is in agreement with RG 1.97 on this variable, and provides instrumentation for this variable.

D11 - Isolation Condenser System Shell-Side Water Level
D12 - Isolation Condenser System Valve Position

These systems are not included in the Brunswick plant design. Brunswick does not intend to add these systems.

4.4.11 Variable D13 - RCIC Flow

Brunswick agrees with the intent of RG 1.97 concerning this variable. Current design has indication as part of the flow controller and therefore indication is not isolated from the control loop. Brunswick does not plan to provide isolation between indication and control. If controller and/or flow indicator fail, RCIC performance can be monitored by monitoring the response of the reactor water level.

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE (Cont'd)

4.4 Brunswick's Position on RG 1.97 Type D Variables (Cont'd)

4.4.12 Variables - D14 - HPCI Flow
D15 - Core Spray System Flow
D16 - LPCI System Flow

The HPCI and CS systems each have one branch line - - the test line - - downstream of the flow - measuring element. The test line is provided with a motor operated valve that is normally closed (two valves in series in the case of the HPCI). Further, the valve in the test line closes automatically when the emergency system is activated, thereby ensuring that indicated flow is not being diverted by the test line. Proper valve position can be verified by a direct indication of valve position. (Although LPCI has several branch lines located downstream of each flow measuring element, each of those lines is normally closed.) For all of these systems, there are valid primary indicators other than flow measurement to verify the performance of the emergency system; for example, vessel water level.

The existing flow-measurement schemes for the HPCI, CS and LPCI are all adequate in that they meet the intent of RG 1.97.

4.4.13 Variable D17 - SLCS Flow

The SLC system is manually initiated. Flow measuring devices were not provided for this system. The pump discharge header pressure, which is indicated in the control room, will indicate SLC pump operation. Besides the discharge header pressure observation, the operator can verify the proper functioning of the SLCS by monitoring the following:

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE (Cont'd)

4.4 Brunswick's Position on RG 1.97 Type D Variables (Cont'd)

4.4.13 Variable D17 - SLCS Flow (Cont'd)

1. Decrease in the level of the boric acid storage tank.

2. Reactivity change in the reactor as measured by neutron flux.

3. Squib valve continuity indicating lights.

The use of these indications is believed to be a valid alternative to SLCS flow indication.

4.4.14 Variable D18 - SLCS Storage Tank Level

Brunswick is in agreement with the regulatory guide range of bottom to top level monitoring. At the Brunswick Plant, this level is given in percent.

Brunswick is in disagreement with the category 2 designation for this variable. The current design basis for the SLCS assumes a need for an alternative method of reactivity control without a concurrent loss-of-coolant accident or high-energy line break. The environment in which the SLCS instrumentation must work is therefore a "mild" environment for qualification purposes.

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE (Cont'd)

4.4 Brunswick's Position on RG 1.97 Type D Variables (Cont'd)

4.4.14 Variable D18 - SLCS Storage Tank Level (Cont'd)

The current design basis for the SLCS recognizes the system has an importance to safety less than the importance to safety of the reactor protection system and agrees with the graded approach to quality assurance specified in RG 1.97. It is unnecessary to apply a full quality assurance program to this instrumentation. Brunswick will classify this variable category 3. A category 3 requirement is consistent with the 79-01B stand on the SLCS, which is that the system is non-safety related and does not require environmental qualification.

4.4.15 Variable D19 - RHR System Flow

Brunswick concurs with RG 1.97 on this variable.

4.4.16 Variable D20 - RHR Heat Exchanger Outlet Temperature

Brunswick concurs with RG 1.97 on this variable.

4.4.17 Variable D21 - Cooling Water Temperature to ESF Components

The engineered safety feature components in the Brunswick design include the RHR heat exchangers, core spray pump room fan cooling units, the RHR pump room coolers and the RHR pump seal cooling exchangers. The service water system provides cooling water to these components. Brunswick interprets this variable as meaning main system temperature. In the Brunswick design, there are two main service water lines, the nuclear and conventional header lines. Since there are no heat sources between

4.4 Brunswick's Position on RG 1.97 Type D Variables (Cont'd)

4.4.17 Variable D21 - Cooling Water Temperature to ESF Components (Cont'd)

these lines and the ESF components there will be no significant temperature change in cooling water temperature. Brunswick will comply with the RG 1.97 range recommendation of 32° to 200°F, and will implement instrumentation for these lines.

4.4.18 Variable D22 - Cooling Water Flow to ESF System Components

Brunswick concurs with RG 1.97 on this variable and will provide flow measurement and indication of main service water flow in the conventional and nuclear service water headers.

4.4.19 Variable D23 - High Radioactivity Liquid Tank Level

Brunswick concurs with RG 1.97 on this variable.

4.4.20 Variable D24 - Emergency Ventilation Damper Position

Brunswick concurs with RG 1.97 on this variable. Brunswick interprets this variable to be dampers which could release radiation to the surrounding plant environment or expose control room personnel to radiation.

4.4 Brunswick's Position on RG 1.97 Type D Variables (Cont'd)

4.4.21 Variable D25 - Status of Standby Power & Other Energy Sources Important to Safety (Electric, Hydraulic, Pneumatic)

At Brunswick the standby AC power supply and distribution system for the two units consists of four diesel generators and four 4.16 kv Class IE buses. The 4 kv emergency buses are E1, E2, E3 and E4. The voltage is stepped down to the 480V emergency buses E5, E6, E7, and E8. The 480V emergency bus feeds the 120V AC emergency bus.

The DC standby power is supplied by batteries. The instrument air pressure is supplied by the standby air compressors.

Diesel generator terminal voltage, feeder breaker indication, and feeder breaker trip annunciation are provided in the control room and provide adequate information on bus voltage. Also, process computer points E039, E040, E041 and E042 give E1, E2, E3, and E4 feeder bus voltage respectively.

Feeder breaker trip annunciation is available in the control room for both the 480V and the 120V AC emergency buses. Feeder breaker indication and feeder equipment malfunction annunciation are available for the 480V emergency bus.

Brunswick believes that its treatment of this variable is adequate in that it provides information which is consistent with the definition of the Type D variable.

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE (Cont'd)

4.1 Brunswick's Position on RG 1.97 Type D Variables (Cont'd)

4.4.22 Plant Designer Selected Variables

In accordance with RG 1.97's statement, "The plant designer should select variables and information display channels required by his design to enable the control room personnel to ascertain the operating status of each individual safety system and other systems important to safety to the extent necessary to determine if each system is operating or can be placed in operation...", Brunswick has selected four additional type D, category 3 variables to monitor. The basis for choosing these variables is the capability of using the main condenser as a heat sink for main steam from the reactor. This involves bypassing the main turbine provided the hotwell level is low enough to accomodate additional condensate, and that there is sufficient vacuum for operation. Verification of the number of condensate pumps running is also recommended. The four variables are:

D26 - Turbine Bypass Valve Position
D27 - Condenser Hotwell Level
D28 - Condenser Vacuum
D29 - Condensate Pump & Booster Pump Status

4.5 Brunswick's Position on RG 1.97 Type E Variables

The RG 1.97 definition for type E variables is: "those variables to be monitored as required for use in determining the magnitude of the release of radioactive materials and for continually assessing such releases." Key variables that are type E are defined as variables that most directly indicate the release of radioactive material. Each variable is discussed in the following paragraphs and Brunswick's position on the variable is given. Where a variable has already been discussed under another type, it is indicated.

4.5.1 Variable E1 - Primary Containment Area Radiation - High Range

Brunswick concurs with the RG 1.97 recommendation on this variable and the requirements of NUREG 0737 (Table II.F.1-3). Brunswick is currently installing equipment to measure this variable. Refer to TMI plant modifications 80-030 and 80-031.

4.5.2 Variable E2 - Reactor Building or Secondary Containment Area Radiation

See Variable C14, paragraph 4.3.14.

4.5.3 Variable E3 - Radiation Exposure Rate

The stated purpose for this variable is to monitor buildings or areas where access is required to service safety equipment. The Brunswick plant is not designed for servicing equipment in the reactor building during or after an accident. Redundancy of system design mitigates the requirement for servicing a safety system after an accident.

4.5 Brunswick's Position on RG 1.97 Type E Variables

4.5.4 Variables E4 - Noble Gases and Vent Flow Rate
E5 - Particulates and Halogens

In the Brunswick design there are five identifiable release points: the stack, two turbine building vents, and two reactor building vents. The instrumentation on the reactor building vents is not required because the reactor building isolates upon the receipt of a high radiation signal to the monitoring instrumentation. CP&L has NRC approval for this position provided in a letter from the NRC dated May 5, 1982, concerning NUREG-0737 Action Items II.F.1.1 (Noble Gas Monitor) and II.F.1.2 (Iodine/Particulate Sampling).

Under variable E4 in RG 1.97, there are six sub-headings. For convenience and clarity of discussion, the six are listed below and their applicability to Brunswick summarized:

4.0 PLANT-SPECIFIC POSITION ON EACH VARIABLE (Cont'd)

4.5 Brunswick's Position on RG 1.97 Type E Variables

4.5.4 Variables E4 - Noble Gases and Vent Flow Rate
E5 - Particulates and Halogens (Cont'd)

RG 1.97	Brunswick
1. Drywell Purge, SGTS	Stack
2. Secondary Containment Purge	Reactor Building
3. Secondary Containment (RX Shield Bldg. Annulus)	N/A
4. Auxiliary Building	N/A
5. Common Plant Vent	Stack
6. All other Release Points	Turbine Vents

Instrumentation for the stack and turbine building vents will be provided through TMI plant modifications 80-034, 35 and 36. These plant modifications meet the requirements of NUREG-0737 and applicable standards and regulatory guides including RG 1.97.

4.5.5 Variable E6 - Radiation Exposure Meters

On hold due to lack of requirements from NRC. Refer to NRC ERRATA dated July 1981.

4.5.6 Variable E7 - Airborne Radiohalogens and Particulates (Portable Sampling with On-Site Analysis Capability)

Brunswick concurs with RG 1.97.

4.5 Brunswick's Position on RG 1.97 Type E Variables

4.5.7 Variable E8 - Plant & Environs Radiation (Portable Instrumentation)

Brunswick concurs with RG 1.97.

4.5.8 Variable E9 - Plant & Environs Radioactivity (Portable Instrumentation)

Brunswick concurs with RG 1.97.

4.5.9 Variables E10 - Wind Direction
E11 - Wind Speed
E12 - Estimation of Atmosphere Stability

Brunswick will install new equipment which will meet the recommendations of RG 1.97.

4.5.10 Variable E13 - Primary Coolant & Sump

Accident Sampling of primary coolant will be done at two points in the jet pump pressure instrument system and from a single sample line connected to both loops in the RHR system. Refer to Plant Modification 80-28 and 80-29.

Sampling of the containment sumps is not necessary at the Brunswick plant because accident conditions will close isolation valves G16-F003, F004, F019 and F020, which prevents release of radioactive materials from primary containment.

4.0 PLANT-SPECIFIED POSITION ON EACH VARIABLE (Cont'd)

4.5 Brunswick's Position on RG 1.97 Type E Variables

4.5.11 Variable E14 - Containment Air

Containment air sampling will be taken from the drywell and suppression pool atmosphere. Refer to Plant Modification 80-028 and 80-029.

5.0 ABBREVIATIONS

ADS	-	Automatic Depressurization System
BWR	-	Boiling Water Reactor
BWROG	-	Boiling Water Reactor Owners Group
CAD	-	Containment Atmospheric Dilution
CS	-	Core Spray
ECCS	-	Emergency Core Cooling System
ESF	-	Engineered Safety Features
FSAR	-	Final Safety Analysis Report
HPCI	-	High Pressure Coolant Injection
LPCI	-	Low Pressure Coolant Injection
NA	-	Not Applicable
QA	-	Quality Assurance
RCS	-	Reactivity Control System
RCIC	-	Reactor Core Isolation Cooling
RG	-	Regulatory Guide
RHR	-	Residual Heat Removal
RPV	-	Reactor Pressure Vessel
RWCU	-	Reactor Water Clean Up
RX	-	Reactor
R/hr	-	Rems per hour
SGTS	-	Standby Gas Treatment System
SLCS	-	Standby Liquid Control System
SRV	-	Safety Relief Valve
TMI	-	Three Mile Island

6.0 REFERENCES

1. ANS 4.5
2. Brunswick FSAR
3. Brunswick System Descriptions
4. BWROG Emergency Procedure Guidelines, Rev. 3 (Prepublication Draft)
5. BWROG Position Paper on RG 1.97, Rev. 2
6. IE Bulletin 79-01B
7. NUREG-0578
8. NUREG-0737 and Supplement 1
9. Plant Modifications:
   - 77-268, Pressure Switch Analog Replacement U1
   - 77-269, Pressure Switch Analog Replacement U2
   - 77-303, CST & MVD Level Indicator Addition & Range Change
   - 80-137, TSC Computer Input Points U1
   - 80-138, TSC Computer Input Points U2
   - 80-180, Nuclear Boiler Instrumentation U1
   - 80-181, Nuclear Boiler Instrumentation U2
   - 81-251, Suppression Pool Instrumentation U1
   - 81-252, Suppression Pool Instrumentation U2
   - 82-049, Drywell RTD Replacement
10. RG 1.97, Rev. 2, Rev. 3
11. TMI Action Item Plant Modifications:
    - 80-025, Drywell Pressure Instrumentation U1
    - 80-026, Drywell Pressure Instrumentation U2
    - 80-028, Improved Post Accident Sampling U1
    - 80-029, Improved Post Accident Sampling U2
    - 80-030, Containment Rad Monitoring U1
    - 80-031, Containment Rad Monitoring U2
    - 80-032, Containment H2 Monitoring U1
    - 80-033, Containment H2 Monitoring U2
    - 80-034, TB Vent High Range Rad Monitor U1
    - 80-035, TB Vent High Range Rad Monitor U2
    - 80-036, Stack Radiation Monitors
    - 80-078, Wide Range Torus Level U1
    - 80-079, Wide Range Torus Level U2
12. 10CFR50 Appendix A and General Design Criteria 13, 19, and 64.