U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-454/93006(DRS); No. 50-455/93006(DRS); No. 50-456/93009(DRS); and No. 50-457/93009(DRS)

Docket Nos. 50-454; 50-455; 50-456; and 50-457

Licenses No. NPF-37; No. NPF-66; No. NPF-72; and No. NPF-77

Licensee: Commonwealth Edison Company
Executive Towers West III
1400 Opus Place, Suite 300
Downers Grove, IL 60515

Facility Name: Byron Station, Units 1 and 2
Braidwood Station, Units 1 and 2

Inspection At: Byron Site, Byron, IL
Braidwood Site, Braidwood, IL

Inspection Conducted: June 1 through July 16, 1993

Inspection Team: D. Butler, Team Leader
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Approved By: David S. Butler 8/9/93
David S. Butler, Team Leader, Region III — Date

Approved By: Ronald N. Gardner 8/10/93
Ronald N. Gardner, Chief, Plant Systems Section — Date

Inspection Summary

Inspection on June 1 through July 16, 1993 (Reports No. 50-454/93006(DRS); No. 50-455/93006(DRS); No. 50-456/93009(DRS); and No. 50-457/93009(DRS))

Special announced electrical distribution system functional inspection in accordance with Temporary Instruction (TI) 2515/107 (25107).

Results: The team determined that both Byron's and Braidwood's electrical distribution systems are designed, operated, and maintained in an effective manner. The team also concluded engineering and technical support was good. Strengths and weaknesses in system design and engineering support are provided in the Executive Summary. The team identified one inspection followup item regarding the fuse program at Byron (Section 3.5).

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Executive Summary

During the period of June 1 through July 16, 1993, a Region III inspection team conducted an electrical distribution system functional inspection (EDSFI) at the Byron and Braidwood Stations. The inspection reviewed the stations' electrical distribution system (EDS) design and operation and also evaluated engineering and technical support (E&TS). The team reviewed EDS electrical and mechanical support systems, examined installed EDS equipment, reviewed EDS testing and procedures, and interviewed selected corporate and station personnel. This inspection was a comprehensive four week onsite effort with two weeks spent at each station.

The team concluded that Byron's and Braidwood's EDS were designed, operated and maintained in an effective manner. In addition, the team concluded that, overall, the engineering and technical support organizations were adequately qualified, trained, and involved in EDS design and operation. However, the team identified the following weaknesses:

- a formal calculation did not exist for determining the voltage dip during a block start of LOCA loads,
- the battery sizing calculation was not revised using the latest capacity rating factor (R_T),
- the miscellaneous electrical equipment room heat capacity verification test did not assess a possible 3°F temperature rise in the air tunnel and a formal electrical heat calculation was not prepared to support the heat load verification test,
- an EDG short circuit decrement curve was not available to demonstrate that protective relays would protect the generator from a fault condition,
- at Byron, incorrect fuses and an inappropriately installed slug (metal tube) were identified in the Unit 1 1B diesel auxiliary feedwater pump control panel, and
- DC molded case circuit breakers were not tested.

The team identified the following strengths:

- the engineering staffs associated with the EDS were competent, experienced, and well qualified, with the exception that several relatively inexperienced system engineers were assigned to some of the more important systems,
- the AC EDS design was robust,
- recent calculations demonstrated ample design margin, utilized conservative assumptions and were required to meet high design calculation standards,
- comprehensive EDS surveillances, and
- well maintained EDS equipment.

DETAILS

1.0 Introduction

During electrical inspections at various operating plants in the country, the NRC staff identified several EDS deficiencies. The Office of Nuclear Reactor Regulation (NRR) Special Inspection Branch initiated special EDS inspections at other operating plants after they determined that such deficiencies could compromise design margins. These deficiencies included unmonitored and uncontrolled load growth on safety buses and inadequate modifications, design calculations, testing, and qualification of commercial grade equipment used in safety related applications. The NRC considered inadequate E&TS to be one cause of these deficiencies.

The EDS inspection objectives were to assess Byron's and Braidwood's EDS performance capability and the licensee's E&TS capability and performance in this area. For this inspection, the EDS included power sources to systems required to remain functional during and following design basis events. EDS components reviewed included the emergency diesel generators (EDGs), offsite circuits and switchyard, 6.9kV and 4kV switchgear, 480Vac load centers (LCs), 480Vac motor control centers (MCCs), 120Vac instrument buses, 125Vdc batteries, 125Vdc MCCs, battery chargers, inverters, associated buses, breakers, relays, and other miscellaneous components.

The team reviewed the emergency, offsite and onsite power sources for EDS equipment, the power regulation to essential loads, protection for postulated fault currents, coordination of protective devices, and breaker interrupting capability. The team also reviewed the mechanical systems that interface with the EDGs, including air start, lube oil and cooling systems, plus the cooling and heating systems for EDS equipment. The team walked down originally installed and as-modified EDS equipment for configuration and equipment ratings and reviewed system component qualification, testing, and calibration records. The team assessed the licensee's E&TS organization capability with respect to personnel qualification and staffing, timely and adequate root cause analyses for failures and recurring problems, and involvement in design and operations. The team also reviewed training for Operations and E&TS personnel relative to the EDS.

The team verified conformance with General Design Criteria (GDC) 17 and 18 and the applicable 10CFR50, Appendix B criteria. The team also reviewed plant Technical Specifications (TSs), the Updated Safety Analysis Report (USAR), and appropriate Safety Evaluation Reports (SERs) to verify that TS requirements and licensee commitments were met.

The areas reviewed and the concerns identified are described in Sections 2.0 and 3.0 of this report. Personnel contacted and those who attended the exit meeting on July 16, 1993, is enclosed as Appendix A. A complete listing of the team's requests for information is enclosed as Appendix B.

2.0 Electrical Systems

2.1 AC Systems

In assessing EDS capability, the team reviewed EDS load regulation, engineered safety feature (ESF) bus electrical interfaces, equipment short circuit ratings, overcurrent protection schemes, environmental equipment qualification, and protective devices coordination for compliance with regulations, design engineering standards and accepted engineering practices. The review was based on the following information:

- system descriptions
- USAR
- technical specifications
- system design basis documents
- voltage drop and short circuit calculations
- equipment sizing calculations
- protection coordination studies
- equipment specifications
- licensee event reports (LERs)
- test and operating procedures
- electrical one line diagrams
- control logic diagrams
- elementary schematic diagrams

The team conducted EDS equipment walkdowns and verified that the operational, environmental and seismic criteria had been correctly applied. The power system electrical grids to which Byron and Braidwood Stations' are connected were reviewed to assess the adequacy of important parameters such as voltage regulation, short circuit contribution, protection schemes, surge protection, control circuits, stability and reliability. The preferred power source supply transformers were reviewed in terms of their capability, their connections to the ESF buses, field installation arrangements, protection and voltage regulation. The EDGs were reviewed to assess power rating adequacy, ability to start and accelerate their assigned safety loads in the required time sequence, voltage and frequency regulation under transient and steady state conditions, compliance with single failure criteria and applicable separation requirements. The 4kV ESF buses and their connected loads were reviewed to assess load current and short circuit current capabilities, voltage regulation, cable connection protection and adequacy between loads and buses, compliance with single failure criteria, and applicable separation requirements.

The team concluded that ample sources of offsite power were available to supply the safety related systems. Several strengths were identified including a robust AC electrical system design and recent calculations' quality.

2.1.1 Emergency Diesel Generator Overcurrent Protection

The team noted that the EDG overcurrent protection setting did not consider the generator short circuit decrement. In the event of a fault, the generator fault current contribution will gradually decrease (decrement) after approximately 34 milliseconds. As a result, the overcurrent relay trip curve intersect with the calculated short circuit current could shift.

In response, the licensee obtained the decrement curve from the manufacturer. While the decrement curve crossed the overcurrent relay trip curve, the small overlap between the calculated short circuit current and the relay tripping characteristics may cause some uncertainty as to when the relay would trip. The team concluded operability was not an issue, but that coordination could be refined. The licensee committed to review the existing relay settings and their relationship to the decrement curve for the Byron and Braidwood EDGs. Based on the above,the team found this to be acceptable. However, the team considered the omission of the EDG decrement curve a design weakness.

2.1.2 Instantaneous Voltage Dip on LOCA Loads During Block Start

The team was concerned that during a LOCA concurrent with a main generator trip and preferred power available, the transfer of nonsafety loads to the station auxiliary transformer (SAT) could occur simultaneously with the start of all LOCA loads (block start). The potential existed for a significant voltage dip to occur resulting in an unanticipated LOCA loads transfer to the EDGs. This scenario had not been analyzed by the licensee.

In response, the licensee performed an analysis which demonstrated the main generator would continue powering nonsafety loads until tripped by it's reverse power relay. The team concluded there was sufficient kinetic energy stored in the main turbine generator to continue powering nonsafety loads, and prevent simultaneous energization of nonsafety and LOCA loads on the SAT. Even though the licensee adequately demonstrated the capability to block start the LOCA loads, the team considered the lack of a formal analysis to be a calculation weakness.

2.1.3 EDS Design

The team concluded that the AC EDS design was robust. Many power sources were available and the offsite power systems were amply sized and exhibited good system stability, including good voltage and frequency regulation. The onsite distribution system was designed with ample design margin. For example, the worst case short circuit current was 6.5% less than the breaker interrupting capability. New calculations contained ample design margin, utilized conservative assumptions and were required to meet high design calculation standards. For example, the voltage drop calculations had well defined assumptions and clearly demonstrated that there would be sufficient voltage available during all station operating conditions. The team considered the AC system design and recent calculations to be a strengtn.

2.2 DC and 480Vac Systems

The team reviewed the stations' Class 1E 480Vac and 120Vac systems, Class 1E DC systems, inverters and cable penetrations for design compliance to applicable standards and codes. The inspection reviewed the 125Vdc battery design with respect to sizing, duty cycle loading, cell temperature, battery aging and capacity. The associated battery charger design and applicable calculations were reviewed for total loading capabilities. The inverter sizing and design calculations were reviewed to verify their adequacy. Short circuit calculations and voltage drop calculations for the 125Vdc systems and 120Vac systems from the inverters were reviewed for correctness and accepted engineering practices. Containment electrical penetration parameters were reviewed for adequacy. Cables in the 125Vdc and 120Vac systems were checked and the cable sizing criteria were reviewed for adequacy in accordance with standard engineering practices. The circuit breakers and fuses were checked for sizing and coordination.

The 480Vac ESF buses and MCCs along with their connected loads were reviewed to assess load current and short circuit current capabilities, voltage regulation, protection and cable connections between loads and sources, and compliance with single failure criteria and applicable separation requirements.

The team concluded the Class 1E low voltage AC systems were well designed and the Class 1E DC systems were adequately designed.

2.2.1 125V DC Battery Sizing

The team noted that calculation No. D-21, Revision 2, "Calculation for Sizing the 125V DC Safety Related Batteries," did not reflect the latest battery capacity rating factor (R_T) for the Gould NCX-1200 battery cell one minute discharge rate. The calculation used an R_T value of 132.63 amperes per positive plate in determining the battery duty cycle. The R_T value was obtained from the manufacturer's battery discharge characteristic curves. The licensee had previously identified and transmitted a 10CFR21 notification describing the NCX series cells inability to meet their published one minute discharge rate. The new R_T value is 99 amps per positive plate.

The licensee evaluated the impact of the new R_T value on the battery sizing calculation. The evaluation indicated the highest duty cycle section would now occur in the first section instead of the fourth section. The total number of positive plates required for the worst case loading increased from 6.739 (for Byron Battery 111) to 7.89 plates. The existing batteries have 8 positive plates. Based on the above, the team concluded the stations' batteries would be able to perform their safety function. However, the team considered this a calculation weakness.

The licensee informed the team that they were replacing the NCX-1200 ampere-hour battery cells with American Telephone and Telegraph (AT&T) round cell batteries. The new cells have an 1850 ampere-hour capacity.

2.2.2 125V DC Voltage Drop

The team noted that calculation No. AQ-72, Revision 0, "125V DC Voltage Drop," did not reflect the new R_t value (see Section 2.2.1). The R_t value will affect the battery duty cycle terminal voltage. The licensee evaluated the voltage drop to the safety related inverters (most limiting load) and concluded the inverters had sufficient input voltage. The team found the results to be acceptable.

2.2.3 DC Grounds

The team observed that the licensee had an excellent program for the detection and removal of DC grounds. The ground detector alarmed in the control room at an extremely sensitive value (120 kohm). Even though immediate operator action was not required for the alarm, records indicate the licensee responded promptly. In addition, the licensee took immediate actions in response to a 20 kohm ground and entered an administrative limiting condition for operation (LCO). The team determined that a 20 kohm ground resistance was 6 times higher than the ground fault level which could energize a grounded relay. The licensee's DC ground detection capability and actions were considered a strength.

2.3 Mechanical Support Systems

The team reviewed the EDGs and their mechanical support systems to determine their adequacy following a design basis accident. Included in the review were EDG fuel oil, starting air, lubricating oil, cooling, air intake and exhaust, HVAC systems, and essential service water. The team addressed all aspects of the design, modification, testing, and maintenance, including protection from internal and external hazards. In determining each system's functional adequacy, the team conducted system walkdowns and examined associated licensing, engineering, vendor, purchasing, and station operating and maintenance documents. The review was based on the following information:

- USAR
- technical specifications
- vendor manuals
- operating and maintenance procedures
- mechanical systems, seismic, and HVAC calculations
- piping and instrumentation diagrams
- HVAC flow diagrams
- selected modifications and Safety Evaluations
- equipment qualification
- licensee event reports (LERs)
- operability evaluations

The team concluded that the mechanical support systems for the EDS design were acceptable. All supporting mechanical systems reviewed showed sufficient design margin and no operability concerns were identified.

2.3.1 Miscellaneous Electrical Equipment Rooms (MEERs) Heat Load Calculation

The team noted that a formal electrical heat load calculation did not exist to verify calculation No. VE-800, "Heat Capacity Verification," assumptions. This calculation establishes the heat capacity of the MEERs. The team was concerned that calculation VE-800 did not correctly model the heat generated by electrical loads.

In response, the licensee performed an informal analysis during the EDSFI. The recalculated heat load was 25% higher than the heat load calculated in VE-800. Since VE-800 is used as the basis for assessing the impact of MEERs' heat load additions, the team considered the lack of a formal electrical heat load analysis a calculation weakness.

2.3.2 MEERs Supply Air Temperature Rise

The team was concerned that the 3°F temperature rise postulated in calculation No. VE-800 for the air tunnel between the supply fan and the MEERs was not verified during the verification test. Based on an extrapolated 95°F outdoor air temperature, the calculated maximum Division 11 MEER temperature was 101.2°F. However, this temperature rise could be larger due to the leakage of warmer switchgear and EDG room air. The team estimated that an additional 3°F temperature rise could occur due to this leakage. Even though the maximum MEERs' design temperature (108°F) would not be exceeded, the team considered this a calculation weakness.

3.0 Engineering and Technical Support

During the inspection, the team evaluated Byron's and Braidwood's engineering and technical support capability. The team reviewed the licensee's programs for temporary modifications (Temp Alts), permanent modifications, engineering interfaces, document and drawing control, discrepancy management, safety evaluations (10CFR50.59), test development and control, manual operator actions, maintenance and QA/QC. In addition, the team reviewed root cause analyses and electrical training programs for engineers.

Overall, the team concluded that the extent and quality of engineering and technical support was good. Modifications reviewed contained good design control, well documented safety evaluations, and good post modification testing. Communication between engineering and other groups was effective. The engineering staffs were competent, experienced and well qualified. One program weakness was identified regarding the fuse control program at Byron.

3.1 Engineering Staff

The team reviewed the electrical system engineer's training program and selected staff training records and work experience. Training was good with several positive attributes. For example, simulator operating scenarios were used for system engineers training and actual operating equipment was available for training.

The corporate engineering staff was adequately trained and experienced. Routine peer group meetings were conducted between onsite and corporate engineering with an emphasis on problem identification and resolution.

The average onsite engineering staff experience was high at Byron and Braidwood. In addition, previously licensed operators were integrated into the technical staff. However, the team noted instances where important systems were assigned to relatively inexperienced engineers. Each station had sufficient engineering staff to support station operation and maintenance. The team found the onsite engineering staff for both stations to be competent, and well qualified with a good working knowledge of their applicable station. The technical knowledge of the onsite engineering staff was considered a strength.

3.2 Design Control and Modifications

The team concluded that Byron and Braidwood had a good program for controlling station modifications. Safety evaluations were thorough and well documented. The team reviewed 10 modifications at Byron and 13 modifications at Braidwood and concluded the licensee correctly implemented those modifications.

The team concluded that the licensee's post modification testing (PMT) program was good. The PMT procedures were well written and included appropriate objectives and acceptance criteria. The PMT program was considered a strength.

3.3 Quality Verification Assurance Programs

The team concluded that EDS quality assurance audits and surveillances (field monitoring) included an appropriate mix of programmatic and performance based reviews. The reports were thorough and well documented.

The team concluded the licensee's self-assessment of EDS equipment was good. For example, the licensee performed a thorough self-assessment of the EDG electrical loading and associated fuel oil consumption scenarios, storage tank capacity calculations and operating procedures.

3.4 Program and Procedure Effectiveness

The team reviewed a number of Byron's and Braidwood's long term corrective action programs which appear to be effective, but implementation time delays were noted due to multi-station implementation. Included were the Integrated Reporting Process (IRP) which includes the Problem Identification Form (PIF) and root cause analyses, the Independent Safety Evaluation Group (ISEG), and Problem Analysis Data Sheets (PADS). The team's reviews concluded these programs were generally effective. The licensee's corporate Lessons Learned Program was considered a strength for sharing information between stations. The licensee's predictive maintenance activities included a good thermography program. The licensee's load growth program (ELMS) was very good.

The team reviewed selected EDS surveillance procedures and found them user-friendly with acceptance criteria clearly defined. The procedures contained brief descriptions of each step to be performed allowing for surveillance personnel to question the consequences of each action when performing surveillances. The team considered the EDS surveillance procedures to be a strength.

3.5 Fuse Control

The team identified two safety related fuses and a slug (metal tube) in Byron Unit 1 1B diesel auxiliary feedwater (AFW) pump control panel which were not installed in accordance with design specifications. The electrical schematic for the 1B AFW pump designated fuses F2 and F4 as 10 amperes and SUF5 as a slug, however, a 3 ampere fuse, a slug and a 10 ampere fuse were installed, respectively. The team determined that the incorrectly installed fuses and slug would not have prevented the equipment from performing its safety function. However, the team was concerned that a short in the 1B AFW pump Class 1E qualified annunciator circuit (slug installed) had the potential to prevent the pump from starting. The licensee reviewed all past work orders associated with these circuits, but came to no conclusions as to when or how the incorrect fuses and slug were installed.

Byron's fuse control procedure required a like-for-like replacement; however, the procedure did not clearly define that the replacement fuse be the same manufacturer, type, size, amperage and voltage. In contrast, Braidwood's fuse control procedure required all of the above. During recent walkdowns at Braidwood, the station generated 53 discrepancy reports identifying 206 incorrect fuses out of 2,478 fuse walked down. As a result, Byron committed within their Nuclear Tracking System to walkdown safety related fuses and strengthen their fuse control procedure. The team considered Byron's fuse control program to be a weakness. Pending NRC review, this is an inspection followup item (454/93006-01(DRS); 455/93006-01(DRS)) to review the results of the Byron walkdowns and program enhancements.

3.6 Electrical Maintenance

The team determined that maintenance at Byron and Braidwood was effectively performed by a knowledgeable and dedicated staff. In addition, the licensee was implementing a good maintenance program which included many vendor recommendations. The team verified that the breaker maintenance procedures included vendor recommendations and adequate testing criteria. However, the team did note several maintenance activity differences between Byron and Braidwood. For example, Byron tested all 480Vac molded case circuit breakers, but Braidwood only tested breakers protecting circuits penetrating containment. In addition, Braidwood tested the output regulation of their Class 1E inverters over their full range of DC input voltage, while Byron did not. Since both stations have similar equipment, the team believes that maintenance and testing should be consistent between stations. In addition, the team noted that both stations were not testing 125Vdc molded case circuit breakers (MCBs). The breaker manufacturer recommended testing. Both stations stated that the MCBs had not exhibited any failure trends and that neither station had 125Vdc MCB testing commitments. However, the team considered this a testing weakness.

4.0 Inspection Followup Items

Inspection followup items are matters which have been discussed with the licensee, which will be reviewed further by the team, and which involve some action on the part of NRC or licensee or both. One followup item disclosed during the inspection is discussed in Section 3.5.

5.0 Exit Interview

The team conducted an exit meeting on July 16, 1993, at CECo's office in Downers Grove, Illinois, to discuss the major areas reviewed during the inspection, the strengths and weaknesses observed and the inspection results. Licensee representatives and NRC personnel in attendance at this exit meeting are documented in Appendix A. The team also discussed the inspection report likely informational content with regard to documents reviewed by the team during the inspection. The licensee identified the proprietary documents and the team agreed to handle this information accordingly.

Appendix A

Byron and Braidwood EDSFI Exit Meeting July 16, 1993

Byron Station and Braidwood Station Personnel

S. Berg, Senior Vice President, Braidwood
K. Graesser, Senior Vice President, Byron
M. Burgess, Technical Superintendent, Byron
D. Miller, Technical Superintendent, Braidwood
G. Vanderheyden, System Engineering Supervisor, Braidwood
A. Javorik, System Engineering Supervisor, Byron
M. Auer, Electrical Group Supervisor, Braidwood
D. Spitzer, Electrical Group Supervisor, Byron
G. Wagner, Electrical/I&C Superintendent, Nuclear Engineering Department (NED)
K. Uhlir, Electrical/I&C, NED
T. O'Brien, Mechanical/Structural, NED
D. Brindle, Regulatory Assurance Supervisor, Braidwood
J. Lewand, Regulatory Assurance, Braidwood
R. Lemke, Independent Review Group
P. Manning, Program Director, Electrical/I&C
J. Bauer, Nuclear Licensing Administrator, Braidwood and Byron
D. Skoza, Engineering Supervisor, Braidwood
D. Van Pelt, EDSFI Director, NED
J. Phelan, Corporate EDSFI Team Leader, NED
G. Morris, Consultant, Ogden
M. Ryterski, SEC

Sargent and Lundy

M. Zar, Department Head, Electrical Projects Engineering Division
D. Galantis, Senior Project Engineer

U. S. Nuclear Regulatory Commission

R. Gardner, Chief, Plant Systems Section
G. Wright, Chief, Engineering Branch
M. Farber, Chief, Reactor Projects Section 1A

APPENDIX B

1. A temporary alteration was implemented to cool the 111 inverter. (1) Please provide the 50.59 evaluation (2) the temporary alteration was installed two years ago - should the installation be permanent?
2. A copy of all surveillance procedures pertaining to T.S. Section 3/4.8 for Div 11 equipment, include a cross reference between tech spec number and procedure number.
3. Provide a copy of electrical system engineers training records for type A/B surveillance testing (electrical group only).
4. Provide a copy of BAP 500-5 and 500-5A1, with a list of VT qualified personnel on-site.
5. Schedule meeting with Tech. Staff training program representative to review training material (lesson plans/handouts) used in qualification program; and provide records of electrical system engineer's training for previous three years.
6. Westinghouse recently identified a problem with incorrectly sized fuses in the solid state 7300 system. Have you responded to the Westinghouse "infogram."
7. Please provide calculations on the setpoint(s) for the DC ground detector.
8. Level indicator 1LI-D0035 for the day tank reads 50%. Does this reading reflect a full day tank? Please provide justification.
9. If the DC ground detector fails - would this failure alarm or annunciate locally or in the control room?
10. Please provide the output regulation checks of inverters 111 and 113.
11. Does Byron calculate the burdens on current and potential transformers? If so, please provide a sample of each type.
12. A copy of equipment operator routine surveillance/round procedures which require the operator to take quantitative data from safety related EDS equipment, such as voltmeters, fuel oil level, ammeters.
13. Provide details of cathodic protection (Byron & Braidwood).
14. Provide study on 345kV SWYD coordination of protective relaying (Byron & Braidwood).
15. Provide stability study for CECo system at Byron & Braidwood.
16. Provide description of reclosing scheme operation (345kV SWYD.) (Byron & Braidwood)
17. Provide short circuit study for 345kV SWYD. at Byron.
18. Provide 345kV SWYD. ground grid design calculations and periodic surveillance requirements (Byron & Braidwood).
19. Provide copy of 345kV System Reliability Study (Byron & Braidwood).
20. Please provide the last three maintenance inspections of the Unit 1 auxiliary feedwater diesel which is required by Technical Specification Section 4.7.1.2.3.C.
21. Please provide copies of all testing and maintenance performed on the Unit 1 auxiliary feedwater diesel battery.
22. Please provide the last Doble tests for the UAT 141-1 & 1412-2 and SAT 142-1 and 142-2.
23. Are 345kV BKRs provided with dual trip coils?
24. Would like to talk with substation construction and OAD to discuss breaker operation and relaying.
25. Electrical Sys. Engr. interviews - Request D. Spitzer, M. Ryterski, C. Gibbs, K. Stremmel F. Buetler, E. Hernandez, B. Ledger Thursday 06/03/93 @ 0800, 0830, 0900, 0930, and 1300, 1330, 1400, 1430.
26. Please provide the relay setting order (RSO) calibration data sheets for all 50/51 relays fed from ESF BUS 141.
27. Please provide the calculation for the two 1A diesel fuel transfer pump thermal overloads.
28. Set up meeting with Trng. Dept. to discuss trng. provided to engineers (i.e., B. Pirnat) best time today (Wed.) or Fri. a.m. Also, wants to review trng. records.
29. Please provide the relay setting order sheets for the last time. The 1A & 1B diesel generator reverse power relays were calibrated.
30. Please provide a copy of the last preventative maintenance activity performed on the Unit 1 inverters.
31. Please provide the last copy of breaker preventative maintenance (PMs) performed on the containment spray pump 1A, RHR pump 1A, safety injection 1A and ESS. Service Water Pump 1A.
32. The schematic and wiring diagram for the AFW pump 1B panel designate fuses F2 and F4 as 10 amp and F5 as a slug; however, we observed a 3 amp fuse in F2, a slug in F4 and a 10 amp fuse in F5 - Where is there a difference?
33. Please provide the post modification test for Mod M6-1-87-124.
34. Please provide a copy of the post modification test for Mod M6-1-86-164.
35. Please provide a copy of the post modification test for Mod M6-1-87-132.
36. Please provide the last two calibration data sheets for the AFW diesel level switch 1LS-D0031.
37. Please provide the procedure and the data sheets for testing of all the thermal overloads on MCC 131X1.
38. Does Byron Station have any DVRs or LERs on diesel generator starting air (none were found in EDSFI DVR books provided to inspection team)?
39. Wants to talk to DC system engineer on 1 hour bus work is setup for batteries, 2 replacement schedule for batteries.
40. Follow up with Max on documenting of required reading (Bill Pirnat to meet with Max in TSC at 11:00 tomorrow 06/03/93).

41. Omar would like clarification on questions 50 and 54 of the 101 questions. He thought question 50 info was for Braidwood only.
42. He was unable to locate the relay house ventilation. He would like another tour of this.
43. He wanted to know if there have been any faults in the switchyard that would show up on the oscillograph.
44. Requested the following system acronyms: Diesel Generator (DG), DG Lube Oil (DG), Diesel Fuel Oil and Transfer (DO), Essential Service Water (SX), DG Room Ventilation (VD), Starting Air (SA/DG), DG Jacket Water (DG), DG Combustion Air Intake etc.
45. S&L calc BB 08.194 ATD-0196, dated 2-2-93 states useable volume 22,868 while BTC-1 shows volume of approx. 24,000. The two numbers don't agree, why? (Stated as a potential Tech Spec concern)
46. 141 Switchgear room seismic concern. - Provide procedure for controlling chocks under GTD's and other rolling equipment-and-procedure for EO cabinets in switchgear room.
47. 1DC12J - One side unlocked. Why?
48. Would like to talk to someone knowledgeable about calculations used in the design of the DC battery and inverter systems.
49. The answers to the 101 questions occasionally refer to "calcs to be provided later". Some of these calcs cannot be located in the material provided the team in the 1SC. Mr. Deinha will be happy to explain which questions he is referring to.
50. Please provide completed copies for testing of all breakers on 125V DC distribution panel 111.
51. Please provide completed copies for testing of all molded case breakers on MCC 131X1.
52. The switchgear rooms and DG rooms have open five dampers: Have these rooms been reviewed for potential flooding from pipe breaks just outside or near the open damper?
53. Switchgear Panels - LOCAL/REMOTE switch: If the switch is in LOCAL, is this alarmed in the main control room?
54. Provide copies of the last two (2) Quality Assurance inspections of Training Department operations/records. [Specifically addressing Tech. Staff Training program]
55. DG 1A skid mounting bolt below L10, near turning gear motor: 1) How long has the oil soaked rag been stuffed in the hole? 2) What is causing the oil leak? 3) When will the oil leak be fixed? 4) Could the oil soaked rag become a fire hazard?
56. Provide a copy of the inverter sizing calculations for Inverters 111 and 113 (both are safety related).
57. Provide the document (e.g. calculation, table, etc.) used to identify the loading on 120V AC Instrument Buses 111 and 113 and associated subpanels (safety related and non-safety related panels). Should identify both individual loading and total bus loading.
58. Provide a copy of the battery sizing calculations for batteries 111 (safety related).
59. Provide a copy of the short circuit calculation associated with the Train "A" 125V DC Distribution System (Associated with Battery 111)
60. Provide a copy of the voltage regulation calculation(s) associated with the Train "A" 125V DC Distribution System (associated with Battery 111)
61. Provide a copy of the voltage regulation calculation(s) associated with the 120V AC Vital Instrument Channels I and III.
62. Provide the document (e.g. calculation, table etc.) used to identify the loading on 125V DC ESF distribution center Bus 111 and associated subpanels (safety related and non-safety related panels). Should identify both individual loading and total loading.
63. Provide a copy of the short circuit calculation(s) associated with the 120V AC vital instrument channels I and III.
64. Provide the original S&L equipment specifications for Battery 111, Battery Charger 111, Inverter 111, Inverter 113 and 120V AC Instrument Buses 111 and 113. Copies of specifications should include any manufacturers fill-in data.
65. Provide original equipment specification and manufacturer's technical data for the 480/120V AC constant voltage transformers (10kVA) providing alternate power to 120V AC instrument Buses 111 and 113.
66. Please provide completed surveillance tests performed in accordance with T.S. section 4.8.4.1.a.(2) for all circuit breakers tested during the last 18 month surveillance.
67. Please provide completed surveillance tests performed in accordance with T.S. section 4.8.4.1.a.(3.) for fuses tested during the last 18 month surveillance.
68. Please provide P&IDs for starting Div 11 DG 1A starting air, lube oil, jacket cooling water, HVAC (Switchgear Room, Battery Room DG Room) combustion air intake and exhaust, essential service water required to support other EDS equipment.
69. Provide detail information relative to the scheme utilized to trip one unit at byron to preserve system stability (re. UFSAR par. 8.2.2, Page 8.2-5)
70. Modification Pkgs (call him with size of pkg prior to copying) (1) M6-1-91-618 jacket water cooler (2) M6-1-92-667 jacket water (3) M6-1-89-650 starting air receiver relief (4) M6-1-93-832 fuel oil drain line supports.
71. Provide a copy of IEEE STD. 946-1985 which is referenced in S&L calc. no. 4391/19D-3 (125V DC battery charger sizing calc)
72. Section 8.3.2.1.3 of the FSAR indicates that 125V DC isolation is accomplished at Byron via 2 fuses in series versus at Braidwood where 2 circuit breakers are used is series. Why is there a

difference in how isolation is accomplished?

73. He requested a meeting to discuss voltage regulation at Byron, voltage studies, setting of degraded voltage relays, conservation of grid voltage, ability of safety related equipment to tolerate degraded voltages.

74. Provide copies of ANSI N-195 and procedure 1BOS 8.1.1.2.a-1.

75. Would like to tour DG rooms with system engineer.

76. Provide following procedures: BTP 300-11, BTP 400-10, BTP 400-13, BTP 400-17, BAP 500-18 & BTP 300-21 Revision 6.

77. Gave Bob Mods M6-1-88-003 & M6-1-89-021-F1 for review along w/copies of monthly & bi-wkly mod status books. AR-3 relay Replacement Mod. Bob wondered what status of similar mod is at Bryon and is planning on asking Braidwood. I did not know the Braidwood status.

78. Provide modification package M6-1-87-142, install cooling fans in inverter cabinets.

79. Provide latest calibration procedures and results for the DC voltmeter, monitoring DC Bus 111, located in the main control room.

80. Provide latest calibration procedures and results for metering located on Battery Charger 111, Inverters 111 and 113 and DC Distribution Center Bus 111.

81. Plant tour of Battery Room 111 indicates that Cells 1 thru 29 are connected to Cells 30 thru 58 via bus bar. This bus bar passes through the floor and does not appear to have allowed for shake space between the bus bar and the concrete. Provide seismic justification for design.

82. Provide copy of the last two Battery 111 service and performance tests, include the procedure, data sheets and strip charts (if applicable). Tech Spec 4.8.2.1.1 requirement.

83. Please provide copies of the last test for each of the breakers on load center 131.

84. Provide the basis for the DG post-LOCA loading on described in section 9.5.4.2 of the FSAR (first exception to ANSI N-195) has load growth affected the loading profile? Provide a justification for nonsafety related fill and vent lines to the storage tanks (second exception to ANSI N-195).

85. Please provide the data sheets for the last calibration of all 50/51 relays fed from Bus 141.

86. Provide a copy of system description for the 24 volt battery system associated with the diesel driven AFW pump. This should include the system's function(s) and description of operation.

87. Provide the minimum and maximum temperatures credited for Battery Room bulk air temperatures.

88. (1) Identify all 125V DC subpanels powered from DC Bus 111.
(2) Provide DC panel/breaker equipment specification(s) associated with the above subpanels and Buss 111 to verify .
(3) Short circuit interrupting capabilities.

89. Are safety related inverters 111 and 113 provided with protective circuitry which alarms and/or shutdown the inverter on certain off-normal conditions (e.g. low DC input voltage, low AC output voltage, low output frequency etc.)? Provide information describing these capabilities if any.

90. Provide a copy of the following IEEE standards associated with the sizing, maintenance & testing of Ni-CAD batteries:
(1) IEEE 1106
(2) IEEE 1115.

91. Provide the following associated with the 24V DC battery system for the diesel driven AFW pump:
(1) Load profile and battery sizing calculation
(2) Electrical schematic showing battery, control panel and loads.

92. 141 4kV room has "Black pipe under ceiling - what is it? Is it acceptable by design? Seismic? Should it be insulated? Condensation concern. - 6.9kV room same question.

93. Provide the story on delta P alarm on vent panel in 141 switchgear room Laundry Tag H-0808.

94. Provide annunciator responses for bus degraded voltage.

95. Provide copies of the DC voltage drop calculations associated with the 480V and 4.16KV switchgear (safety related) control closing/tripping circuits fed from DC Distribution Bus 111. These circuits were not addressed in Calc. No. AQ-72.

96. He requested the Hi/Lo Alarm setpoints on the ESF Battery Rooms along with copies of EA Round Sheets where temp. is recorded (Fred Buettler is gathering this and will give to J. Phelan when he has it).

97. He would like to discuss HVAC calc's: (1) BB 08.015 VD-103 (2) BB 08.023 VD-400 (3) BB 08.018 VD-800 (4) BB 08.078 3 CB-01.89-001 during the week of 06/14/93 with Sys Eng and HVAC Corp Eng. type.

98. Would like clarification on Question 7 - Where is the transient data? Questions 28 & 35 - He would like actual calcs to take with him today.

99. Provide Specification for Inverters & Instrument Buses (See N-165).

100. Wants to know if there is any fault interrupting capability between the 24 Vdc battery on the AF pump and its load.

101. Wants to know how 480 V ESF MCC feed to inst. cabinets works to supply inst. loops when the normal Inst. Bus 111 or 113 is de-energized.

102. Question 86 of 101: 2nd page of response talks about DG exhaust stacks being vulnerable to tornado missile impact and ↑ pressure causing rupture discs to burst. This would allow continued operation of DG. He wants to see documentation to support this statement and calcs to verify adequate flow rates (someone to talk to him week 06/14/93).

103. Is the output voltage regulation checked for the safety related inverters as the input voltage is varied from 105 to 140 Vdc?

104. Question N-164: Fault current from the inverters is not the primary concern. The primary concern

is the available fault current from alternate power sources to the 120 V. AC instrument buses.

105. Ref DWG 6E-1-4030A Relaying & Metering Diagram for 1A DG drawing appears to be in error. Phase B&C are transposed on differential protection relay primary side of current transformer. He doesn't see the corresponding transposition of the secondary side of the current transformer.

106. For loads powered from DC Bus 111 and which use a short ckt protective device such as bkr or fuse, has a short ckt analyses been performed to ensure that 1) the actual short ckt current doesn't exceed device rating? 2) Efficient short ckt current will occur to actuate device? If so, please provide analysis.

107. For battery sizing calc D-21 address the following assumptions and inputs.

108. Provide root cause analysis of incorrect fuses found in AF pump control panel.

109. DG Loading Questions:
- Do unit substation transformer losses include inloading?
- Are cable losses included?
- Are random losses included? i.e. loads that are not constant like thermostats.

110. Outstanding question from Friday mtg with Phelan on degraded voltage: in the voltage study, voltage condition at 120V system, loading was determined by field measurement. Is the existing condition (measured) equivalent to the LOCA loading?

111. Reference S&L calc AQ-71 Rev 0 Dated 4/27/93 on voltage surges Q=1.8 (1) Is 1.8 fully applicable? (2) Define "Appreciable Loan". (3) Is the no load condition considered? (4) What is the definition of Category I equipment?

112. Question outstanding from Friday mtg with Phelan on degraded voltage: Verify adequacy of 5 minute timer for degraded voltage relay. Voltage could drop very low during 5 minutes. Would equipment remain operable?

113. Battery calc D21 P50 references
(1) ref. K "Notes of Mtg. dated April 29, 1977 file 7A book 1
(2) B/B Tech spec amendment 39 (Byron) and amendment 26 (Bdwd) spec 3/4.8.2, crosstie & temperature restrictions. Please fax the references. Fax #508/879-3291.

114. Provide 125V DC Bus crosstie operating procedure.

115. Are DC Bus unit tie breakers locally operated or can they be operated remotely (from control room)? How are tie breakers administratively controlled?

116. 125 Volt Battery sizing calculation D-21 uses 132.63 amps/positive plate for capacity factor Rx for the one minute rate, however GNB discharge characteristic curve for NCN cells indicates a value of 99 amps/positive plates provide explanation.

117. Provide bases for 125V DC system 63 amp crosstie load.

118. Provide purchase specification for NCS-1200 batteries.

119. Provide original FSAR Chapter 8 DC system load table and narrative section.

120. Provide original battery (Class 1E 125 volt) sizing calculation in order to verify original design credited shedding of inverters after 30 minutes.

121. Provide a copy of procedures BAP 299-TS-03, -04 and TSM 800-5.

122. State the procedural guidance or operator actions required to restore power to a de-energized ESF bus following entry into BEP-0, Rx trip or safety injection, step 3.b; Assume, EDG for that bus is unavailable.

123. DWG 4030AF12: If Fuse F1 [FU-1] was open, when would it be detected and how?

124. Provide the following drawings E-1-4030DC15, E-1-4030DC19, E-1-4030EF01, E-1-4030DC17, E-1-3997.

125. Please provide copies of the last two PM's for a 345kV OCB (for only one breaker of this type).

126. Please provide copies of the last two PM's for a 345kV ACB (for only one breaker of this type).

127. Please provide the complete modification package BM6-1-88-23 Relocate DC-AF-067 aux feed diesel driven pump lube oil pressure switches.

128. Need copy of pre-op test of inverters. When AC turned off to inverters, DC feed to pick up inverters.

129. Wants to know where the surveillance for DG overspeed trip is verified. Reference T.S. section 4.8.1.1.2.F.6.c. (Elmer Hernandez and Terry O'Brien were contacted to provide an answer, which I provided as referenced below).

130. The required was for the calculation which shows that with the tygon hose, level indication on the DO tank that the T.S. 44,000 gallons of DO is satisfied.

131. The inspector requested a description of the temporary alteration process.

132. Provide copy of the following mod packages M6-1-87-166-A1 (DC# DG-088), M6-1-88-6 (DC# DG-061).

133. How do you satisfy the requirement of TS 3.8.1.2 when performing surveillance 1BVS 8.1.1.2.h.1-1; specifically, the one operable EDG (44,000 gallons of fuel) requirement doing modes 5 and 6?

134. Response to question N-159 included battery sizing calc, the calc seems to be missing pages 159-199. Provide missing pages.

135. If the tygon tube is used to measure DO tank level why do we still have 93.8% in the operating surveillance for DO tank level?

136. Question T-185 was answered for vent lines only. It needs to also be addressed for fill lines.

137. Operating rounds for Daily, Weekly, Monthly surv. for relay yard. DC Batteries (completed surveillances - most recent).

138. Relay house batteries need copy at quarterly, 18 month surveillance. Execute copy.

139. Need copy of vendor manual 345kV ACB.

140. MCC131X1 Cub F1 on 1-4008C shows a spare EPN book shows as DSX1165A.

141. What is the maximum voltage dip experienced upon a LOCA load or other load simultaneously applied to the SAT's? Is the voltage dip within acceptable limits?

142. Please provide a review copy of the 4.16kV system neutral grounding design calculations, including EDG neutral grounding.

143. (1) Refer to questions T-207 and N-160: The responses to these requests provide only a partial verification of short circuit evaluation for the 125Vdc system. Please verify whether short circuit analyses to verify interrupting capabilities has been performed on interrupting devices associated with the loads for buses 111 and 113. (2) Also how is coordination between load interrupting devices and upstream devices ensured?

144. Provide installation details (physical drawings) showing the bus bar/cable arrangement between individual tiers of battery banks and between the battery and its associated DC distribution panel. Also explain why this bus bar/cable design was used.

145. DWG 4030-AF12: Why doesn't the diesel AFW pump have a power monitor circuit for fuse F1 [FU-1]? The "Engine Ready to Start Light" does not monitor the actual starting circuit. Could this be a design weakness? You could go a month with a blown fuse.

146. Relay house battery charger is it tested on schedule frequency?

147. FSAR Question Page 8.1-7, need copy of print showing two trip coils for each bkr.

148. Refer to questions N-159 and N-217: Per discussion with K. Uhlir provide clarification of the basis for battery sizing as relates to licensing commitments, calculations, plant procedures and Tech Specs. Also how does this relate to crosstie capability?

149. Refer to assumption B in Section IV (page 14) of calculation No D-21 (battery sizing) - What is the basis for assuming that no lock-out relays operate? Lock-out initiation is typically initiated during the scenario defined in the calculation. Typically a unit trip will cause the initiation of various lockout relays.

150. The fuel consumption curves submitted in response to NRC question #78 appear different than those used in a recent fuel consumption calculation. Please provide an explanation.

151. (1) Provide a copy of your RG 1.97 submittal (post-accident monitoring) including associated notes and exceptions. (2) Also provide a copy of NRC's safety evaluation for your RG 1.97 submittal.

152. Single cell test perform on switchyard battery. Need copy of SPP on procedure (bite test).

153. How "rare" are voltages lower than minimum (re UFSAR 8.2-8)? What is plant safety system response to low voltages? How low can the voltage be at these "rare" contingency events?

154. Are there any postulated conditions for backfeeding plant aux systems via step up transformer?

155. Please provide stability studies to cover contingencies not included in question N116, including verification of frequency decay rates.

156. Please provide ground grid resistance value.

157. What are the recommended vendor pm frequencies for a 345kV OCB and ACB.

158. Please provide the calibration data sheets for one trip circuit of a 345kV switchyard breaker (protective relay package).

159. Please provide the relay metering diagram for the protective relays which operate the trip coils of the 345kV breakers.

160. Reference procedure BOP DC-7 Rev. 2 attached to request #N-216 - What was the basis for the 20 volt value identified in step F.1.a of this procedure?

161. The questions were all in the general area of document control.

162. Copy of BAP 1260-3 (Vendor Information Notices) and copy of a VIN (Cooper-Bessemer/Service News Bulletin 748A, 734) was requested.

163. If one EDG is being tested in parallel with the grid, how is EDG bkr tripped on loss of offsite power? Indicate whether tripping will occur in a time short enough to start redundant EDG.

164. He wanted to see the actual short circuit calc for Byron. Ref Question N-199. I set up a meeting with Dean for 6/15//93 12:30.

165. Provide short circuit (SC) calc's for AC systems fed from MCC's thru step down transformers (not in ELMS).

166. How does ELMS short circuit calc interface with relaying setting calcs?

167. SAT impedance calculations for input into ELMS report #SL 124 No. 7,8,9, and identification of base KVA.

168. Please provide input data for ELMS short ckt calc from 345kV down to 4.16 kV, include unit subs.

169. Investigation of SC duties when SAT crossties are utilized.

170. Confirm that ELMS does 30 SC fault calc's.

171. Refer to Table TL and reference "X" of calc. no. D-21 (Rev. 2) - Both of the above indicate a diesel generator field flashing current at 140V DC of 1.54 amps. Provide the following:
(1) S&L letter dated 4/28/93 referred to in reference "X"
(2)Diesel manufacturer's description of field flashing operation including any schematics.

172. She wants to know the correlation between the inches from centerline setpoint to gallons of oil in the diesel oil day tank 1DO02TA. (reference level switches 1LS-DO033, 1LS-DO036 and 1LS-DO034, 1LS-DO037).

173. Why was calculation VE-403 performed, the calc shows the average temperature in the battery rooms during the year? Battery life?

174. The inspector requested the heat capacity verification calculation VE-850. What is the purpose of calculation VE-402. (temp vs time profile without fans operating during a loop) 130°F room temperature is the max temperature calculated. How is this used?

175. Provide a copy of the following modifications: M6-1-91-716 (degraded voltage relays), M6-1-92-632 (xformer tap changes).

176. Question on justification of Midget MOL3 & Reliance MOL-3 fuse for use in place of Bussman BAF-3 observed in MCC231X1 inspection.

177. The calculation for electrical loading of the EDG indicates a higher level of loading than the fuel oil consumption calculation. (Ref. Question T-5) Please clarify the discrepancy.

178. In the calculation for seismically qualifying the batteries and attached bus bar, for the cable penetrating the floor, 1/2 the load is applied to the battery terminal where is the rest of the load applied?

179. How are IE systems affected by the voltage depression (voltage sag) that would occur if non IE systems experienced a fault? (Particularly for non IE loads on IE buses).

180. See attached concern #1 on slug found in 1B AFW diesel pump local panel fuse block.

181. See attached document concern #2 on lack of short circuit analysis for 125Vdc loads.

182. Question 77 requested six (6) oil sample tests only 4 were provided. Also some of the tests provided indicate an "F" under sediment and water & by volume. How do we know the FSAR criteria of .5% is met?

183. MCC131X1, Cub A2, had 6 amp fuse should of been 3 amp fuse, feed thru for breaker for penetration FSAR 8.1-20(b) shows 3 amp. What justification for response.

184. Please provide short circuit duties when one SAT feeds both safety buses - 141 and 142 (links relocated).

185. Please advise on the possible voltage depression that would occur upon bkr. failure to load shed upon initiation of an automatic transfer. Concern is with voltage excursion tolerance (FSAR p8.3-5)

186. The inspector requested a copy of executed SX flow balance surveillance.

187. The inspector requested any LER's or other deficiencies on the EDG due to high jacket water temp. He also requested system descriptions for SX and jacket water. Additionally DG jacket water monitoring data was requested.

188. Follow up to question T-212: The no load condition is more restrictive than 20-30% load. This affects the selection of Q. Would like follow up on this.

189. Follow up to question N-199 on DG transient loading:
1) He would like clarification on graph BVS 8.1.1-13
2) Test does not apply to LOCA condition
3) What is the impact of high voltage on equipment?

190. Follow up to question N-242:
1) The maximum voltage dip does not require a transient analysis.
2) He would like clarification on Mike Reed letter, page 2. Paragraph starting "Block starting...".
3) Fast BVS transfers on unit trip is not the same as a LOCA condition. This question wasn't on fast bus transfers.

191. The inspector requested a copy of the SX single active failure analysis which was performed in response to GL 89-13.

192. Follow up to question T-210:
1) Will info provided as response to Question 7, replace UFSAR Table 8.3-5?
2) When will UFSAR update be done, if so?
3) In written response, 2nd paragraph is OK for steady state but how about transient voltage dip?
4) 3rd paragraph - How about other motors starting?

193. Identify the heat load values from electrical equipment calculations 439V19A1-11,12,13 which were used in ventilation sizing calculations VX-100 and VX-101.

194. How do you meet the requirement of TS 4.8.4.1.a.b with 1BVS 8.4.1-a.1 (It wasn't obvious that you perform integrated system functional test on selected 6.9 KV + 4.16 KV circuit breakers).

195. Need graph or curve for comparison of MOL3 + BAF3 fuse.

196. FSAR 8.1-13 on what is normal line-up for 1SI8802A, 1SI8806, 1SI8809A, 1SI8812A, 1SI8814, 1SI8835, 1SI88-0, 1SI8920.

197. Calc. 4391/19AN-S fails to include the bases for settings of relays 27/59, 81, 59G, 32 and 51. Also, no calculations were included to show proper CT burden for 87 relay. Can these calc's be provided?

198. Provide technical basis/calc's to substantiate EDG vendor information that generator can sustain a 10A ground fault indefinitely. Consider the possibility of arcing faults. Re: Calc T-1.

199. DG neutral grounding could impose a load of I^2R = 24kW on diesel. This load was not shown on EDG loading tables/calc's. Please investigate and advise.

200. No calculations of settings were included in calc 19AN-3. Please advise whether they exist elsewhere and provide for review if so.

201. Relay settings were made in reference to a sustained sub transient EDG short circuit contribution. This is not correct in that the current will decay per ckt. time constant. (Ref 19AN.3).

202. Calc 19AN-3, p.12 shows DC pick up at 125% for motors. This setting may allow for undesirable trips under highest voltage and service factor conditions. (ex. V=1.1, SF = 1.15 - VxSF - 1.265)

203. Requested a copy of the last calibration for 1PSL-AF142 & 1PSL-A143. she also requested vendor manual information on setpoints for these switches. Supplied her with a portion of F-0459 which

spelled out the setpoints we use. Field walkdown proved no head correction required.

204. What are the lowest and highest temperatures recorded in the battery rooms as documented in BOP-199? What is the vendor recommended lowest temperature for the rating of the batteries?

205. Do we have alarms on DO tank level? If so, what are the setpoints and how effective are the alarms with the new information available about instrumentation concerns?

206. Are EDG combustion air intake and exhaust and DO fill and vent lines seismically qualified in addition to tornado qualified? Additionally, are all SA, DG (jacket water & lube oil), VD, VE & UX seismically qualified.

207. Sequencing of loads onto diesel. Does Byron test relays? (Eagle relay)

208. Follow up to question N-199: Is any trending done on parameters for BVS 8.1.1.f-13? i.e. time between starts.

209. Follow up to question N-199: Is there a procedure that demonstrates the setting of the D/G voltage regulator at 4160 volts?

210. Discuss which items in the Diesel Oil OE 40.1's represent commitments by the station.

211. Describe which items in the root cause of fuse discrepancy represent NRC commitments.

212. Provide vendor information for EDG exciter & volt. regulator.

213. Please provide copies of technical manuals associated until the safety related 15kVA Westinghouse inverters.

214. The warmest temperatures recorded in areas cooled by VX, VE & VD. Have there been any days where UFSAR temperatures were exceeded, if so provide copies of any evaluations performed. How frequent are temperatures measured.

215. For the inverter cabinet areas, when temperature limits were exceeded what evaluations were performed (i.e. EQ, operability)? Please provide copies of these evaluations.

216. In response to question T-278 it was presented that the difference in the diesel loading in the electrical calculation and the diesel loading in the fuel consumption calculation is that operators will switch off electrical loads. However, why is the loading different ATT = 0.

217. How does procedure BZP 100-2T relate to the emergency procedures. What is the date of rev. 5 of BZP 100-2T?

218. Refer to calculation No. AQ-66 (inverter loading) - Please provide section XI references 17, 19, and 21 (as applicable) which support the loading for inverter 1IP05E for circuit breakers 1,2,3,5,9,12, and 16.

219. Please provide standing order for purchasing fuel oil in case of emergency indicating expected delivery quantities and times.

220. Please provide the sections of the SER including questions and responses which address your commitments to the NRC regarding fuel oil storage tank capacity length of run time without refueling and other relevant information.

221. Please provide the section of the SER, including questions and responses, which describe your commitments regarding EDG starting air.

222. Bob would like to look at the now degraded voltage relays. Please have someone knowledgeable take him there (he has been reviewing mod package).

223. Bob would like to hear about our IRP process. Cathy Kudalis will discus @ 13:00.

224. Provide historical information (e.g. incident reports, safety evaluations, mod package narratives) describing the problems encountered with the Byron safety related inverters and the measures taken to identify the cause(s) and correct these problems.

225. Please provide short circuit calculations for loads off MCC's at voltages below 480V. (Re. response to question T-266) with IE systems, documentation of adequate design must be provided.

226. The inverter tuning procedure BHP 4200-105 requires the inverters to be set at 117.7-122.1V. During troubleshooting (CM) of the inverter this morning the output voltage was raised to 117.5 volts - is this acceptable?

227. Follow up to question N-270. He would like formal documentation of this calculation.

228. Requested executed copy of surveillance on bus undervoltage relay on Unit 1 4KV.

229. Follow up to question T-264: He would like a meeting to discuss:
1) How is the 1412 breaker tripped?
2) How long does it take for DC (51) or UF (81) relays to trip?
3) Cogenerator tolerance time in 2) above?
4) Please show him the 86 lockout relay trips & EDG trip schemes.

230. Provide additional EDG fuel oil sample results for all DO EDG tanks. Verify all T.S. oil sample requirements are met.

231. Provide a copy of DCR 88-060 (DG piping downgrades).

232. Provide data on Nuclear experience of System Engineering groups: Nuclear Group, Safety System, Secondary System, Aux System, Performance Monitoring, Electrical group (this might be average experience level or a listing of sys. engrs and their experience in years).

233. Bob would like to review administrative controls on mod testing. KWP will review this with him at 11:00.

234. Provide DG, VE, VX & VD system descriptions. Instrument setpoints for fan and damper controls for VE.

235. Please provide: 1) DG sequencer test procedure, 2) frequency of the DG sequencer test, 3) DG sequencer calibration procedure & results and 4) any trending of DG sequencer timers.

236. How does 1BOS 8.1.1.2.a-1 satisfy the ISI requirements for the DG air receiver check valves?

237. What are the IST requirements for the air receiver check valves? Also, identify the system (safety-related) boundary for the DG air start system.

238. Refer to Section IV-D (assumptions) of calculation AQ-66 (inverter loading) - Provide documented evidence supporting the selection of the valves of power factor identified in this assumption. Assumption implies that these valves were based on review of operating characteristics of similar types of devices.

239. Refer to calculation AQ-66 (inverter loading) - Section V "Acceptance Criteria" indicates that steady state coincidental loading is the only concern, why wasn't inrush loading reviewed during the development of this calculation?

240. Please advise on the ability of the diesel engine and generator to ride through the load step imposed by a loop when EDG is paralleled with the grid and in test (Ref: 1-264).

241. Calc AN-28 did not take into account the computational error of calc AQ63, which was performed to determine the allowable value of switchgear voltage (3793.3 volts).

242. Feedback on response to question T-211; "Loading of 120Vac Distribution Transformers", calc AQ-69, the justification for the loading is subjective, there are no assurances on any objective evidence that LOCA loads are below estimates.

243. Provide PIF program data for 1992 & 1993.

244. Provide copy of IEEE-1106.

245. Provide copies of onsite reviews for DC bus 211 grounds.

246. Provide copy of vendor manual for DC bus 111 distribution panel breakers.

247. Provide volt vs ohm curve for DC ground detectors.

248. Provide maintenance memo for DC grounds.

249. Is the 125Vdc unit crosstie a single conductor or multiple conductor?

250. Provided information to support 20kA interrupting rating of the Westinghouse LA molded case circuit breaker used is the 125 volt battery charger output breaker.

251. Provide schematic diagram for the Unit 1 Div I 125 volt battery charger and Instrument inverter.

252. Provide DWGs and information depicting physical location of fuses between 125 VDC bus 111 and bus 113.

253. Several cable lengths for Braidwood Unit 2 identified in calculation D-25 are significantly longer than Byron 1&2 and Braidwood Unit 1. Specifically DC002, DC012, DC195, DC0[illegible] and DC196 (see pg 7-8 of D-25). Why? Also DC002, inter rack connection for 125 Volt Class 1E batteries seem quite excessive. How were these lengths determined?

254. Discuss the status of the AR-3 relay modification at Braidwood with Bob Winter.

255. Discuss the impact of Diesel Oil QE 40.1 recommendations on station operation.

256. Discuss education and experience levels within Braidwood engineering groups.

257. 125Vdc Ground Detection operating procedures and calibration procedures per D. Butler - Braidwood procedures.

258. Provide copies of IEEE Std 279 and 379.

259. Provide basis for acceptance of lack of supervision of DG bkr closing ckt (fuses may blow without giving any alarm). Check the compliance with single failure criterion.

260. Scheduled meeting with Tech Staff training program representative at 12:30 p.m. to review training material (Lesson Plans/Handouts) and record for qualification program over the previous three year period.

261. Please provide current transformer burden evaluation for 1200/5 ct's on diesel gen 2B DC, relay circuit and relate to requirements on CT accuracy.

262. Please provide current transformer burden evaluation (to check CT accuracy) for SAT 242-2 feed to 4.16kV bus 242, CT 1200/5 (re: DWG 20E-2-4018B).

263. Electrical Sys. Engr. interviews - request 3 sta. support eng. personnel responsible for electrical oversight and 3 sys. Eng. personnel responsible for electrical oversight for Thursday, 7/1/93 @ 1800, 0830, 0900, 0930, and 1300, 1330, 1400, 1430. Also, include one (1) supervisor from each group.

264. For 2TIC-VE003: What is function?, Why is setpoint set at 150°F? What is basis for setpoint? and What happens at 150°F (i.e. Alarm etc.)?

265. What were battery room 211 and 212 temperatures prior to temporary fan installation on 6/28/93?

266. Does Braidwood have plans to install additional inverter cooling and/or room cooling? (Byron has A/C unit to cool inverters). Why difference?

267. Instrument power design, Why no auto transfer to constant voltage transformers on inverter failure?

268. Please provide individual cognizant on inverter failure history. - Norm wants to talk to someone who can present history of Byron/Braidwood inverters. Including problems - failures - W recommendations - future plans. Team has cooling concerns.

269. Do we have any internal panel temperature readings for inverters?

270. Why is Unit 2 channel 3 inverter output reading ≈ 20 amps when all other channels read ≈ 40 amps? and Why difference in values?

271. Provide setpoints for DG storage tank alarms and switches (this information was not included as part of question N-81).

272. What are the low temps experienced in the Battery RM 212 during last winter? How do you regulate the BAT RM between 60-108°F? How do you monitor low temp in the BAT RM? Do you have any alarms (local/remote) for Hi/Lo BAT RM temp?

273. Question N-320 asked for the standing order for purchasing fuel oil (purchase oil agreement). The

response did not provide such information. Please respond. Provide copy of purchasing agreement with local distributors.

274. Question N-316 asked for the evaluations performed when inverter temperature limits were exceeded. The response provided info. on battery rooms but not on rooms where the inverters are located. Please provide information.

275. Mr. Bailey would like to review any "corrective work performed within the last 24 month period relating to 211 & 212 batteries, battery chargers, inverters.

276. Mr. Bailey requested copies of the last four (4) surveillances performed on the 211 & 212 battery & charger. Particularly interested in the recording of the battery parameters. Surveillance in question is BwOS 8.2.1.2.B-2.

278. Provide timer tolerances used in eagle signal timer calibrations (reference question N-336).

279. Mr. Traiforos requested the ELMS EDG Loading Totals for the Braidwood EDGs.

280. Provide alarm/trip settings for the following: 1) DG engine lube oil, 2) Turbo charger lube oil pressure, 3) Bearing temp, 4) Engine vibration, 5) Loss of field, 6) Crankcase press 7. Generator differential, and 8) Jacket H_2O temp.

281. Provide the setpoint tolerance for the 2B DG starting air receivers relief valve setpoint and for the 2B DG Air Compressor Hi pressure stop setpoint.

282. Mr. Winter would like to look at the station thermography program on 6/30/93.

283. Mr. Winter has requested an appointment with the Qual. Verification Dept. to look at and discuss electrical items on 6/30/93.

284. Provide a copy of electrical penetration qualification test documentation demonstrating compliance to IEEE 317 (1972). Also provide a copy of IEEE 317 (1972). Test documentation should include both Conax and Amphenol/Sams Penetrations.

285. Please provide copy of DC cable tabs for use. Integrated in cable type-size-routing.

286. DWG 20E-2-4030DG02: Please clarify function of 486-2424 contact in coil ckt of relay DG 2 BAL.

287. Provide the plant response to a situation involving a LOOP and LOCA (coincidental) when one EDG is in test and in parallel with the grid.

288. The inspector needs copy of the daily surveillance record for the D.O. storage tanks. She would also like a copy of the associated procedure which shows the minimum level acceptance criteria for these tanks.

289. Calc 19AN4, pg A11, exhibit 4, control room chiller, provide relay setting table (missing from corresponding calc). Clarify if the relay changes do not apply to Braidwood, why not?

290. Review of question N-315 (temperature data for Byron in VX, VE & VD areas during 7/1/92-8/31/92) indicates measured temperatures substantially lower than expected. For example 90°F in MEER roughly corresponds to 80°F. Please explain.

291. Please provide surveillances of temperatures recorded at Braidwood in areas cooled by VX, VE and VD during 7/1/92 to 8/31/92. What are the warmest temperatures recorded in these areas and outside air temperatures? Have there been any days when UFSAR temperature limits were exceeded? Provide copies of any evaluations performed. How frequently are temperature measured?

292. Provide copy of ANSI N-195 that Braidwood is committed to.

293. Provide the table from ASHRAE that provides the basis for the design summer outdoor temperature for Byron & Braidwood of 95°F.

294. How are informational notices from vendors, such as Westinghouse, or from other regulatory agencies, received and tracked at Braidwood Station? What computer data bases are used for this purpose? Who is the coordinator for this at Braidwood Station?

295. Provide a copy of the last two Quality Assurance (QA) audits that addressed Tech. Staff personnel training program and performance in their job.

296. Mr. Traiforos requested additional information on question N-332.

297. Is Braidwood committed in whole or in part to RG 1.75? Provide a copy of commitments and/or exceptions to the Reg. Guide.

299. Provide manufacturer's data on new round cells.

300. Identify the power supplies for the MEER ventilation auxiliary fans and the (Byron) spot coolers. Are they fed from a safety relate power supply fed from the diesel generators?

301. Requires Alarm response procedures for MEER high temperature alarm

302. Mr. Bailey has asked to walk down Temp Alt's 92-2-005 (Aux Feed Diesel) & 93-1-007 (TERtd411B) Thursday morning at 10:00 a.m.. Both of these are for jumper installations

303. There is a large discrepancy between the results of 4391/10A1-15, Rev. 4, 6/30/92 (heat loads of electrical equipment in MEER rooms) and VE-800, Rev, 0 8/2/85 (heat capacity ventilation for MEER ventilation system). The substantially smaller loads and temperatures in VE-800 have been used to demonstrate ventilation effectiveness. No effort has been made to reconcile the results of the two calculations. Justify the use of VE-800 versus 4391/10AJ-15. Identify any unwarranted conservatisms in 4391/10AJ-15.

304. DWG 43030DC01 for the 125Vdc battery chargers. Is any surveillance/calibration performed to verify the tripping and time delay function of charger A-C input breaker? Provide the applicable procedure.

305. DWG 40301PD1 for the 7.5kVA safety related inverters shows an overload tripping relay (device CSRT). Is any surveillance/calibration performed to verify the tripping and time delay function of this relay? Provide the applicable procedure.

306. In reference to question N-628, you provided WR A41960 in which the DG compressor would not stop

because relief valve kept the press below the auto stop press. It appeared that the tolerance for the DG compressor stop setpoint still overlaps the relief valve setpoint. Please provide justification.

307. Mr. Butler requested information on the EDG Diesel Oil Storage Tank Low Level Alarm Setpoint. Specifically what is the low level setpoint and is the setpoint over the tech spec 44,000 gal level.

308. Mr. Winter will be going with a Q.V. inspector tomorrow morning to observe EMD troubleshooting a battery charger.

309. Mr. Winter wants to meet with the station PADS coordinator tomorrow and discuss the stations' PADS program.

310. As referenced in question N-627, the turbocharger low lube oil pressure alarm/trip of 32 psi is different than the data provided on the general data sheet of 30 psi. Please provide explanation of this setpoint change.

311. See attached concern #3 on calculation weaknesses.

312. See attached concern #4 on failure to consider decrement EDG fault current contribution.

313. See attached concern #5 on Byron Unit 1 EDG fuel oil storage tank capacity.

314. See attached concern #6 on design weaknesses in the MEER ventilation system.

315. 1) Requires copies of specific pages in the EQ binders (See attached). 2) Provide a copy of the electrical penetration spec. 3) Provide duty assignment of each penetration.

316. The current transformers that provide protective functions for isolating bus 242 (ESF) from bus 244 (NSR) are marked as being NSR equipment on DWG 20E2401BB. Appears to be incorrect.

317. Provide power supply for A/C units in Byron MEER (inverter rod drive).

318. Response to question N-637 provided temperature data for MEER Div 11 and 12 rooms and for outside ambient. When comparing the data taken on 7-13-92 with the data taken on 7-14-92, it is apparent that there is not a direct correlation between MEER temperature and outside ambient temperature. From this observation, how is it possible to accurately calculate the MEER electrical equipment heat load based upon heat balance equation $Q_{tot} = Q_{elec} + Q_{trans}$ stated in calculation VE-800 (bottom of page 21)? Explain the equation methodology and why it is conservative. Q_{elec} = 12,881 Btu/hr is calculated based on MEER room temperature, adjacent room temperature, and outside ambient temperature and is then assumed constant for calculating MEER temperature on a 95°F summer day. Using the above equation, it appears that Q_{elec} could be calculated to be significantly different depending on which day the test data was taken. Is this possible?

319. Bus 241, cub 15, 2A motor driven AFW Pump overcurrent relay on phases A and C appear to be set at 2. Phase B appears to be set at 11. Why is there a difference in settings?

320. At what voltage level is the voltage drop study performed for the 120V AC instruments i.e. is the base at 120Vac?

321. We are walking down relays on bus 242 & 241 in 4kV SWGR RMs. Mr. Mendez would like copies of the last calibrations for 50/51 relays, ground overcurrent, bus undervoltage & lockout relays to review against his walkdown data.

322. Refer to calculation AQ-72: 1. The lengths of the following cables in AQ-72 are not in agreement with the slice cable tabulation. Why?

2IP058	90 ft (in calc)	194 ft (in slice)
2IP060	50 ft (in calc)	80 ft (in slice)

2. On page 22 cable AF979 appears for all four units. This cable does not exist in the cable tabulation.
3. Calculation AQ-72 uses different cable lengths than calculation 19D-25.
4. How were numbers generated in Table 2 of calculation AQ-72?

323. Provide copy of last breaker surveillances and relay calibrations for buses 231X and 232X.

324. Mr. Mendez asked for copies of the last two discharge tests on Aux Feed Batteries 2AF01EA-A, 2AF01EA-B, 2AF01EB-A, & 2AF01EB-B.

325. Mr. Mendez asked for copies of the last two calibrations performed on the 2A & 2B DG sequencing relays.

326. Mr. Mendez asked for copies of the last two tests performed on Aux Feed Battery Chargers #2AF01EA-1 & 2AF01EB-1

327. Mr. Mendez asked for copies of the last two calibrations performed on instrument #2LS-DO031.

328. While walking down 2AF01J, Mr. Mendez asked to see the last test data taken on Agastat Relays K2, K3, K4 & K11.

329. Reference question T-609: Please note that the calculation of CT burden is required since the overcurrent relay is the back up protection for differential relay failure.

330. Reference question T-610: See attached sheet.

331. The inverter specification provides the minimum acceptable AC voltage as 420 volts. Provide the inverter response to system transient voltage sags such as those caused by faults or motor starting conditions, where voltage may be below 420 volts.

332. Is there a high level alarm on the fuel oil 7 day tanks? Reference ANSI N.195 Section B

333. Is there any auxiliary equipment permanently attached to the fuel oil 7 day tanks? Reference ANSI N-195, Section 7.3.

334. Refer to question N-663. Since the inverter units at Byron are cooled from A/C units powered from non-1E sources, are there plans to power these A/C unit from 1E sources?

335. Reference calc AQ-72 for 125V DC voltage drop. 1) Identify which solenoid operated valves are

located in high temperature ambient locations. 2) The calc does not address the impact of high temperatures on the operability of these SOV's.

336. Reference calc AQ-72 for 125V DC voltage drop the calculation does not address whether other worse-case conditions may exist at voltages greater than 105 volts. For example, at maximum system voltages what is the impact on self-heating and operability?

337. Mr. Winter wants to look at the station's self assessment program and would like to review the results of previous self assessments.

338. Mr. Winter wants to review the station's IRP program and talk to the person in charge.

339. Please supply last surveillances performed on the MCC breakers on MCC 231X1A.

340. Explain why the operator rounds and the electrical maintenance 18 month calibrations do not have the same inverter voltage output acceptable ranges.

341. Please provide information regarding the impact on Westinghouse inverter output given changes to loading, power factor (of loads) and inverter input voltages (AC and DC).

342. Doris needs info on the check valves leading into the DG air receivers. Are these check valves under any ISI or check valve program? If so...what? What,if any, are the surveillance programs and requirements?

343. Please provide test curves for a FH-30 thermal overload relay. This would be a generic question and not specific to any breaker.

344. Please provide copies of the last two surveillances performed on the AKR-50 breakers for DC bus 211 & 212 (2DC05E & 2DC06E).

345. Surveillance procedures 1BwOS 8.3.1-1 (Rev. 3) and 1BwOS 8.3.1-2 (Rev. 3). Please provide reference B.4. "PED letter of 4/24/84 from W.J. Groszko, PED, to D. Schroder Byron Tech Staff concerning instrument Bus voltage requirements".

346. Please supply test curves for breakers on MCC 131X1 & 131X1A. Cubicles in question are MCC 131X1 compt K1, & MCC 131X1A compt Q1.

347. Mr. Traiforos requested clarification to the response provided for N-317. Specifically, the basis and acceptability of the AFW pump flow listed in the DO 7 day calc at T=0.

348. Instrument power and inverter cubicle fan cooling modification MG-1(2)-87-142 approval letter refers to a "maximum outside hot spot temperature of 124°F." Does this represent MEER ambient temperature and where was the temperature measured? (location)

349. Compile the coldest temperature recordings in the MEER for the months of December 1992, January 1993, and February 1993.

350. In response to question N-223, please provide operator actions to perform the "Emergency AC restoration program" stated in BEP-0. step 41 and BES ES-0.1 step 9a (RNO column). Braidwood only

351. Provide documentation demonstrating that the electrical penetration thermal capability test data can be extrapolated as a constant I^2t.

352. Doris would like a complete copy of NWR A57210 on 0WO01CB control Rm chiller, Temp Alt 92-0-035, and should be given a current status.

353. Calc AQ-72 and question N-161. 1) Identify all SOV's located inside containment and Main Steam Tunnel. 2) Provide copies of valve equipment specifications. 3) Address the impact of high temperatures on the minimum required voltage to pick-up and to maintain position of SOV's.

354. The effect of screen-mesh door from MEER to turbine deck on the results of heat capacity verification calcs has not been addressed.

355. The response to N-649, on reconciliation of heat loads of electrical equipment is incomplete. It does not discuss Div 12 but only Div 11. No documentation is provided for items 3 and 4. The total load of N-649 is 21% higher than VE-800. The load of ponds 1DC10J & 1DC12J (640W max) is not included. If included, the new load would be 38% higher than VE-800.

356. Mr. Winter wants to look at an electrical mod package that the Sys. Eng. Electrical Grp has at this time (no specific mod number).

357. Mr. Winter wants to know who reviews completed mod tests to ensure acceptance criteria are met. He wants to see a mod test and look at the review forms in it.

358. Mr. Winter wants to monitor a QV team doing a field inspection/observation of electrical equipment.

359. Mr. Winter wants a tour of SEC. He wants to see what the engineering organization does, what responsibilities they have, and how they interact with other departments. (Wed afternoon after lunch).

360. Please provide a copy of the operators daily rounds sheet that check the output voltage on instrument inverters, at Byron Station.

361. Please provide a copy of the pre-op test that would test the instrument inverters @ 105 volts at Byron Station.

362. Evaluation of the revised one minute rating of the GNB NCX 1200 cells for the Byron and Braidwood Class 1E 125 volt batteries (calc NED-E-EIC-0022) was performed based on Rev. 1 of code D-21. Please provide evaluation based on Rev. 2 of code D-21.

363. DCELMS voltage profile in calc AQ-72, 125Vdc voltage drop calculation, does not include the actual voltage per cell value for each time increment of the battery duty cycle. Are these values available? Also, does voltage profile for the first minute period of the duty cycle take into account the revised one minute rate data for the NCX series cells?

364. Please provide a few samples of completed testing surveillances for molded case circuit breakers. Surveillance in question is BwHS 4002-077.

365. Please provide copies of the last tuning procedure (BwHP 4002-023) for Instrument Inverters 2IP05E & 2IP06E

performed. Note: These would have been performed via NWR.

366. The response to concern T-660 indicates that discrepancies between electrical and heat load calcs. have been reconciled. This issue has been addressed separately in N-649. The team has found the response to N-649 incomplete. In addition, the ventilation adequacy of the Battery Room, discussed in T-660, is qualitative. The team recently (7/13) requested analyses to support low temperature operation in the Battery Room. (N-695)

367. Mr. Bailey asked for information pertaining to flow rates & routing of battery room exhaust ductwork. S&L DWG M-1293 Sheet 3 provides this information. Please supply him an information only copy.

368. Per surveillance BwHS 4002-078, relay T4B in panel 2PA14J failed the surveillance & was replaced under NWR A51523. Gary Gruhn submitted a DVR on 10-30-91. Please supply Mr. Mendez with a copy of this DVR.

369. Provide voltage drop calculation between inst. inverter and its associated loads (NIS cabinet and 7300 cabinet)

370. Section 8.3.2.2 of the FSAR states that the class 1E DC systems are testable and conform to GDC 17; however, Braidwood and Byron currently do not test DC breaker - why?

371. Provide short circuit calculation determining the short circuit currents at the containment electrical penetrations.

372. Provide SER and FSAR question discussing electrical penetration protection.

373. DWG 4030DG52: EDG starting on solenoid fuses do not have any monitoring to ensure that fuse open failures are indicated:) 1 Is this acceptable? 2) Will the EDG start on a single oil solenoid without identifying an open fuse in the other solenoid circuit?

374. Provide design description of 2TI-VE003 (on panel 2VE01J). Type of sensing element/mode of operation/calibration accuracy. Provide basis for low temperature alarm on 2VE01J (set at 40°F) which is using 2TI-VE003 for indication. Why isn't the alarm set above 60°F, since MEERs air flows into the Battery Room.

375. The Byron MEER capacity verification test measurements indicate that the temperature differential between the supply air and the outside air ranges between 4.4°F and 7.9°F by the time supply air reaches damper 1VE12Y. Of this temperature rise, 3°F is due to the temperature rise from the supply fan. Calc. VE-800 page 24 shows a temperature rise of 3.8°F after the fan, at the start of the test (see page 587). Based on the temperature difference between the MEER and surrounding areas, one might expect that a similar temperature rise would be experienced for the limiting outside temp. of 95°F. This could result in a temperature of 101.8°F at the entrance to the MEER Div. 11 and a maximum temperature in the room of about 101.2 + 3.8 = 105°F. However, a calculation on page 24 shows that no temperature rise in the tunnel occurs. <u>Please explain.</u>

376. Battery rooms - what actions do operators take if the battery room temp approaches 60°F or is <60°F? Have temporary heaters ever been used (like at Byron) to increase room temp? How are the heaters controlled if used?

377. Describe the calibration method and frequency for the thermometer used in quarterly battery surveillances.

378. The maximum temperature for MEERs, Battery Room, ESF Switchgear Rooms, Div. 12 and 22 cable spreading areas is 108°F per Table 3.11-2 of B/B UFSAR. However, original ventilation sizing calculations used T_{max} 104°F. Please discuss any 10CFR50.59 evaluations performed justifying such a change.

379. What kind of Lessons Learned Program does the station have? How are items tracked and who is in charge of the program? Mr. Winter wants to meet the person in charge and discuss/review the Lessons Learned Program (Thursday morning)

380. How are prints and documents issued, tracked, and controlled by Central Files? Mr. Winter wants to meet the Central Files Supervisor and discuss/review Central Files document control. (early Thurs. morning).

381. Doris would like a copy ASAP of the vendor manual for the DG air receiver release valve. This is a Crosby valve. She noticed that at Byron this valve was initially installed horizontally then re-installed vertically. What does the vendor manual say?

382. Please provide a copy of the G-1 calculation for allowable ampacities in cable design. Also provide an example of a G-51 calculation for justification of overloaded routing points.

383. Please provide examples of tray loading overfill with relation to "Z" hold cable routing as well as installed cable routing. Routing point in question is 11045A. This would be in regards to fill & weight loading.

384. With expected battery terminal voltage after first minute of discharge based on revised discharge data supplied by battery vendor, what is the voltage at the inverter input terminals (use Byron battery 111 limiting case). Also, what is the impact of the reduced voltage of the inverter input on the output of the inverter?

385. Is Westinghouse presently or in the future going to conduct tests on the instrument inverters at DC input voltage less than 105 volts?

386. Please provide the test curves for both "NON" style fuses & "BAF" style fuses.

387. Please provide results of fuse walkdowns on Safety Related fuses that will tabulate discrepancies generated and their breakdown by manufacturer, type, model etc. etc.

388. Please supply copy of vendor print showing models & styles of fuses in panel 2AF01J if it exists. May have been converted to S&L DWG.

389. Who is providing service support from Westinghouse on the instrument inverters now that Westinghouse does not manufacture inverters? Does support come from an engineering staff or a field staff?

390. During discussions with Dr. Mazzoni he requested information on the ECCS fuel flow testing conducted during pre-operational testing.

391. How long does it take to update all satellite procedure libraries in the station after a permanent procedure has received final approval? Who is in charge of this program and how are updates tracked?

392. Supplemental response to question T-669. Provide copy of undervoltage relay calibrations for bus 232X.
393. Mr. Mendez asked for information pertaining to the controlling program that governs cable separation in the plant. This may have been covered in response to original question N-041 which asked for the "Basis" document.
394. Requested meeting to discuss the DC ground detection program at Braidwood with regards to setpoints, voltages, etc. Set up meeting with Kurt Uhlir (CECo) to discuss the program.
395. Requested meeting to discuss the Braidwood fuse control program with Ron Decker. Set up meeting with J. Bergner (CECo), G. Sharpe (CECo) & Mr. Mendez to review program.
396. Requested meeting to discuss the new procedure implementation for thermal overload sizing for continuous duty motors & motor operated valves. Scheduled meeting with J. Bergner (CECo) & Mr. Mendez.
397. Requested meeting to discuss the governing program that control the design & monitoring of cable tray loading for both seismic considerations & ampacity. Scheduled mtg. with D. Galanis (S&L), P. Rausc (S&L), J. Bergner (CECo), & Mr. Mendez.
398. Request copies of December 1992 logs covering the Div 22 batteries weekly pilot cell "temperature" measurement and daily Div 22 Misc Elec Equip Rm "temperatures" for these respective days in December.
399. Mr. Mendez requested some information on our testing program for lockout relays on 4KV buses. I talked to Bill Wurglitz and he was going to assemble some information.
400. Mr. Mendez requested a meeting with Dean Galanis to answer some questions he has on the voltage drop calculation provided for the NIS cabinets.
401. Mr. Mendez requested a meeting with Dean Galanis & Kurt Uhlir to discuss some questions he has on the DC circuit breaker testing.
402. Mr. Mendez requested a meeting with Dean Galanis & Kurt Uhlir to discuss the Byron issue concerning fuses in the AFW diesel control panel.
403. How often is procedure BwHS 4009-062 being performed?
404. Mr. Mendez requested additional information relative to CECo's position on DC breaker testing. His main question is what is our justification for not performing testing in question.