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## REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

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BOUCHEY,G.D. Washington Public Power Supply System
RECIP.NAME RECIPIENT AFFILIATION
FAULKENBERRY,B. Region 5, Ofc of the Director

SUBJECT: Provides addl info re acceptability of five installed items for use in safety related applications,per Insp Rept 89-21.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

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July 20, 1989
G02-89-120

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Docket No. 50-397

Mr. B. H. Faulkenberry
Deputy Regional Administrator
U.S. Nuclear Regulatory Commission
Region V
1450 Maria Lane, Suite 210
Walnut Creek, CA 94396

Dear Mr. Faulkenberry:

Subject: NUCLEAR PLANT NO. 2
LICENSE NO. NPF-21
NRC INSPECTION REPORT 89-21
ADDITIONAL INFORMATION

Reference: 1) Letter, B. H. Faulkenberry (NRC) to D. W. Mazur, dated July 3, 1989

2) Letter, B.H. Faulkenberry (NRC) to D.W. Mazur, dated July 14, 1989

Per the verbal agreement made in our telephone call on July 13, 1989 and the Reference 2) letter, we are providing additional information regarding the acceptability of the five installed items for use in safety related applications. This response includes specific critical characteristics and verification methods.

This additional submittal provides details on how the current Supply System commercial grade dedication would be performed in accordance with EPRI Standard NCIG-07 guidelines. These evaluations also demonstrate the acceptability of the previous dedication efforts by the Supply System. Both this submittal and the previous submittal concluded that the actions taken by the Supply System were acceptable. We conclude that the items procured and installed are acceptable and of a quality level commensurate with the items importance to safety. The Supply System has determined that some of the items under review were produced and supplied under 10CFR50 Appendix B QA programs. The application of these QA programs as accepted by the Supply System ensures that characteristics affecting form, fit and function are controlled to a design standard and that quality of the item can be verified. These items are now essentially being treated as Quality Class I items and do not require dedication. Additionally, both submittals were reviewed by our consultant of CYGNA Energy Service. They have reached the same conclusion. CYGNA has been involved in development of the EPRI standards for commercial grade dedication and in the NUMARC training for industry personnel.



IE-01

Commercial grade dedication activities have been evolving as an area of growing concern with the NRC and Utilities over the past several years. The guidance that has been available to Utilities for commercial grade dedication is only now evolving. This is demonstrated by the issuance of the EPRI/NCIG-07 Standard dated June 8, 1988, the NRC conditional endorsement of the methods developed by this standard in March of 1989 (the same time as the SSOMI performed by the NRC at WNP-2) and by NUMARC endorsement of this standard in March of 1989 with utility implementation planned to be complete by December of 1989.

For all of the five items of concern the original dedications were performed in advance of issuance of the EPRI Standard, the NRC Generic Letter (89-02) and the NUMARC endorsement of the EPRI Standard. These dedications were done by qualified engineers to assure acceptability, and the judgements, conclusions and basis for dedication were reviewed by qualified engineers.

In conclusion, it is the Supply System's position that improvements can and have been made to our dedication process to provide added assurance and documentation of acceptability. It is also our position that these items are acceptable for use, that the dedications were acceptable as prepared based on existing acceptance criteria and that none of these items represent a violation of NRC regulations.

Should you have further questions regarding these items we suggest a meeting would be the appropriate format to allow full exchange and resolution of concerns.

Very truly yours,

G. D. Bouchey, Director
Licensing & Assurance

SHP/bk
Attachment

cc: JB Martin - NRC RV
NS Reynolds - BCP&R
RB Samworth - NRC
Document Control Desk - NRC
DL Williams - BPA/399
NRC Site Inspector - 901A

ATTACHMENT 1

ITEM NO. 1: POTTER & BRUMFIELD RELAYS

Item Description - Relay, control 8PDT contacts rated 0.8 amp 125VDC resistive, 125VDC continuous duty coil, MIL-R-19523A(SHIPS), operating voltage general service (80 to 110%), endurance category A, ambient temperature 65 degrees C, shock class 1

Additional Supply System Response

These relays are "like for like" replacements for the original installed relays.

Critical Characteristics Determination

Function of the Item - Active electrical, this relay is energized on a "loss of offsite power" signal. When picked-up it enables/causes a diesel auto start.

Failure Modes/Effects - 1) Coil short circuit/failure of diesel to start. 2) Coil open circuit/failure of diesel to start. 3) Coil short to ground/failure of diesel to start. 4) Contact failure to change to energized state/failure of diesel to start. 5) Contact failure to change to de-energized state/makes it difficult to stop DG, use of "emergency stop" switch will stop DG. Returning switch to normal would cause DG to start, (acceptable, DG running is safe condition). 6) Contact chatter in energized state/could cause air start motors to stop operating. This is not considered a credible failure as the K16 relay which is in series with the K52 and K54 relays would also have to drop out and then air start motors (pneumatic) would stop. 7) Contact chatter in de-energized state/could cause diesel start (acceptable-DG running is safety condition).

Critical Characteristics

1) Relay operational endurance - 500,000 operations
2) Relay operation frequency - 10 cycles per minute (minimum)
3) Ambient temperature - 65 degrees C
4) Seismic capability
5) Coil rated voltage - 125 VDC
6) Coil operating voltage - 80 to 110% of rated
7) Coil pick-up voltage - 80% of rated (maximum)
8) Coil duty - continuous
9) Contact configuration - 8PDT
10) Contact rating - 0.8 amp continuous at 125 VDC resistive

Verification Method

The manufacturer has a QA program which has been audited by Wisconsin Electric Power Company (audit A-V-88-20). This audit determined that the manufacturer's program was acceptable.

The manufacturer is an approved vendor of these MIL Spec. Relays by listing on Federal Qualified Products List (QPL 19523-13).

The manufacturer has a QA program which has been audited by Washington Public Power Supply System. This audit determined that the manufacturer is acceptable for the supply of commercial grade items for use in safety applications. The audit specifically covered the manufacturing of MDR relays to the requirements of MIL-R-19523A(SHIPS). This audit gives us reasonable assurance that statements made by the manufacturer with respect to the design, testing and inspection of the relay are correct.

MIL-R-19523A(SHIPS) requires qualification testing of the following critical characteristics and assurance that the above defined acceptance criteria are met. It also requires periodic testing and testing after "...any change in design which affects performance characteristics." [Note that the following critical characteristics are considered performance characteristics by MIL-T-19523A(SHIPS)].

- Relay Operational Endurance
- Relay Operational Frequency
- Ambient Temperature
- Coil Operating Voltage
- Coil Pick-up Voltage
- Coil Duty
- Contact Rating

Seismic capability was originally established for the relay by testing. The applicable test report is Wyle Labs. Report 43735-1, dated 9/20/78. This test qualified the relay as part of the panel E-CP-DG/EP1.

MIL-R-19523A(SHIPS) requires vibration testing of the relay after "...any change in design which affects performance characteristics." The test requires that the relay's resonant frequency be determined by test. This test requires a 0.010 single amplitude vibration applied for 15 seconds at 1 Hz. steps from 4 to 33 Hz. The relay is then vibrated from 4 to 50 Hz. (in 1 Hz. steps) for 5 minutes at each frequency [amplitude as specified in MIL-R-19523A(SHIPS)]. The relay is then vibrated at its resonant frequency [amplitude as specified in MIL-R-19523A(SHIPS)] for two hours. Although the amplitude/frequency combinations required by the tests do not attain the levels required by the QID (assuming that the relays are not rigidly mounted) the MIL tests are of such extended duration that is it our judgement that the MIL testing imposes sufficient design constraints such that similarity is established to the relays tested by Wyle. Acceptance criteria in MIL-R-195523A(SHIPS) is no mechanical damage, contact chatter or failure to operate to either the energized or de-energized position. Operation will be checked at each frequency.

Coil rated voltage is specified in the purchase document and is stated on the relays nameplate. It is normal procedure for the receipt inspection to verify by comparison that the received item's nameplate data matches the purchase documents description. The audited manufacturer's QA program gives us reasonable assurance that the correct nameplate is attached to the relay.

MIL-R-19523A(SHIPS) requires routine testing of each relay subject to MIL-R-19523A(SHIPS). This testing includes:

- o Visual and mechanical examination to verify the materials, design, construction, dimensions, weight, marking and workmanship.
- o Measuring the coil resistance to determine if it is within 10% of the value required by the design.
- o Measuring of the insulation resistance to determine if it is within design limits.
- o Measure of the pick-up and drop-out voltages at maximum operating temperature to determine that they are within specified limits.
- o A dielectric test.

The routine testing gives us reasonable assurance that the relays supplied are of high quality and that the problem documented by Palo Verde Unit 3 LER, Docket Number 50-530, does not exist for the supplied relays. Control over relays with know deficiencies identified by specified data code has been established to assure none are installed, available for installation or procured by the Supply System. Post maintenance testing would also reveal this problem.

Contact configuration is verified at time of installation by post maintenance testing.

Per the INPO NPRDS records on 968 MDR relays there have been 35 failures based on records from 12/84 to 10/88. The failure rate for this relay type is approximately $3 \times 10^{-6}$. This is considered by the Supply System to indicate a high reliability factor.

The Supply System has obtained certification that the relays supplied through Newark Electronics were manufactured by Potter & Brumfield to the purchase order requirements and the Potter & Brumfield QA program as verified by serial numbers on relays. A Supply System QA Auditor has verified that the tests and inspections required by the MIL Spec. were accomplished on 2/10/87 or 2/12/87.

Conclusion

The Supply System concludes that all critical characteristics of the relay have been verified by a combination of manufacturer's testing/inspection (Method 1*), Supply System testing/inspection (Method 1), audit of manufacturer (Method 2), performance history (Method 3) and approved vendor certification. Therefore, the relay installed by MWR AV1684 is acceptable for its application.

*Exception methods as defined in NCIG-07

ITEM NO. 2: ANCHOR DARLING VALVE PARTS

Item Descriptions -

Item 2-1 - stem, yoke ASTM A-564 Gr 630 HT 1150 F, with collar (P/N 19-2-01) for 12" 900 lb. Anchor Darling double disc gate valve. Part No. 94-13401-19-2, Dwg. No. 94-13401, item 19-2.

Item 2-2 - wedge, upper yoke ASTM A-216 Gr WCB with Stellite for 12" 900 lb. Anchor Darling double disc gate valve. Part No. 94-13401-14-5, Dwg. No. 94-13401, item 14-5.

Item 2-3 - wedge, lower ASTM A-216 Gr WCB with Stellite for 12" 900 lb. Anchor Darling double disc gate valve. Part No. 94-13401-15, Dwg. No. 94-13401, item 15.

Item 2-4 - pin, wedge ASTM A-108 Gr 1018 (AISI 1018) for 12" 900 lb. Anchor Darling double disc gate valve. Part No. 94-13401-82-14, Dwg. No. 94-13401, item 82-14.

Additional Supply System Response

The Supply System re-evaluation of these items has concluded that the items are available and were originally manufactured under the Anchor-Darling Quality Assurance program. We have revised this evaluation to require these parts to be supplied as Quality Class I. Anchor Darling has provided certification under a revision to the original purchase order that the items supplied meet the requirements of this program.

The Supply System has audited the Anchor Darling Quality Assurance Program and its implementation on numerous occasions. Anchor Darling is maintained on the Supply System's Evaluated Suppliers List (ESL) as a 10CFR50 Appendix B Quality Class I supplier. The current full audit was performed in June of 1987, six (6) months before the subject parts were procured. This audit was the basis for inclusion of Anchor Darling on the Coordinated Agency of Supplier Evaluations (CASE) list of approved suppliers.

Additional inspections to assure implementation of their program occurred in February of 1988, April of 1988, June of 1988, October of 1988, December of 1988 and January of 1989. These inspections provide additional assurance of supplier performance history.

Anchor Darling was audited by a team of auditors from 3 utilities on October 11 - 13, 1988 as a Nuclear Supplier Quality Assurance Committee joint utility audit. This audit also concluded that Anchor Darling's QA Program "was evaluated as effective and satisfactory". This audit specifically addresses piece parts supplied, including commercial grade parts.

The Supply System concludes these items are acceptable as installed

ITEM NO. 3: FUSES (600 VOLTS AND LESS)

Additional Supply System Response

Standard Procurement and Use Policy No. 6, "Fuses (600 volts and under)" was issued on 6/30/87 to define procurement and dedication requirements for these items.

This policy was prepared by an engineer from the Supply System design engineering organization, reviewed by an engineer matrixed to Plant Technical from design engineering, and approved by the Supervisor of Plant Technical Electrical Group and the Manager of Electrical/I&C group of design engineering.

The Supply System policy and acceptance of the fuses in questions is based on an understanding of the manufacturer's processes, Underwriter's Laboratory (UL) activities and our experience with fuses.

To confirm our policy we contacted the manufacturers in question on 6/27/89. These conversations provided the following:

- Bussmann
  1) Bussmann fuse production quality is governed by the Bussmann Quality Assurance Manual.
  2) The QA Manual includes:
     a. Physical checks to verify compliance to design requirements and workmanship,
     b. 100% resistance checks, and
     c. UL specified tests.
- Gould
  1) Gould production testing is governed by their QA Manual.
  2) UL listed fuses are subjected to quarterly testing at the factory by UL.

Additionally, Supply System Procurement QA made contacts with the QA Manager of Bussmann in June of 1985 to ascertain their testing requirements. The contact concluded that "in-process testing consisted of gaging for length and DC resistance testing at 100% of rated amperage". Also "On a random basis, QC conducts audits of the in-process manufacturing. During these audits, fuses are selected for destructive testing; i.e., subjected to anywhere from 130 - 500% of rated amperage. All Bussmann fuses are subjected to these tests."

On 3/16/88 Gould-Shawmut was added to our "commercial grade" suppliers list based on review of a QA audit performed by American Electric Power on 9/17/86. This audit concludes: "Gould, Inc. is an established manufacturer of circuit protection (fuses). Although Gould does not claim to do nuclear work, their QA program is written to 10CFR50 Appendix B, ANSI N45.2 and 10CFR21. In general, Gould's QA program and implementation is adequate for the manufacture of fuses.

Both of these manufacturers produce UL listed fuses. UL independently tests these fuses to assure acceptability. The performance of these tests was audited by Niagra Mohawk in April of 1988 and concluded UL listing was a "critical characteristic" of a listed product. Our review of this audit and UL standards concludes that UL activities constitute a significant quality assurance effort involving certification by an independent laboratory that the products meet the published industry standard. Observance of the requirements of the UL Standards by a manufacturer is a condition of continued listing of the product.

UL Standards specify requirements for construction, dimensions and performance. Performance testing is completed on samples of each type of material (or design). Tests include:

1) Capacity test - fuses must carry 110% of rating indefinitely.

2) Temperature test - fuse temperature must not exceed specified temperature limits when subjected to 110% rated current.

3) Clearing time current test - fuses must clear (open) within specified time limits when subjected to a combination of current values. Test values are 135%, 150%, 200% and 500% based on fuse type.

4) Other design verification tests (i.e. interrupting ability, maximum energy, maximum threshold ration, let-through current and clearing $I^2t$.).

The Supply System's use of fuses is controlled by procedure (PPM 1.3.47) which requires evaluation of the fuse log and identification of repeated failures of fuses. This evaluation would reasonably be expected to identify a concern with fuse quality.

PPM 1.3.47 requires:

1) Inspection of fuses for evidence of overheating.

2) Replacement of fuses with like in kind fuses.

3) Requirement to replace known incorrect fuses with the proper fuse as found.

4) Requirement to log fuses as replaced to provide a record of fuse replacements.

5) Requirement to replace all fuses when one fuse is replaced in the circuit, i.e., both sets of isolation fuses, all three fuses in three phase applications, both fuses for DC applications. This practice limits the possibility of fuse again causing a problem of inadvertent opening.

6) Requirement for checking fuse integrity after installation.

7) Requirement for a technical review of replacements every three months to assure fuse configuration is being maintained and to identify recurring failures or other design problems.

Critical Characteristics Determination

Functions of the Items - Fuses are used in safety related equipment electrical circuits to prevent severe equipment damage in the event of faults or shorts, to protect 1E motors and transformers from overloads and to provide isolation of non-1E circuits from 1E circuits. The fuses have been sized with the consideration for the total loads the fuse would be expected to experience under all conditions. This sizing is done in a conservative manner (at least 125% of full load current) to preclude the event of a fuse opening in any condition other than a real fault or overload, and minimize impact of commercial product tolerances.

Failure Modes and Effects - Fuses have two failure modes of concern: 1) inadvertent opening with no fault or overcurrent condition and 2) failure to open when a fault or overload exists.

Inadvertent opening could result in loss of downstream safety related equipment operability. Random loss of a fuse in one division and subsequent loss of downstream safety related equipment would not affect the ability of the redundant division's equipment to perform the required safety fuctions. In all cases this loss of function would be repairable by fuse replacement in a minimal amount of time.

Failure to open on a fault or overcurrent condition could cause the upstream circuit protection devices to open potentially resulting in loss of additional safety related equipment operability of the same division but would not affect the ability of the redundant divisions equipment's ability to perform the required safety functions.

Critical Characteristics

Critical characteristics for fuses include manufacturer's part number and current rating, and UL listing where fuse is UL listed.

Verification Methods

Industry Standards govern the manufacture of fuses. These controls provide an acceptable level of assurance that the items have sufficient quality. Audits of UL activities described above provide further assurance of product acceptability (Method 2). Historical performance of fuses provide an additional level of assurance (Method 4). Receipt inspection verifies proper rating, part number, and UL listing where fuse is UL listed by comparison with procurement requirements (Method 1). Controlled application of fuses and fuse trending program provide further assurance of fuse acceptability.

Conclusion

Our acceptance of fuses has not been based solely on installation checks to verify fuse quality. Tests at the time of installation verifies that the fuse replacement has restored circuit integrity. Testing which will verify that a fuse will perform in a manner consistent with its design parameters will generally result in destroying the fuse. We are further unaware of any industry consensus concerning receipt testing of fuses.

Fuses are relatively simple devices which operate on physical principles that are well characterized. We know of no basis for doubting that modern designs can perform their intended function. Application of specific fuses by design engineers includes adequate margin to account for production tolerances. Our experience with these fuses has not identified a quality concern.

The Supply System is aware of a utility doing extensive inspection of procured fuses and are rejecting significant levels of fuses based on failure to pass a load test. These failures have primarily been with non UL listed fuses. We have been in contact with this utility and are reviewing their program to see if a similar or joint effort is warranted. We are also aware that these tests are difficult to perform without a controlled environment and the results of this testing may be questionable.

The Supply System concludes the installed fuses are acceptable as installed.

ITEM NO. 4: PRESSURE SWITCH

Item Description - Switch, pressure, range 10 - 250 psi, differential 23 - 25 psi, maximum allowable pressure 300 psi, double pole double throw contacts rated 10 amps at 600 VAC, with form W-1 (NEMA 4 watertight enclosure). Square D Part number 9012 ACW-29.

Additional Supply System Response

These switches were procured as commercial grade because the Supply System understood the manufacturer no longer offered them as Quality Class I. We have subsequently learned that the manufacturer always offered these items as Quality Class I but was accepting orders only for replacements. We expect to revise our procurement evaluation to a Quality Class I purchase, audit the manufacturer and add them to our ESL.

The manufacturer's Quality Assurance department stated that these switches were made under the same QA program even while not offered as Quality Class I.

Critical Characteristics Determination

Function of the Item - These pressure switches monitor the air pressure in the Division 1 and 2 diesel generator air receivers. Their function is to start and stop the non safety related air compressors to maintain a specified range of air pressure in the air receivers and provide low air pressure alarms. The switches perform a passive mechanical integrity function (prevent air leakage from the air receiver due to switch leak).

Failure Modes and Effects - In the event of loss of mechanical integrity of the switch the switch will provide a start signal to the compressor upon reaching the low setpoint. The makeup capacity of the compressor is greater than the leakage capacity through the switch so this is of minor significance.

In the event of failure of the pressure switch to start the compressor at the low pressure setpoint due to contact seizure, binding or other causes, the pressure switch will provide a low pressure alarm to the control room which will allow the operator to manually start the air compressor.

Mechanical integrity is the only concern for seismic qualification, contact chatter does not pose a problem in this application.

The switch can easily be serviced without declaring the DG inoperable, there is a totally redundant system in service which provides sufficient air for multiple start attempts.

This switch has minor safety significance due to the failure effects and the redundancy provided.

Critical Characteristics

1. Range 10 to 250 psi
2. Contact rating - 10 amps 600 VAC
3. Part No. - 9012 ACW-29
4. Contact Configuration - DPDT
5. Differential - 23 - 25 psi
6. Seismic integrity

Verification Methods

Items 1, 2, 3, and 5 were verified by comparison of nameplate/tag data with the procurement requirements, as part of standard receipt inspection and have been reverified on installed switches (Method 1).

Item 4 was verified as part of installation checks, calibrations and post maintenance operability tests (Method 1). Installation included QC inspection of the work performed.

Item 6 is assured by the switch being a like for like replacement. The manufacturer has stated that no significant design changes occurred which would effect the mechanical integrity of these switches. Original switches were qualified by Supply System in Qualification Information Documentation (QID) file 256015. Additionally the switches have a pressure rating such that a safety margin greater than two times exists.

The Supply System has contacted Stoneway Electric and obtained a copy of their invoice for the switches supplied by Square D Company which provides traceability to the manufacturer.

These verifications provide adequate assurance the switches are acceptable.

Conclusion

The Supply System concludes that the switches as installed are acceptable.

ITEM NO. 5: METAL O-RINGS

Item description -

Item 5-1 - O-ring, metallic, 2.262" OD (as measured prior to plating) 0.125" free height 0.010" wall thickness, Inconel X-750 w/0.001" minimum silver plate, American Engineering P/N 2262-125X010 - AMS5582Ag.

Item 5-2 - O-ring, metallic, 1.656" OD (as measured prior to plating) 0.125" free height 0.010" wall thickness, Inconel X-750 1656-125X010 - AMS5582Ag.

Additional Supply System Response

Dedication requirements are stated in Design Change Package DCP 83-0056-0A dated 4/22/85. A CMTR was not required for the metal O-rings, but was received with the purchase as it is that vendor's practice to always provide the CMTR from the material supplier as a courtesy to the purchaser.

Generation engineering has determined that the effects of temperature cycling on these O-ring seals are negligible in this application.

These O-rings are specifically exempted as pressure boundary parts by the ASME Code. However to assure all possible safety functions are evaluated the Supply System provided the following evaluation.

Critical Characteristics Determination

Function of the Item - These O-ring seals constitute a part of the containment pressure boundary between ECCS system relief valves and the containment suppression pool. The discharge strainer in the suppression pool is below the water level. The sole safety function of the O-rings is to provide a pressure tight seal at the discharge flange of RHR-RV-1B.

Failure Modes/Effects - Seal leakage or failure is the only plausible failure mode.

1) Relief Valve Operation

Seal failure would cause a small leak in the RHR heat exchanger room if any of the various system relief valves sharing the common discharge path to the suppression pool were to lift. The leak would stop as the valve re-seats.

2) LOCA Event

The containment pressure that would be required to push suppression pool water from 466' 4-3/4" elevation to a relief valve height of 585' 2-9/16" is approximately 51.4 psi, which is higher than the 45 psi containment design pressure and significantly higher than the highest postulated accident pressure in containment. The water seal would therefore maintain containment integrity. If the water seal were lost, the effects would be insignificant due to the small size of the leak.

Critical Characteristics

1) The O-ring diameter must be of correct size to properly fit into the associated groove on the flange.

2) The O-ring height (tube diameter) must be of correct size to provide a seal when installed.

Verification Method

DCP 83-0056-0A required a "Type B" leak test in accordance with 10CFR50 Appendix J to determine adequacy of installed material and workmanship (Method 1). This was performed at installation and documented on the installing MWR. Seal integrity is tested periodically pursuant to 10CFR50 Appendix J.

Conclusion

The Supply System concludes that the O-rings are acceptable as installed.