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DAVIS,A.B.	Region 3, Ofc of the Director

SUBJECT: Forwards info re actions taken to resolve requirements concerning environ qualification of electrical splice.

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TITLE: OR/Licensing Submittal: Equipment Qualification

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Iowa Electric Light and Power Company

October 20, 1989
NG-89-3121

Mr. A. Bert Davis
Regional Administrator
Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License No: DPR-49
Environmental Qualification of Electrical Splice Connections
Reference: D. Mineck to A. Davis, NG-89-2825, Oct. 2, 1989
File: A-103, A-64

Dear Mr. Davis:

As committed in the referenced letter, this letter and attachments describe the actions that we have taken to ensure that the recently-discovered problems with electrical splices and other electrical components which did not meet environmental qualification requirements have been resolved prior to plant startup. Your staff also requested a preliminary assessment of the root cause for our failure to fully implement effective corrective actions following a previous discovery of non-qualified electrical splices. The following states that preliminary assessment and our augmented corrective actions that we have taken as a result.

During routine maintenance on September 19, 1989, with the plant in cold shutdown, Iowa Electric personnel discovered two AMP butt splices (associated with SV-4639) in a High Energy Line Break area which were not insulated using an environmentally-qualified method. This discovery caused us to question the reliability of inspections performed in 1986 and 1987 which were intended to identify all such splices. Our preliminary conclusion is that the most probable root cause for the earlier failure to identify all of these splices was inadequate administrative controls. Specifically, the acceptance criteria set out in the written instructions for the prior inspections were too subjective; the requirements for training of inspection personnel and for preparation of documentation should have been more specific; and the supervision of these inspections was not continuous. Also, since the inspection documentation was not sufficiently detailed, subsequent reviews of the documentation did not reveal that some unqualified electrical splices had not been adequately repaired. Once these deficiencies were recognized, we made a number of improvements in our inspection program now being completed. The program was further improved as a result of the concerns raised by members of your staff during their inspection on September 29, 1989.

A formal Project Quality Plan (PQP) was written which imposes administrative measures to control the project scope, describes the functional

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responsibilities of the individual project team members, provides detailed instructions for performing the work and objective acceptance criteria, and establishes detailed requirements for recording the results of the inspections. A copy of the PQP has been provided to your staff. A significant feature of our current inspections is the use of two, independent inspections, a method similar to that normally used to verify system valve line-ups prior to plant startup. We have also added two Design Engineers to each inspection team; they recorded the inspection results and resolved any discrepancies found between the first and second re-inspections. We believe that our current efforts assure, with very high confidence, that all electrical splices requiring environmentally-qualified insulation have been identified and necessary corrective actions have been completed.

The attachments to this letter describe actions we have taken to address the five issues identified by your staff (listed in the referenced letter), as well as four additional items that we identified during our current re-inspection effort. A subsequent letter will be provided which will include our final determination of root cause, safety significance of the identified deficiencies and longer-term corrective actions. Our response to the Notice of Violation transmitted with Inspection Report 89-019 will also be made in this follow-up letter one month after plant startup.

We will contact you prior to plant startup.

Very truly yours,

Stephen L. Swailes for

Daniel L. Mineck
Manager, Nuclear Division

DLM/gt

Attachments:
1) Reverification of Environmental Qualification of AMP and Thomas & Betts (STAKON) Splices
2) Potential Submergence of Electrical Components Located Above the Flood Level
3) Qualification of Terminal Blocks in Junction Boxes with Top-Entry Conduit
4) Qualification of Taped Splices in Instrument Circuits
5) Equipment Qualification for Motor-Operated Valves (MOV)
6) Flame-Retardant Foam Located in MSIV Solenoid Valve Junction Boxes
7) Environmental Qualification of Tailpipe Pressure Switches
8) Environmental Qualification of Victoreen Radiation Monitors

cc: U. S. NRC Document Control Desk (Original)
R. Browning
L. Liu
L. Root
R. McGaughy
J. R. Hall (NRR)
NRC Resident Office - DAEC
Commitment Control No. 890379

Issue Title: Reverification of Environmental Qualification of AMP and Thomas & Betts (STAKON) Splices

Issue

During performance of corrective maintenance, two untaped AMP splices were found in an electrical circuit for an Environmentally-Qualified (EQ) component. This equipment is located in the drywell, which is an EQ-harsh environment, i.e. either a High Energy Line Break (HELB) area or a high-radiation-only area. This discovery raised questions about the reliability of earlier inspections which were intended to identify all such splices.

Actions Taken

A reverification program was developed and implemented to ensure that all electrical splices in EQ circuits are properly insulated in accordance with the DAEC EQ program. Written instructions for the re-inspection included a list of the equipment to be inspected; the composition of the inspection teams; the method of inspection to be used (hand-over-hand); the training instructions for the inspection teams; and the requirements for documenting the results of the inspections. This re-inspection effort was nearly complete when an NRC inspector found errors in the re-inspection documentation as well as other EQ-related concerns during an inspection on September 29, 1989. As a result of these inspection findings, we re-evaluated our inspection program and made further improvements to increase our level of confidence in the program's effectiveness. These improvements were formalized into a Project Quality Plan (PQP). The following significant improvements made were: formation of a dedicated project organization composed of personnel from various departments (Maintenance, Quality Control, Design Engineering, Systems Engineering, EQ Engineering, Quality Assurance, Licensing and Technical Support); additional administrative controls for the identification, performance and documentation of the work items; augmented inspection teams (Two engineers were added to each team to assist in documenting the results of the inspections, as well as resolving discrepancies in the field); and, a second re-inspection, which utilized a "double-blind" method, similar to that used to verify system valve line-ups during plant startup. In our version of the double-blind method, one engineer with each team had the results of the first re-inspection, while the other team members were "blind" to these results. If different results were obtained between the first and second re-inspections, the engineer attempted to resolve the discrepancy in the field and documented that resolution on the inspection documents. If the discrepancy could not be resolved in the field or a deficiency was found, then the item was brought back to the project organization for further evaluation and final resolution. Each such item was logged and tracked to completion. In addition, after the inspections were completed, the inspection documentation was independently reviewed by a Quality Control Engineer and an EQ Engineer to ensure that the results of the re-inspections were properly documented; all discrepancies between the first and second re-inspections were satisfactorily resolved; all deficiencies were identified and follow-up actions taken, e.g. corrective maintenance, engineering evaluation.

Resolution

The preliminary results of the first re-inspection found twelve untaped splices, in addition to the two originally found during maintenance. Of these twelve splices, nine were of the Thomas & Betts (STAKON) type and the remaining three were AMP butt splices. All twelve were found in areas designated EQ-harsh for radiation only. The second re-inspection found no additional untaped splices in EQ circuits. (Note: other deficiencies were found during the second re-inspection, due to its expanded scope, and are discussed in later attachments.)

During our earlier review of NRC Information Notice (IN) 89-57 regarding unqualified splices within vendor-supplied equipment, we identified an additional concern regarding spare leads without EQ insulation. These spare leads, if they became energized during an accident, could affect other EQ circuits. Therefore, the most-recent inspection program included searching for such spare leads within electrical enclosures containing EQ circuits. We identified fifty-one spare leads during our inspections. We then made a conservative decision to either insulate with EQ insulation, or remove these spare leads rather than evaluate each one on a case-by-case basis to determine if, under accident conditions, it had the potential to become energized and adversely affect other EQ circuits.

All the improperly-insulated splices have been corrected in accordance with the DAEC EQ program.

A subsequent engineering review of the original two untaped AMP butt splices found in the drywell has determined that this circuit is not required to remain active in a post-accident environment and it has been removed from the EQ program. The safety significance of the remaining twelve splices will be addressed in later correspondence.

We believe that the action that we have taken with regard to the taping of spare leads is conservative and meets or exceeds the requirements of our current EQ program.

Issue Title: Potential Submergence of Electrical Components Located Above the Flood Level

Issue

A potential exists for electrical components located within enclosures which do not have proper drainage to become submerged; they are not environmentally qualified for that condition. For example, under the DAEC EQ program, taped splices are not qualified for submerged conditions. Therefore, it is necessary to identify all such potentially affected components and to ensure that proper drainage exists or is provided in the enclosure containing these components.

Actions Taken

The most-recent inspection program, previously described, instructed the teams to ensure that electrical enclosures (junction boxes, field option boxes, pull boxes, and condulets) located in EQ harsh areas had proper drainage paths. The engineering members of the inspection teams evaluated the installation geometry and determined whether the enclosure is susceptible to submergence, i.e., some configurations had a natural drainage path, such as condulets with bottom exit points. If the enclosure was susceptible to submergence, a team provided a drainage point (weephole) if one did not exist.

During an NRC inspection at the Clinton Power Station a concern was raised regarding the possible submergence of end-use equipment, which was not qualified for this environment (reference NRC Information Notice 89-63). The current inspection program at the DAEC documented the installed configuration of the end-use equipment for further engineering evaluation for the potential concern.

Resolution

We have not yet finished our accounting of the results of the inspection for drainage paths. However, we have a preliminary estimate for the number of enclosures in HELB areas in which weepholes were provided. Sixty-two such enclosures were drilled during this inspection. Of these sixty-two enclosures, thirty-nine contained EQ-insulated splices (eleven taped and twenty-eight Raychem) and the remaining twenty-three contained EQ terminal blocks. In addition, weepholes were added to enclosures in areas designated EQ harsh for radiation only. We decided to add weepholes to enclosures in both HELB and radiation only areas, even though in many cases, an engineering evaluation of the installed geometry could have demonstrated that submergence of the components within the enclosure was not possible and, therefore, a weephole would not be needed.

Also, one electrical enclosure containing EQ circuits was found which had been encased in fire retardant materials in accordance with 10 CFR 50, Appendix R requirements. Installation of a weephole in this enclosure would compromise the Appendix R qualification. An evaluation determined that a weephole was not required because the enclosure contains only electrical cable and no electrical splices or terminal boards. It is our position that electrical cable that has been tested in accordance with IEEE-383-74 is qualified for submerged conditions at the DAEC. We recognize that the subject of cable qualification under submerged conditions is an issue being addressed by the NRC and the Nuclear Utility Group on Equipment Qualification (NUGEQ). We are a member of NUGEQ and will be following this issue closely. We will consider further actions when a final resolution is reached.

The concern for moisture intrusion and possible submergence of electrical circuits in end-use equipment enclosures was addressed for instruments located in EQ harsh areas for radiation only. (Instruments that are located in EQ HELB areas are either qualified for that environment (100% humidity) and are installed in the tested configuration, perform their safety function before the accumulation of enough moisture to affect the equipment's operability, or have sealed enclosures to protect them against moisture intrusion and, therefore, are not of concern here). As noted earlier, the installed configuration for the end-use equipment was documented during the current inspection program. This information was subsequently reviewed for those end-use components that were not sealed against moisture intrusion. The general configuration consists of the end-use equipment connected to a field option box by a short length of flexible conduit. The instrument wiring exits the field option box through rigid conduit. The field option box contains a weephole and any moisture entering the field option box via the rigid conduit will drain out through the weephole. Therefore, the only credible source of moisture intrusion into the flexible conduit is by condensation. Given the short lengths of flexible conduit used (approximately four to six feet), we concluded that negligible amounts of moisture can accumulate through normal condensation. Consequently, submergence of this end-use equipment is not credible at the DAEC.

Issue Title: Qualification of Terminal Blocks in Junction Boxes with Top-Entry Conduit

Issue

During the inspection on September 29, 1989, the NRC inspectors raised a concern regarding the environmental qualification of terminal blocks in junction boxes with top-entry conduits. Specifically, during LOCA testing performed by an NRC subcontractor (Sandia), some terminal blocks exhibited leakage currents, which could affect the circuit's safety function, when moisture was present on the blocks. Although a junction box protects the terminal block from direct spray, a top-entry conduit could allow moisture that had accumulated upstream of the junction box to spray onto the terminal block, resulting in unacceptable leakage current. During the NRC inspection, junction boxes with top-entry conduit were found in HELB areas which had not been evaluated in the DAEC EQ files.

Actions Taken

We reviewed our equipment database to establish a list of terminal blocks in EQ circuits. This list was verified against the results of the current inspection to identify all EQ terminal blocks in junction boxes with top-entry conduit, which are located within HELB areas. The boxes in non-HELB areas, i.e. radiation only, are not subject to this concern as it is not possible to accumulate enough moisture under either normal or post-accident conditions to result in spraying of water onto the terminal blocks, the conditions which caused the excessive leakage currents seen during the LOCA tests. In addition, drainage paths are provided in electrical enclosures in both HELB and radiation-only areas, further reducing the potential for significant moisture accumulation.

While the inspection results and subsequent evaluation did find terminal blocks in junction boxes with top-entry conduit in HELB areas, all but two were in configurations that had previously been evaluated and found acceptable. Of these two boxes, one was further evaluated and found to be acceptable because the terminal block was offset within the junction box and direct spray onto the terminal block via the top-entry conduit was not possible. The remaining one had its top-entry conduit relocated to the side of the junction box, eliminating the concern.

During the re-inspection, twelve terminal blocks in EQ circuits were found that had not been included in our equipment database. A subsequent review determined that, in all but three cases, these terminal blocks were qualified under the DAEC EQ program. These three terminal blocks have been replaced with terminal blocks which are qualified under the DAEC EQ program.

Resolution

Our review and evaluation of terminal blocks within junction boxes with top-entry conduit has determined that, with a single exception, the installed configurations were in compliance with the DAEC EQ program. This one junction box has had the conduit re-routed to eliminate the concern. This junction box is associated with the Shutdown Cooling mode of the Residual Heat Removal System. The affected valve (MO-1908) is normally closed and is not required to function to mitigate a Design Basis Accident at the DAEC. Also, since the control power for this valve is controlled from the motor control center (MCC), which is outside the EQ-harsh environment, the likelihood of a spurious opening of this valve is not possible.

The three previously-unidentified terminal blocks, which were not qualified under the DAEC EQ program, have been replaced with qualified terminal blocks. As these blocks were found in areas designated EQ-harsh for radiation only, they are qualifiable, i.e., they could be qualified, using an existing analysis. The remaining nine terminal blocks were verified to be qualified under the DAEC EQ program.

Issue Title: Qualification of Taped Splices in Instrument Circuits

Issue

During the qualification testing of taped splices, leakage currents were observed which were capable of adversely affecting the accuracy of certain types of instrument circuits. The leakage currents were caused by the accumulation of moisture. If the accuracy of the instrument is degraded to the point that it can no longer perform its safety function, then other EQ qualified insulation methods, which exhibit acceptably low leakage currents, should be utilized.

Actions Taken

The EQ Master Equipment List and the qualification file for the tape used to insulate splices (QUAL-M345-00) were reviewed to identify those instruments that could be subject to this concern. The list of those instruments was then reviewed against the information gathered during the current inspection program to identify instruments with taped splices located within HELB areas. The non-HELB areas are not subject to this concern because neither sufficient moisture to degrade the taped splices can be accumulated since the enclosures have a drainage path, nor can water spray onto the splices via top-entry conduit. These are the conditions necessary to cause the excessive leakage currents seen during the testing.

Resolution

The screening process narrowed the equipment of concern to switches and temperature elements within HELB areas. Switches were subsequently excluded because leakage currents of the magnitude seen during qualification testing would not prevent them from performing their safety function. An engineering evaluation was then performed for the remaining temperature elements. Assuming the worst-case insulation resistance observed during the test (26.4 K-ohms), the evaluation determined that the leakage currents for these temperature elements would not inhibit operation of the circuit. Consequently, our current qualification file for taped splices in these circuits is acceptable.

It should be noted that, during the review of maintenance records in preparation for the current inspection of these circuits, it was determined that commercial-grade, heat-shrink tubing had been specified as an acceptable alternative to the environmentally-qualified Raychem sleeves normally used in such circuits. The current inspections confirmed that commercial-grade, heat-shrink tubing had been used on eight temperature element circuits. Each circuit had three splices, for a total of twenty-four splices with the commercial-grade, heat-shrink tubing. These temperature elements are used to sense drywell temperature and perform no automatic safety function. However, while they are Regulatory Guide (RG) 1.97 Category 2 instruments and therefore must meet EQ requirements for post-accident conditions, they are Type D variables only.

In addition, one dual-element thermocouple, associated with the Steam Leak Detection System (SLDS) in the Reactor Water Cleanup System pump room, was found with its lead wires insulated with the commercial-grade, heat-shrink tubing. One of these splices was the grounded shield wire, which has no safety significance, and was, therefore, determined to be acceptable. The other four splices are being evaluated for their affect on the circuit. The results of this evaluation will be provided in later correspondence.

All of the above identified deficiencies (i.e., the twenty-eight splices with commercial-grade, heat-shrink tubing) were repaired with environmentally-qualified Raychem insulation.

Issue Title: Equipment Qualification for Motor-Operated Valves (MOV)

Issue

During the NRC EQ inspection on September 29, 1989, the inspectors requested that we re-evaluate all EQ issues which we had previously identified and which were scheduled to be resolved during the next refuel outage, to determine if they required resolution prior to startup from the current outage. Several issues were recently identified relating to the qualification of Limitorque motor-operated valves (MOV).

One such issue was with regard to a 10 CFR Part 21 notification from the Limitorque Co. regarding a potential failure of torque switches manufactured from a melamine material in their Model SMB-00 and SMB-000 motor-operators. We had previously written a Justification for Continued Operation (JCO) to support our decision to defer corrective action on valves with these model motor-operators until the next refuel outage. As we have many valves in the EQ program which were covered by this JCO, these valves need to be reassessed prior to startup.

As discussed in Attachment 2, NRC Information Notice 89-63 had recently been issued which raised the concern of possible submergence of electrical equipment above the plant flood level. This concern also affected end-use equipment such as MOVs. Therefore, MOVs were required to be evaluated for potential submergence conditions for which they were not qualified.

We had revised the DAEC EQ file for Amerace/Buchanan terminal blocks as a result of recently issued industry information on these blocks. Our review of this information resulted in restrictions being applied to the use of these terminal blocks in power circuits for MOVs.

The NUGEQ had recently published their final report on Limitorque MOVs. This report provided guidance as to standard qualification practices for tee-drains, terminal blocks, grease relief valves and other related issues. It also identified the potential for vendor-supplied untaped splices to be found on the internal motor leads within dual voltage motors supplied with valve motor-operators. We, therefore, decided to initiate inspection of all MOVs in the EQ program to identify any dual voltage motors for internal splices. (Inspections for splices found externally to the motor compartments were being performed as part of the re-inspections described in Attachment 1 to this letter.)

Actions Taken

Our earlier review of the Limitorque Part 21 notification had identified that there were forty-six valves in the EQ program which had model SMB-00 and SMB-000 motor-operators. Of these forty-six MOVs, nineteen had been identified as not containing torque switches made of the melamine material. Of the remaining twenty-seven MOVs, twenty had been evaluated and we had concluded that their safety function would not be impaired by the failure of the melamine torque switches. Each of the torque switches in the remaining seven MOVs had been replaced with a non-melamine torque switch prior to this EQ inspection.

Another inspection program for MOVs was developed which was composed of three phases. The first phase was an external inspection of all eighty-one MOVs in the EQ program. The primary purpose of this inspection was to identify those MOVs with dual-voltage motors. The secondary purpose was to re-confirm that tee-drains and grease relief valves were properly installed on those MOVs which required them per our EQ program. The phase one inspections identified a total of sixty-two MOVs with dual voltage motors. In addition, no MOVs were found with incorrect tee-drain installations and one MOV was found with an incorrectly installed grease relief valve. This grease relief valve installation has been corrected.

The second phase of the inspection consisted of internal inspections of the sixty-two MOVs with dual-voltage motors to inspect for internal, unqualified splices. The switch compartments of these valves were also inspected to verify that proper torque and limit switch materials were used in accordance with the DAEC EQ program. The results from this inspection would be used to decide if the remaining nineteen MOVs, i.e. those without dual-voltage motors, should be include in the phase two inspections. The phase two inspections found no MOVs with incorrect torque or limit switch materials and one (1) dual-voltage motor was found with three internal, untaped Thomas & Betts (STAKON) splices. These splices were determined to be vendor-supplied.

The third phase of the MOV inspections was conducted to determine if inappropriate terminal blocks were used in power circuits. This inspection found six MOVs which contained terminal blocks that were not rated for the maximum-applied voltage. The power leads for these six MOVs were removed from the terminal block and spliced using DAEC qualified methods.

Resolution

After re-evaluation of our JCO for the MOVs with melamine torque switches, we have concluded that all MOVs in the EQ program, whose safety function could have been impaired by the torque switch failure, have been repaired. Therefore, corrective actions for the remainder of the affected MOVs can continue to be deferred until the next refuel outage.

As the results of the dual voltage motor inspections did not find any deficient torque or limit switch materials, we are confident that our previous efforts to identify and correct such problems has been effective. Thus, inspections of the switch compartments for the remaining nineteen MOVs is not warranted.

Our evaluation of IN 89-63 identified a possible conflict between the recommendations of the IN and the tested configuration for MOVs utilized outside of the primary containment. Specifically, the IN suggests that drainage paths to avoid internal submergence of end-use equipment, e.g. MOVs, should be provided, while the EQ test configuration for these MOVs did not have this drainage path, i.e. a tee-drain. We have concluded that, while the addition of tee-drains in these MOVs is conservative, it is not required under the DAEC EQ program. We are, therefore, deferring implementation of this item until the next refueling outage. The remainder of the EQ MOVs had tee-drains installed which satisfied both the tested configuration and IN 89-63 recommendations.

The one dual voltage motor which was found with the three unqualified internal splices is associated with MO-1943B, the cross-tie valve between the Residual Heat Removal (RHR) system and the RHR Service Water system. The function of this valve is to allow the primary containment to be flooded, if necessary, in certain post-accident conditions. Although this capability is described in the DAEC Updated FSAR (Section 5.4.7.2.1), it is a manually-initiated function and no credit is taken for its use in any existing accident analyses. We have therefore determined that this MOV, as well as its redundant counterpart, MO-1943A, is not required to be included in our EQ program. We have subsequently removed both MOVs from the DAEC EQ program.

The six MOVs which had underrated terminal blocks were located outside the drywell, where the post-accident conditions and accident duration are less severe. In addition, the maximum-allowable voltage based on th EQ test results for these blocks would only be exceeded by a maximum of seven percent. Our preliminary conclusion is that the potential for terminal block leakage current levels which would cause MOV failure is negligible.

Issue Title: Flame-Retardant Foam Located in MSIV Solenoid Valve Junction Boxes

Issue

During the current inspection, junction boxes associated with the Main Steamline Isolation Valves (MSIV) were found to be filled with flame-retardant foam. Consequently, the contents of these boxes could not be visually inspected. A method of inspecting the contents of these boxes must be developed to ensure that this foam did not encase any untaped splices, because the foam has not been environmentally qualified as an insulating material for such splices.

Actions Taken

A documentation review was performed to determine the original requirement for filling these boxes with this fire-retardant foam, i.e., to determine if other regulatory requirements applied, such as 10 CFR 50, Appendix R. It was subsequently determined that the foam had not been installed to meet Appendix R requirements; it was installed in response to an early vendor recommendation to ensure that moisture does not intrude into the MSIV position swithces. This documentation review also revealed that this foam was installed prior to the 1986-87 inspections for untaped splices. Therefore, if splices were found within these boxes, they most likely would not be in compliance with the DAEC EQ program. It was decided to attempt to non-destructively examine these boxes by radiographic examination. A sample box was prepared which contained untaped splices and had been filled with the fire-retardant foam. The results of the radiographic examination of this test box demonstrated that this examination technique is effective in detecting splices encased within the foam. We then radiographically examined the foam-filled MSIV solenoid junction boxes.

Resolution

The results of the radiographic examination showed that no splices or other electrical connections are contained within these boxes; they are pull boxes only. No further actions are required.

Issue Title: Environmental Qualification of Tailpipe Pressure Switches

Issue

During the current inspection, questions were raised internally regarding the environmental qualification of the tailpipe pressure switches mounted on the discharge piping of the Safety/Relief Valves (S/RV) and the Spring Safety Valves (SSV), (PS-4400A, B & C thru PS-4407A, B & C). Specifically, the installed configuration permitted moisture to accumulate in the conduit leading to these switches and no drainage path was provided. The EQ test report for these switches did not enable one to determine whether the tested configuration had allowed moisture to collect on the switch connections and wiring supplied with these switches. These switches were required to be installed by NUREG-0737, Item II.D.3 and are a RG 1.97, Category 2 variable; there must be a positive determination of their environmental qualification.

Actions Taken

After further engineering review, we decided to assume that these pressure switches were not qualified in their as-installed configuration and to take action to preclude moisture from coming in contact with the pressure switch wiring and external connections. Because installation of a drainage path, i.e. a weephole, was not practical, a design change was initiated to seal the entrance to the conduit leading to these pressure switches and thereby prevent moisture intrusion. An electrical connector sealed assembly (ECSA), manufactured by the Conax Buffalo Co. was installed in the junction boxes. These ECSAs are qualified in accordance with the DAEC EQ program.

Resolution

The installation of the ECSAs assures that the as-installed configurations of these pressure switches conform to the tested configuration and therefore, comply with the DAEC EQ program.

Our preliminary assessment of the previously-installed configuration is that that while these are RG 1.97 instruments, they are Type D variables only and other qualified instruments are available to assist the operator in determining S/RV position status. Our final determination of the safety significance of this item will be reported in later correspondence.

Issue Title: Environmental Qualification of Victoreen Radiation Monitor

Issue

During an internal review of the DAEC EQ files conducted in August, 1989 a question was raised as to whether the as-built configuration of the two drywell high-range radiation monitors (RE-9184A & B) was in conformance with the qualified configuration. A recommendation was then made to inspect the installed configuration at the next refuel outage. However, we decided to inspect these radiation monitors as part of the current EQ inspection program. This inspection determined that the installed configuration was not in conformance with the qualified configuration because the electrical enclosures leading to these instruments were not sealed to prevent moisture intrusion. The test report states that any moisture accumulation on the instrument's external connections during accident conditions causes instrument failure. These instruments were installed to meet NUREG-0737, item II.F.1.3, and RG 1.97, Category 1 requirements and must be enviromentally qualified for HELB conditions.

Actions Taken

A design change was initiated to install ECSAs, similar to those installed in the S/RV tailpipe pressure switches, at the entrance to the conduit leading to the radiation detectors. These ECSAs will prevent moisture from entering the conduit.

Resolution

Because the newly-installed ECSAs are qualified under HELB conditions, these radiation monitors conform to the tested configuration and are, therefore, qualified.

Our preliminary assessment of the safety significance of this item is that, while these instruments are required to meet NUREG-0737 and RG 1.97 requirements, they provide indication only and do not perform an active safety function. Alternate indications of high radiation levels within the primary containment, including other RG 1.97 instruments, are available to assist the operator in evaluating post-accident conditions. Therefore, the safety significance of the failure of these instruments is minimal.