June 19, 2003

EA-03-109

Mr. Thomas Coutu
Site Vice President
Kewaunee Nuclear Plant
Nuclear Management Company, LLC
N490 Hwy 42
Kewaunee, WI 54216-9511

SUBJECT: KEWAUNEE NUCLEAR POWER PLANT
NRC INSPECTION REPORT 50-305/02-07(DRS)

Dear Mr. Coutu:

This refers to your letter dated April 4, 2003, denying the Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion III, that pertained to improper application and use of a common non-safety related power supply to feed two redundant safety-related service water control valve circuits. After consideration of your response, we have concluded that the violation of 10 CFR Part 50, Appendix B, Criterion III remains valid. The bases for our conclusion are stated in the enclosed evaluation. In accordance with the NRC Enforcement Policy, Section VI, licensees must take steps to address corrective actions for Non-Cited Violations. Furthermore, licensees are required to restore compliance within a reasonable time after a violation is identified. Failure to implement such actions will result in consideration of issuing a Notice of Violation requiring a formal written response.

In accordance with 10 CFR Part 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

James L. Caldwell
Deputy Regional Administrator

Docket No. 50-305
License No. DPR-43

Enclosure: As stated

cc w/encl: D. Graham, Director, Bureau of Field Operations
Chairman, Wisconsin Public Service Commission
State Liaison Officer

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ENCLOSURE

NRC RESPONSE TO NUCLEAR MANAGEMENT COMPANY'S DENIAL OF NON-CITED VIOLATION 50-305/02-07(DRS)

Restatement of Non-Cited Violation 50-305/02-07(DRS)

On February 21, 2003, Inspection Report 50-305/02-07(DRS) was issued. The inspection report included the following Non-Cited Violation in the Summary of Findings:

- Green. A finding of very low safety significance associated with a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified that pertained to improper application and use of a common non-safety related power supply to feed two redundant safety-related circuits. This was not in accordance with the plant engineering specification procedure, the Updated Safety Analysis Report and the applicable Electrical and Electronics Engineers Standards.

  This finding was more than minor because this finding was associated with design control attributes which affected the Mitigating Systems Cornerstone objective to ensure the reliability and capability of the component cooling water (CCW) system to respond to initiating events to prevent undesirable consequences. The use of a common balance of plant (non-safety) power supply to feed redundant safeguard electrical circuits, the lack of adequate electrical separation, and evaluation of seismic qualifications of some of these redundant circuits and components have the potential to upset plant stability, challenge critical safety functions during shutdown as well as power operations, and could potentially affect the reliability and capability of the CCW system to respond to initiating events.

  This design deficiency finding is assessed as Green because it did not result in an actual loss of the CCW system's safety function. A review of the system design identified a number of electrical separation issues, but did not result in any immediate operability concerns. This provides reasonable assurance that there has not been an actual loss of system function due to this condition. Therefore, this issue was screened out of the significance determination process as Green (Section 1R17).

Description of Design Change

Design Change Request (DCR) 3163 was initiated on January 30, 2000, to align the service water (SW) system on a safety injection (SI) signal to maximize flow to the containment fan coil units early in the event of an accident. Specifically, the design change modified the control circuits for SW to component cooling water (CCW) heat exchangers temperature control valves CV-31406/SW-1306A (Train A) and CV-31407/SW-1306B (Train B). The design change modified the control logic and added new control switches, relays, and solenoid valves, which would cause the SW-1306A/B valves to open on a SI signal and on loss of the non-safety control power. The DCR documented that actuators for SW-1306A/B, the SI relay contacts, the new switches, relays, and the cabling from the existing relays to the new relays were all classified QA1 (safety-related) and were to be separated per plant Kewaunee Engineering Specification ES-9010, "Cable Installation and Separation Criteria," and IEEE Standard 308-1971, "Criteria for Class 1E Electric Systems for Nuclear Power Generating Stations." Also, the safety evaluation for this DCR stated that the power supply

for the control circuit remained the same and that the new valves were powered from separate power supplies, separated as required by Engineering Specification ES-9010.

Use of Common Non-Safety Related Power Source to Feed Redundant Safety Circuits

The inspectors determined that the licensee failed to apply the needed Class 1E separation requirements to the 120 Vac power supplies and fuses that feed the two redundant and safety-related valve control circuits. The inspectors noted however, that the licensee did apply the required Class 1E separation to the electrical components used in the same circuits such as relays, switches, solenoids, the interconnecting wiring and the routing of cables. For some reason, this separation requirement was not applied to the 120 Vac power supplies. The licensee used the same common non-safety related power source to feed both of the safety-related valve control circuits. The non-safety related power supply is not considered quality power that is free from adverse voltage and current transients, which can disturb component operation. The licensee failed to address the effect of non-safety related power supply on the solenoids. The non-safety power supply may have a detrimental effect on the solenoids and the solenoids could be degraded so that they may not perform their intended safety function.

Two independent reviewers from the Electrical and Instrumentation and Control Branch in the Office of Nuclear Reactor Regulation also reviewed this electrical separation issue and concurred with the non-cited violation and RIII's assessment of this issue.

NRC Response to the Violation Contested by the Licensee

In their reply to Non-Cited Violation 02-07-01, the licensee stated that they did not agree that the design of the power and control circuits for the CCW control valves is in violation of plant procedures, design basis documents or industry electrical design standards. However, on page 8 of the response, the licensee agreed that a violation of 10 CFR Part 50, Appendix B, Criterion III, did occur, but not against procedures, design basis documents, or industry electrical design standards.

Licensee's basis for denying the non-cited violation included the following:

(1) The licensee stated that the valves' safety-related function is to open when a post accident SI signal is present. This function is accomplished by de-energizing the solenoids that align control air to the control valve actuators. Therefore, the licensee stated that there is sufficient separation to fulfill the requirements and meet the ES-9010 intent, even though both redundant valves' control circuits are fed by a common non-safety related power supply.

NRC Response: The NRC does not agree with the licensee's philosophy used whereby the power feeds to two separate and redundant safety-related circuits do not have to be supplied from safety-related and redundant sources (if the safety function of the safety-related Train A and Train B control valves is accomplished by de-energizing the solenoids). As stated in detail in report 02-07, the electrical configuration used to feed the valve control circuits is contrary to plant design procedures, design basis documents and industry electrical design standards.

When asked during the inspection, the licensee could not provide a plant, industry or NRC document that approves or supports this electrical design philosophy.

(2) The licensee stated that when DCR 3163 was initiated, it took the plant's existing control valve circuit design (which was non-safety related) and upgraded portions of it to safety-related. The newly added solenoids, control switches, control contacts, and control cabling for the control valves were designed and classified as safety-related components. The DCR never changed the existing power source. The portion of the control circuit that was upgraded is separated according to the requirements of the ES-9010.

NRC Response: The NRC concern regarding this design change is that the DCR failed to also upgrade the existing power source to the now upgraded safety-related components in the redundant control valves' circuits. Upgrading the power source from non-safety to safety-related and providing redundant and safety-related power supplies to the valve control circuits would ensure components associated with these valves would have been safety-related and in compliance with plant procedures, design basis documents and industry electrical design standards.

(3) The licensee stated that there is no single failure in the circuit design that would prevent the safety-related function of both valves to open. There are no shorts or other circuit fault conditions upstream or down stream of the safety-related interrupting contacts for the power source to the valves' solenoids that could cause a loss of both of the valves safety-related function to open the valves.

NRC Response: Since the redundant safety-related circuits are being fed by a common non-safety power source one can not provide assurance that a single failure in the non-safety common source would not adversely affect both circuits. When the inspector asked that the licensee provide an analysis or documentation to support their statements relative to the single failure conclusions noted above, such an analysis was not available for review.

(4) The licensee stated that it is recognized that the non-qualified, non-safety portion of the control circuit and power source leads to inadvertent or undesired opening of the temperature control valves and a transient on the CCW system and upon the plant (undesirable reactivity change), it is not an impact on any engineered safety feature and does not form a basis for applying the ES, USAR, or IEEE electrical standards. Consequently, the licensee stated that a loss of control that causes the valves to fail open is not truly relevant and should not be considered when relating the circuit design to be compliant or not.

NRC Response: Relative to this issue, the inspectors documented in the inspection report that on at least nine (9) separate occasions, between May 2000 and February 2003, control valves SW-1306A and/or SW-1306B inadvertently opened, potentially causing an undesirable positive reactivity addition in the reactor. These events occurred during normal plant operation due to random grid disturbances, lightning strikes, and/or surveillance testing activities. Inadvertent opening of valves SW-1306A and/or SW-1306B causes the CCW temp to decrease, and potentially have a positive reactivity affect on the reactor. The inspectors also noted that operator workaround 01-22 and abnormal procedure A-CC-31A, "Abnormal Conditions in the

Component Cooling System," were implemented during these events to bypass the letdown demineralizer and to regain control of the system and prevent positive reactivity addition. In addition, on June 21, 2002, the licensee concluded that as a result of the numerous instances where valves SW-1306A and B have failed open, System 38 Function 04 (supplies 120VAC QA2 power) has had repetitive maintenance preventable functional failures (MPFF) and was considered (a)(2) degraded.

The inspectors determined that the lack of design control regarding reliable power sources (use of non-safety related power sources in lieu of safety-related sources) and lack of adequate electrical separation contributed to the inadvertent and unexpected opening of the control valves and resulted in potential reactivity related events and a undesirable challenge to the operators and the safeguard components and systems.

(5) Relative to the reference to IEEE Standard 308-1971, the licensee does not see this as an applicable standard for control circuit in question.

NRC Response: Kewaunee is committed to IEEE Standard 308-1971. This standard is applicable, in part, to vital instrumentation and control power systems including power supplies that provide electrical power to Class 1E, safety-related and redundant electrical systems in nuclear power generating stations.

(6) In the design of the power source to the valves in question, independence of power is not required to ensure that the valve will open. If power were required to open the valve to ensure its safeguards function, NMC would agree that independence would be necessary.

NRC Response: Electrical separation requirements to maintain independence, redundancy and reliable operation of safety-related Class 1E electrical components and systems applies to normally energized as well as to normally de-energized electrical circuits and systems. When asked if this separation philosophy regarding normally energized circuits has been formally documented and approved, the licensee could not provide documented evidence to support this position.

(7) In summation, the design of the system at Kewaunee is sufficiently independent so as to fulfill their intended safety functions. There is also adequate separation so that no single failure (IEEE-279) can result in loss of a safety function for the valves.

NRC Response: The NRC disagrees with the conclusions arrived in the summation that the design of the system for the control valves is sufficiently independent so as to fulfill their intended safety functions. Per ES-9010, USAR, and applicable industry standards and codes, safeguard components in Class 1E electrical circuits must meet electrical separation requirements to ensure redundant circuit independence and system reliability. Separation requirements need to be applied for the power supplies similar to the rest of the electrical components in the safeguard, Class 1E circuits.

During the inspection, the licensee was asked to conduct an extent of condition review to determine if similar electrical separation applications existed in other safety-related systems. The licensee could not identify other similar applications in safety-related circuits at Kewaunee.

NRC Conclusion:

NRC review of the licensee's denial of the Non-Cited Violation determined that the bases for the denial is not valid. Specifically, the NRC considers the use of a common non-safety related power supply to feed redundant normally energized safeguard Train A and Train B electrical circuits to be contrary to the requirements of Kewaunee's design procedure ES-9010, the USAR and the applicable industry standards and codes. The use of un-reliable non-safety related power quality, with undervoltage, overvoltage and frequency variations, in safety-related applications may have a detrimental effect on the solenoids which could be degraded such that they may not perform their intended function. To address all potential failure modes of redundant circuits in safety-related applications, it is essential that redundancy and electrical separation of redundant safety-related circuits be maintained, including the power supplies to the safety-related control circuits.

ENCLOSURE

Applicable Section from Inspection Report 50-305/02-07(DRS)
(for information only)

1R17 Permanent Plant Modifications (71111.17B)

Review of Recent Permanent Plant Modifications

a. Inspection Scope

The inspectors reviewed 17 permanent plant modifications that were performed by the licensee's engineering staff during the last two years, 10 of which were commercial grade dedications. Three of the modifications affected the component cooling water system and therefore, review of these modifications counted for completion of activities under both NRC Inspection Procedures 71111, Attachments 17 and 21. The modifications were reviewed to verify that the completed design changes were in accordance with specified design requirements and the licensing bases and to confirm that the changes did not affect the modified system or other systems' safety function. Calculations which were performed or revised to support the modifications were also reviewed. As applicable to the status of the modification, post-modification testing was reviewed to verify that the system, and associated support systems, functioned properly and that the modification accomplished its intended function. The inspectors also verified that the completed modifications did not place the plant in an increased risk configuration. The inspectors evaluated the modifications against the licensee's design basis documents and the Updated Safety Analysis Report (USAR). The inspectors also used applicable industry standards, such as the American Society of Mechanical Engineers (ASME) Code and the Institute of Electrical and Electronics Engineers (IEEE) Standards, to evaluate acceptability of the modifications.

b. Findings

Introduction: Green. The inspectors identified a Non-Cited Violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," that pertained to improper application and use of a common balance-of-plant (BOP) non-safety power supply to feed two redundant safety related control valve circuits.

Discussion: Design Change Request (DCR) 3163 was initiated on January 30, 2000, to align the service water (SW) system on a safety injection (SI) signal to maximize flow to the containment fan coil units early in the event of an accident. Specifically, the design change modified the control circuits for SW to component cooling water (CCW) heat exchangers temperature control valves CV-31406/SW-1306A (Train A) and CV-31407/SW-1306B (Train B). The design change modified the control logic and added control switches, relays, and solenoid valves, which would cause the SW-1306A/B valves to open on a SI signal and on loss of the non-safety control power.

The valves were designed to modulate and control SW flow to the CCW heat exchangers, thereby controlling CCW temperature during normal plant operation. If the

valves were fully open, the CCW temperature at the heat exchanger outlet would be cooled to approximately the SW temperature. This would then result in a subsequent cooldown of the letdown flow temperature. The valves were designed to fail open on a SI signal, loss of air, or loss of electrical power.

The DCR documented that actuators for SW-1306A/B, the SI relay contacts, the new switches, relays, and the cabling from the existing relays to the new relays were all classified QA1 (safety related) and were to be separated per plant Engineering Specification ES-9010, "Cable Installation and Separation Criteria," and IEEE Standard 308-1971, "Criteria for Class 1E Electric Systems for Nuclear Power Generating Stations." The inspectors noted that separation criteria in ES-9010 included the following:

- Section 4.1, "Safeguard Separation" stated, "The objective of the following criteria is to achieve independent electrical systems compatible with and for redundant equipment. Cable separation shall provide sufficient isolation between redundant systems so that no single failure or credible incident can render both systems inoperable or remove them from service."
- Section 4.1.2 stated, "There are two "trains" provided for the Redundant Safeguard System and four "channels" provided for the Reactor Protection System. Separation of these trains or channels must be maintained to preclude the possibility of any single incident causing both trains or more than one channel from becoming inoperative. The power, control, and instrumentation cables and trays for the Safeguard System and Reactor Protection System shall be separated as follows: Train "A," Train "B..."
- Section 4.1.3 stated, "The power cables for each Redundant Safeguard System may be placed in the cable trays only of the same train."
- Section 4.1.14 stated, "Where the wiring for redundant engineered safety features is within a single panel or panel section, this wiring shall be separated, one group from the other by six-inch (6") air space or fireproof barrier..., wiring not associated with either "train" may be grouped with one train but may not cross from one "train" bundle to the other "train."

The inspectors also noted that USAR Section 8.2-2, "Separation Criteria," Revision 17, contained similar separation requirements to the one specified in ES-9010. The separation criteria in the USAR included the following:

- Cable separation provides sufficient isolation between redundant systems so that no single failure or electrical incident can render both redundant systems inoperable or remove them from service.

- Non-safety related power, control or instrumentation cable shall not be permitted to cross over from one safeguard tray to another.

- Where the wiring for redundant engineering safety features is within a single panel or panel section, the wiring is separated one group from another, by a

> 6-inch air space or a fireproof barrier. The barriers are steel metal or flexible metallic conduit. Wiring not associated with either train may be grouped with one train but may not cross from one train bundle to the other train.

IEEE Standard 308-1971, Section 5.4, "Vital Instrumentation and Control Power Systems," stated in part,

> Dependable power supplies are required for the vital instrumentation and control systems of the unit(s) including the engineering safety feature instrumentation and control systems.
>
> Power must be supplied to these systems in such a manner as to preserve their reliability, independence and redundancy. Typically one or more of the following may be required: (3) two or more independent alternating current power supplies having a degree of reliability and availability, compatible with systems they serve.

The inspectors concluded that use of a common non-safety related power supply to feed both trains of safety related circuits was not in accordance with the requirements stated above. The non-safety related power supply was not considered quality power that was free from adverse voltage and current transients, which can disturb component operation.

IEEE Standard 279-1968, "Proposed IEEE Criteria for Nuclear Power Plant Protection Systems," required that protection systems that generate reactor trip or engineered safeguards actuation meet the single failure criterion specified in the IEEE Standard. Section 4.2 states under Single Failure Criterion, "any single failure within the protection system shall not prevent proper protection system action when required." Valves SW-1306A and B were designed as redundant safeguard components/systems and were therefore required to meet the single failure criterion of IEEE Standard 279. Section 3, "Design Basis," states in part, a specific protection system design basis shall be provided for each nuclear power plant and shall document as a minimum the following: (h) the malfunction, accidents, or other unusual events (e.g., fire, explosion, missiles, lightening, flood, earth-quake, etc.) which could physically damage protection system components or could cause environmental changes leading to functional degradation of system performance and for which provisions must be incorporated to retain necessary protection system action.

The inspectors reviewed the safety evaluation for this DCR. In response to question No. 1, the safety evaluation for this DCR stated that the power supply for the control circuit remained the same and that the new valves were powered from separate power supplies, separated by Engineering Specification ES-9010. However, the inspectors determined that the 120VAC power supply for valves SW-1306A and SW-1306B redundant control circuit logic was not being provided from separate safeguards power supplies (as it should have been for redundant circuits) and was not separated per the separation requirements delineated in Engineering Specification ES-9010. The DCR

design implemented in the field indicated that the redundant safeguards valves were powered from the same BOP (non-safeguard) power feed supplied by fuse panel RR172 (circuits ACNI-9 and ACNI-10), as shown on schematic diagram E-2492, Revision G. The licensee, however, considered it separate power supplies based on the use of a separate fuse from the same BOP source to feed each of the redundant valve's control circuits. As such, the licensee considered that the installed modification was in agreement with the statements in the safety evaluation. On February 4, 2003, the licensee initiated CAP014584 which documented the difference between the licensee's and inspectors positions with respect to the statements in the safety evaluation. The CAP stated that this was not an operability issue and that there was no failure potential that can impact the operability of the CCW system from fulfilling its safeguards function. However, the inspectors noted that there was no detailed engineering analysis to evaluate all potential failures that could result from feeding both redundant circuits from the same BOP feed.

The inspectors also determined that while the DCR stated that the SW-1306A/B valve actuators (CV-31406 and CV-31407) were QA 1 components, they were supplied and installed as non-safety (QA-2) components (reference CAP013501, dated October 30, 2002). In addition, the inspectors noted that an evaluation was not performed for DCR 3163 to ensure that SW-1306A/B control switches 19904 and 19905 were seismically qualified. CAP014389 was initiated on January 20, 2003, to address this issue. The inspectors also noted that temperature controllers TC-26309 and TC-26310 used for controlling CCW temperature by modulating opening positions of valves 1306A and 1306B had been designated as non-safety components and were also fed from the same common non-safety power supply.

The DCR stated that normal (non-safeguards) power will be used to power the new solenoid valves consistent with the remainder of the SW 1306A/B valves and that the valves will be powered from two existing separate circuits. However, the inspectors noted that the remainder of the SW-1306A/B control circuits were designed and installed as safeguard systems but were fed from a common BOP feed.

The inspectors reviewed the electrical schematic and wiring diagrams for SW-1306A/B and noted that terminal box (TB)1371, shown on wiring diagram E-2112, Revision V, contained field wiring for both SW-1306A and SW-1306B valve circuits. Electrical conductors coded ACN1-9L1 and ACN1-9L2 (designated as Train A wires), electrical conductors coded ACN1-10L1 and ACN1-10L2 (designated as Train B wires), and BOP conductors ACN1-42L1 and ACN1-42L2 were all terminated to terminal blocks inside TB1371. In addition, a conduit containing the cables feeding control circuits for SW-1306A and SW-1306B valves was routed from Train A section to Train B section of TB2771. This conduit contained wire codes ACN1-42L1(power supply to BOP lights and controllers for both 1306A and 1306B valves), ACN1-9L1 and ACN1-9L2 (power supply to SW-1306A control circuit), and ACN1-10L1 and ACN1-10L2 (power to SW-1306B control circuit).

The inspectors also conducted a field inspection of SW-1306A/B and its associated components. Wiring diagram E-I531, Revision AJ, showed TB2771 wiring which included the new relays and switches. TB2771 was divided into two sections, which were separated horizontally by a fireproof metal barrier to separate SW-1306A (Train A) electrical components from SW-1306B (Train B) electrical components. The BOP feeds from common fuse panel RR172 were routed via the same conduit into TB2771. Train A related (9L1) 120VAC BOP feed was routed to the Train A section of TB2771 and Train B related (10L1) 120VAC BOP feed was routed via the same conduit to the Train B portion of TB2771. A short conduit was routed from Train A section to Train B section of TB2771. This conduit contained the BOP feed cables conductors. The inspectors determined that the present installed configuration of the 120VAC BOP feeds to SW-1306A/B resulted in electrically connecting Train A and Train B circuitry through the 120VAC BOP power supplies. Each of the SW-1306A/B control circuits was protected by one fuse and one slug located in RR172. The inspectors determined that the installed electrical configuration was contrary to the electrical separation requirements delineated in ES-9010, USAR 8.2.2, and IEEE-308-1971.

During review of condition reports, the inspectors identified that since May 2000, the SW-1306A and/or the SW-1306B valve(s) inadvertently opened on at least nine separate occasions. These following events occurred during normal plant operation due to random grid disturbances, lightning strikes, and/or surveillance testing activities.

- May 10, 2000, (Kewaunee Assessment Process (KAP) 00-001414) SW-1306A/B failed open when grid perturbation caused short lived loss of voltage. The KAP stated that this condition has been experienced in the past.
- September 2, 2000, (KAP 00-003120) an electrical disturbance caused by a lightning induced spike resulted in reactivity problems when SW-1306A and B had failed open.
- November 24, 2001, (KAP 01-018732) SW-1306B failed open during performance of SP-33-110, “Diesel Generator Automatic Test,” as a result of load shedding and restarting of large loads. The KAP stated that the apparent cause for the identified problem appears to be that the system design is subject to this type of event because a momentary loss of power which occurs when switching 120VAC QA2 power will result in valves SW-1306A and B failing open.
- November 20, 2001, (KAP 01-18695) valves SW-1306A and B failed open during performance of surveillance testing SOP-ELV-40-8, after losing power during a power switching activity.
- June 24, 2002, (CAP012001) a transient where both SW-1306A and B valves opened due to an electrical transient. This caused the CCW temp to decrease, which could have had a positive reactivity affect on the reactor had the operators not taken actions. The CAP documented that operator workaround 01-22 and abnormal procedure A-CC-31A, “Abnormal Conditions in the Component Cooling System,” were implemented to bypass the letdown demin and an auxiliary operator was dispatched to regain control of the system. Reactivity effects were monitored, although no changes were seen due to early recognition of the problem. The inspectors determined that loss of the common non-safety power

supply resulted in both valves opening unexpectedly, challenging the operators by use of an operator workaround to expeditiously bypass letdown demin and prevent a potential positive reactivity effect.

- July 9, 2002, (CAP012174) a misalignment of substation capacitor bank opening and closing resulted in a voltage dip that caused SW-1306B to fail open. Operator workaround 01-22 and abnormal procedure A-CC-31A were implemented to bypass the letdown demin and an auxiliary operator was dispatched to regain control of the system.

The first three items above were determined by the licensee to be maintenance rule functional failures in maintenance rule evaluation MRE000082, dated November 21, 2001. The fourth item above was classified as a maintenance preventible functional failure in KAP 01-18695. Condition Evaluation CE002373, dated February 12, 2002, and apparent cause evaluation ACE001828, dated June 21, 2002, concluded that as a result of the numerous instances where valves SW-1306A and B have failed open, System 38 Function 04 (supplies 120VAC QA2 power) has had a repetitive MPFF and was considered (a)(2) degraded. ACE001828 documented three more instances where SW-1306A or B valves failed open on June 23, July 21, and July 22, 2002, during substation breaker manipulation and lightening strikes. Licensee's investigation (ACE001828) revealed the following three distinct concerns related to the SW-1306A and B valve events: (1) The effects of random grid disturbances while at full power should not result in these valves fully opening at times when plant power is not lost or interrupted and a SI signal in not present, (2) train separation (should the power supply for these valves be separated instead of tied to the same source), and (3) the controllers are obsolete.

To identify the correct cause of the SW-1306A/B valves inadvertent openings and to determine if Design Change 3205 (initiated to modify the power supplies to the electronic controllers) will address the concern of the undesired opening of these valves under certain conditions, the licensee issued temporary change TC 02-01 on July 2, 2002, to install monitoring equipment on the SW-1306B train. This has not yet been implemented in the field. Therefore, the inspectors noted that actual cause of SW-1306A/B failing open during normal plant operations has yet to be determined.

In a related matter, the licensee documented in OTH002449, dated August 30, 2001, that CC water temperature could reach 39^0F during an event where a SI signal was generated (SW-1306A and B open). The licensee stated in the OTH that this temperature was not considered in the piping analysis and that the issue needed to be examined by Westinghouse.

Analysis: Evaluation of this issue concluded that it was a design control issue resulting in a finding of very low safety significance (Green). The design control issue was due to a licensee performance deficiency in that the licensee failed to adequately control the design modification process for modification DCR 3163 as required by established plant and industry design standards.

In accordance with Manual Chapter 0612, the inspectors determined the issue was more than minor because this finding was associated with design control attributes which affected the Mitigating Systems Cornerstone objective to ensure the reliability and capability of the CCW system to respond to initiating events to prevent undesirable consequences. The use of a common BOP (non-safety) power supply to feed redundant safeguard electrical circuits, the lack of adequate electrical separation, and evaluation of seismic qualifications of some of these redundant circuits and components have the potential to upset plant stability, challenge critical safety functions during shutdown as well as power operations, and could potentially affect the reliability and capability of the CCW system to respond to initiating events.

This design deficiency finding is assessed as Green because it did not result in an actual loss of the CCW system's safety function. A review of the system design identified a number of electrical separation issues, but did not result in any immediate operability concerns. This provides reasonable assurance that there has not been an actual loss of system function due to this condition. Therefore, this issue was screened out of the significance determination process as Green.

Enforcement: 10 CFR Part 50, Appendix B, Criterion III, "Design Control," states, in part, that measures be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. It further states that design changes shall be subject to design control measures commensurate with those applied to the original design. Section 4.1.2 of ES-9010 states in part that cable separation shall provide sufficient isolation between redundant systems and that the power and control cables for the safeguard system shall be separated.

Contrary to the above, on June 30, 2000, the installed electrical configuration was not in accordance with plant and industry established electrical separation design requirements as specified in IEEE Standard 308-1971, and in ES-9010 for the control circuits for temperature control valves SW-1306A/CV-31406 and SW-1306B/CV-31407. The licensee used non-safety related 120VAC power supplies from a common fuse cabinet to feed the redundant safeguard system control circuits for these valves in lieu of separate safety related power supplies, which would provide sufficient isolation between these safeguard redundant systems.

Because of the low safety significance of this issue and because it was entered in the licensee's corrective action program (CAP013801), the issue is being treated as a Non-Cited Violation, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 50-305/02-07-01).