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DENTON,H. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards response to NRC 811124 ltr re generic concerns of venting & purging containment.One oversize drawing encl. Aperture card is in PDR.

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**Iowa Electric Light and Power Company**

March 15, 1982
LDR-82-078

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ASSISTANT VICE PRESIDENT
NUCLEAR GENERATION

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Mr. Harold Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Denton:

This letter and enclosures provide information requested in Mr. Thomas Ippolito's letter dated November 24, 1981 regarding the generic concerns of purging and venting of containment.

With regard to the request for proposed changes to the technical specifications, Attachment C to the enclosed report provides a description of the changes to be submitted. Due to the evaluation and approval process required by our procedures, it is estimated that the proposed amendment will be submitted in 30 to 45 days.

Please contact this office if there are any questions concerning this matter.

Very truly yours,

B. W. McDonughy
for Larry D. Root
Assistant Vice President
Nuclear Generation

LDR/BWR/dmh*

cc: B. Reid
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Iowa Electric Light and Power Company

Response To

NRC Generic Concerns of

Venting and Purging of Containment

## 1.0 CONFORMANCE TO STANDARD REVIEW PLAN SECTION 6.2.4, REVISION 1 AND BRANCH TECHNICAL POSITION CSB 6-4, REVISION 1

### 1.1 POSITION

Provide sufficient information concerning provisions made to ensure that isolation valve closure will not be prevented by debris which could potentially become entrained in the escaping air and steam.

Response

In Reference 3, Iowa Electric indicated that a visual inspection of the purge connections in the drywell and torus had been conducted and that further evaluation was necessary. Based on subsequent evaluations and the close proximity of valves to the penetration, it has been determined that additional protection against debris may be desirable for the drywell purge exhaust connection (Figure 1). It has also been determined that additional protection against debris is not necessary for the torus purge exhaust, torus purge supply, and drywell purge supply connections. For the torus purge exhaust and torus purge supply connections, this determination is based on the location of the conncections (vertical takeoffs near top of torus) and the lack of debris in the torus. For the drywell purge supply connection, this determination is based on the remote location of the isolation valves relative to the connection and the piping configuration between them (Figure 2). Iowa Electric is proceeding with the development of design modifications to provide a Seismic Category I debris screen for the drywell purge exhaust connection.

### 1.2 POSITION

Provide an analysis of airborne radiation released as a result of a LOCA, which includes the amount of air/steam which will be released to the environment prior to purge system isolation following a LOCA.

Response

Iowa Electric has performed an analysis of the potential consequences of a design basis LOCA occurring during containment purge system operation. The analysis includes determination of the airborne radiation and the mass of air/steam released through all purge lines prior to full closure of the 18-inch purge line isolation valves. The results of this analysis demonstrate that the potential airborne radiation released to the environment as a result of this accident scenario is well below the guidelines of 10CFR100.

1. Airborne radiation released via purge lines (drywell and torus, supply and exhaust) prior to isolation

   o Thyroid dose at exclusion area boundary = 3 mrem

2. Combined air/steam mass released via purge lines (supply and exhaust)

- Drywell = 299 pound-mass
- Torus = 147 pound-mass
- Total = 446 pound-mass

1.3 POSITION

Provide an analysis of the provisions to protect structures and safety-related equipment located downstream of the purge isolation valves against a loss of function from the environment created by the escaping air and steam.

Response

Iowa Electric has evaluated the effect of the escaping air/steam mass on safety-related equipment located down-stream of the purge isolation valves. Based on this evaluation, it has been determined that additional provisions to protect against possible overpressurization of the SGTS downstream of the drywell and torus purge exhaust valves may be desirable. No safety-related equipment is located downstream of the drywell and torus purge supply isolation valves. Iowa Electric is proceeding with the development of design modifications to provide additional protection against overpressurization of the SGTS.

1.4 POSITION

Although the licensee provided information to justify unlimited purging/venting during power operation, purging/venting should be limited, because the plant is inherently safer with closed purge/vent valves than with open lines which require valve action to provide containment integrity. We therefore recommend that the licensee commit to limit usage of the purge/vent system commensurate with identified safety needs.

Response

In References 3 and 4, Iowa Electric provided detailed discussion of its position regarding purging at the DAEC. It is Iowa Electric's position that a maximum numerical limit on annual purge time, which may unduly restrict the number of containment entries for safety-related reasons, is not in the best interest of safety. However, Iowa Electric remains committed to minimize purging, in the interest of safety, without unduly limiting plant flexibility. Therefore, Iowa Electric proposes the following restrictions to limit purging at the DAEC:

1. Purging During Reactor Operational Modes

- Mode a (startup/hot standby),
- Mode b (run), and
- Mode c (shutdown), the hot shutdown condition

Purging shall be limited to a maximum of 90 hours per year, plus up to an additional 48 hours during each plant shutdown.

2. The above limits will not apply to reactor operational modes:

- Mode c (shutdown), the cold shutdown condition
- Mode d (refuel)

## 2.0 VALVE OPERABILITY

### 2.1 POSITION

This item is still under review. By letter dated December 14, 1979, you provided your response to our September 27, 1979, letter which requested a program demonstrating purge and vent valve operability. This response will be the subject of future communications as the staff review progresses.

Response

No response has been requested at this time.

## 3.0 SAFETY ACTUATION SIGNAL OVERRIDE

### 3.1 POSITION

The licensee should provide, in accordance with Criterion 4, a system whereby the purge/vent valves, including all lines to the Standby Gas Treatment System (SGTS), will receive an automatic isolation signal upon the existence of a high radiation condition inside the primary containment (i.e., the drywell).

Response

As indicated in Reference 1, Iowa Electric concurs with the BWR Owners Group position on this item. As stated in Reference 2, an assessment was performed to determine the benefits of providing automatic closure of the containment vent and purge valves on a containment high radiation signal. This study shows that, based on existing monitoring capability and dose considerations, the automatic closure of containment vent and purge valves on high containment radiation is not necessary. The BWR Owners Group is currently pursuing resolution of this issue.

### 3.2 POSITION

The licensee should re-review the design of the purge/vent system to the SGTS to assure that all needed post-accident capabilities are provided.

The following from Enclosure 5 of Reference 5 provides a clarification of this position:

> . . . we note that the smaller bypass lines (around the purge exhaust valves) to the standby gas treatment system cannot be operated unless all PCIS actuation signals have subsided (i.e., cleared) and the PCIS logic network has been manually reset. This situation arises from the fact that the PCIS trip logic interrupts power to these valve solenoids at two points and only one of

points is overridden by the installed normal-torus-drywell override switch. The licensee should re-review this aspect of the design to assure that all needed post-accident capabilities are provided by the design.

Response

The DAEC purge/vent system control logic had previously been modified to include the design features described in Attachment A subsequent to the submittal of information used in the Franklin Research Center review.

Iowa Electric has again reviewed this aspect of the design of the DAEC purge/vent system to SGTS. The results of this review demonstrate the operability of smaller inboard bypass purge valves CV-4309 (torus purge exhaust) and CV-4310 (drywell purge exhaust) and verify that the DAEC design provides purge/vent capability to the SGTS via the 2-inch bypass lines under post-accident conditions. Attachment A provides a description of this capability.

4.0 CONTAINMENT LEAKAGE DUE TO SEAL DETERIORATION

4.1 POSITION

We request that you propose Technical Specification changes incorporating the test recommendations set forth in Enclosure 1 together with the details of your proposed test program within 60 days of receipt of this letter. If the results of current and past surveillance are believed to demonstrate operability of these valves, provide this information as justification for not increasing the surveillance requirements.

Response

Iowa Electric has reviewed the results of current and past surveillance testing of the DAEC purge system isolation valves, and has determined that the current Type C surveillance testing requirements, as defined in the DAEC Technical Specifications, are adequate to demonstrate operability of these valves. Iowa Electric has also reviewed the recommendations for additional leakage integrity testing of the purge system isolation valves contained in Enclosure 1 of Reference 5. In these recommendations, the NRC states that the purpose of the additional leakage integrity testing is to identify excessive degradation of the purge isolation valve resilient seats; therefore, these tests need not be conducted with the precision required for the Type C isolation valve testing in 10CFR50, Appendix J. Although the DAEC has not experienced excessive degradation of the purge isolation valve resilient seats, more frequent monitoring of the condition of these valves may be desirable. Therefore, Iowa Electric has developed a proposed purge isolation valve leakage integrity test program to be performed in addition to the Type C testing required by 10CFR50, Appendix J. Attachment B to this letter provides the details of this program. Proposed Technical Specification changes incorporating this additional testing are addressed in Attachment C.

## 5.0 TECHNICAL SPECIFICATIONS REVIEW

### 5.1 POSITION

Although the Technical Specifications necessary to finalize the purge and vent part of Item II.E.4.2 are not completely finalized, a recently developed sample Technical Specification is provided for your consideration as Enclosure 6. We request that you review existing Technical Specifications against the sample provided herein. For any areas in which your existing Technical Specifications need expansion, you are requested to provide a Technical Specification change request within 60 days of receipt of this letter.

Response

Iowa Electric has reviewed the DAEC Technical Specifications and the sample Technical Specification contained in Enclosure 6 of Reference 5. Based on this review and the commitments addressed in the responses to Positions 1.4 and 4.1 of this report, Iowa Electric will propose Technical Specification changes for the DAEC. The changes are addressed in Attachment C to this letter. Further review will be performed and, if necessary, additional changes will be proposed upon resolution of the Technical Specifications necessary to finalize the purge and vent portion of NUREG 0737, Item II.E.4.2.

REFERENCES


1. Iowa Electric Letter LDR-81-223, L.D. Root to H. Denton, dated July 1, 1981

2. T.J. Dente to D.G. Eisenhut letter, dated June 29, 1981, BWR Owners Group Evaluation of NUREG 0737, Item II.E.4.2(7)

3. Iowa Electric Letter LDR-80-54, L.D. Root to T.A. Ippolito, dated February 15, 1980

4. Iowa Electric Letter LDR-79-173, L.D. Root to T.A. Ippolito, dated August 31, 1979

5. NRC letter, T.A. Ippolito to D. Arnold, dated November 24, 1981

## ATTACHMENT A

### POST-ACCIDENT PURGE/VENT CAPABILITY

Under Group III isolation conditions (see Note 1), the DAEC design provides the plant operator with the capability to purge/vent either the drywell or torus through one of two paths. One path for post-accident purging/venting is through inboard torus bypass purge valve CV-4309 and outboard torus purge valve CV-4301. The alternative path is through inboard drywell bypass purge valve CV-4310 and outboard drywell purge valve CV-4303 (see Figures 1 and 3). To reopen these valves following a Group III isolation, the capability to override the Group III isolation signal is provided.

A Group III isolation will deenergize relay K74A and, consequently, the control circuitry for each containment purge isolation valve to cut off power to the solenoid valve(s) providing air to the purge valve actuators. Loss of power to the solenoid valves will vent air from the corresponding valve actuators, causing actuator spring force to close each of the containment purge isolation valves.

Containment purging/venting under Group III isolation conditions will require manipulation of at least five keyswitches by the plant operator. These include the following:

a. One or more keyswitches to bypass the Group III isolation parameter contact(s) which initiated the containment isolation in the Division I (inboard bypass purge valves CV-4309 and CV-4310) circuitry

b. One or more keyswitches to bypass the Group III isolation parameter contact(s) which initiated the containment isolation in the Division II (outboard purge valves CV-4301 and CV-4303) circuitry

c. The S34 keyswitch which selects the source of containment purging as either the torus or drywell

d. The keylocked (override) position on the control switch for the corresponding outboard purge valve (CV-4301 or CV-4303)

e. The keylocked (override) position on the control switch for the corresponding inboard bypass purge valve (CV-4309 or CV-4310)

Steps a, b, and c above will restore power to the control switches for valves CV-4309 and CV-4310. Step e would be initiated following opening of outboard valve CV-4301 or CV-4303 using the corresponding valve control switch in Step d, such that the inboard bypass purge valve would be the last valve opened and the first valve closed during post-accident purging/venting operations.

The DAEC design allows parameters which are not overridden to retrip the Group III isolation circuitry. In addition, the Group III isolation circuitry cannot be reset until all Group III trip parameters have been cleared (i.e., returned to their nontrip condition).

Note 1

Group III isolation conditions:

1. Reactor low water level

2. High drywell pressure

3. High/low radiation - reactor building ventilation exhaust plenum or refueling floor

ATTACHMENT B

PROPOSED TEST PROGRAM
PURGE SYSTEM ISOLATION VALVE LEAKAGE INTEGRITY TESTING

## I. INTRODUCTION

The proposed surveillance test will provide a means of periodically updating the type B and C Local Leak Rate Tests (LLRTs) to detect excessive leakage of the purge isolation valve resilient seats. The test can be divided into three parts:

A) The actual leak testing of the purge valves (PVs),

B) Updating the results of the most recent LLRT to reflect the newly measured PV leakage, and

C) Application of acceptance criteria.

The purge system isolation valves will be tested in three groups by penetration: drywell purge exhaust group (CV-4302 and CV-4303), torus purge exhaust group (CV-4300 and CV-4301), and drywell/torus purge supply group (CV-4307, CV-4308 and CV-4306). Test connections, setups, and procedures will be based on the DAEC standard test procedures for Type C testing of these purge system isolation valves (STP 47A005). The additional purge system isolation valve leakage integrity testing shall be performed at least once every three months.

## II. DEFINITIONS

1. Cplr (scc/min): The combined purge isolation valve leakage rate for all components subject to the purge system isolation valve leakage integrity testing

2. CLR (scc/min): The combined leakage rate for all components subject to Types B and C penetration tests, after repairs, measured during the most recent Types B and C reactor containment local leakage rate testing

3. PCLR (ss/min): The purge system combined Type C leakage rate for penetrations X-25, N-205, and X-26/N-220, after repairs, measured during the most recent Types B and C reactor containment local leakage rate testing

4. CLRa (scc/min): The combined leakage rate adjusted for all components subject to Types B and C penetration tests, with the exception of the purge system Type C penetration leakage rates (X-25, N-205 and X-26/N-220), after repairs, measured during the most recent Types B and C reactor containment local leakage rate testing

   CLRa = CLR - PCLR

5. TLR (scc/min): The total leakage rate determined during the purge system isolation valve leakage integrity testing is the sum of the combined leakage rates CLRa and Cplr defined above:

   TLR = CLRa + Cplr

6. $L_a$ (percent/24 hr): The design basis accident leakage rate at the calculated peak containment internal pressure defined in the Technical Specifications. (For the DAEC, $L_a$ equals 2% per day at 54 psig or 367,553 sccm.)

7. sccm: Cubic centimeters of air or nitrogen at standard temperature and pressure per minute

III. PROCEDURE

A. Measuring Leakage

In accordance with STP 47A005, measure the leakage for the following valve groups (grouped by penetration number):

| Penetration Number | Valves | Leakage Results (example) |
| --- | --- | --- |
| X-25 | CV-4302, 4303 | $X_1$ |
| X-26/N-220 | CV-4307, 4306, 4308 | $X_2$ |
| N-205 | CV-4300, 4301 | $X_3$ |

The sum of these leakage measurements ($X_1 + X_2 + X_3 = X_T$) is the Cplr (combined purge isolation valve leakage rate, defined above).

B. Update the Local Leak Rate Test

1. Obtain a copy of the most recent LLRT results and find the CLR (Combined Leakage Rate, defined above).

2. From the same LLRT, find the leakage measured after repairs for the three valve groups listed in part A above. The sum of these three leak rates is the PCLR (Purge System Combined Leakage Rate, defined above).

3. The CLR (obtained above) is adjusted by removing the leakage for the PV's (PCLR, obtained above). The result is the CLRa (Combined Leakage Rate Adjusted, defined above).

4. Find the new updated total leakage (TLR, Total Leakage Rate, defined above), by adding the Cplr (obtained above) to the CLRa (obtained above).

C. Acceptance Criteria

1. The TLR shall be less than 0.60 $L_a$ (Accident Leakage Rate, defined above). For DAEC Unit 1, 0.60 $L_a$ equals 220,532 sccm.

2. The absolute maximum leakage rate for any single penetration subject to the purge system isolation valve leakage integrity testing will be 5% of $L_a$ (18,378 sccm).

# ATTACHMENT C

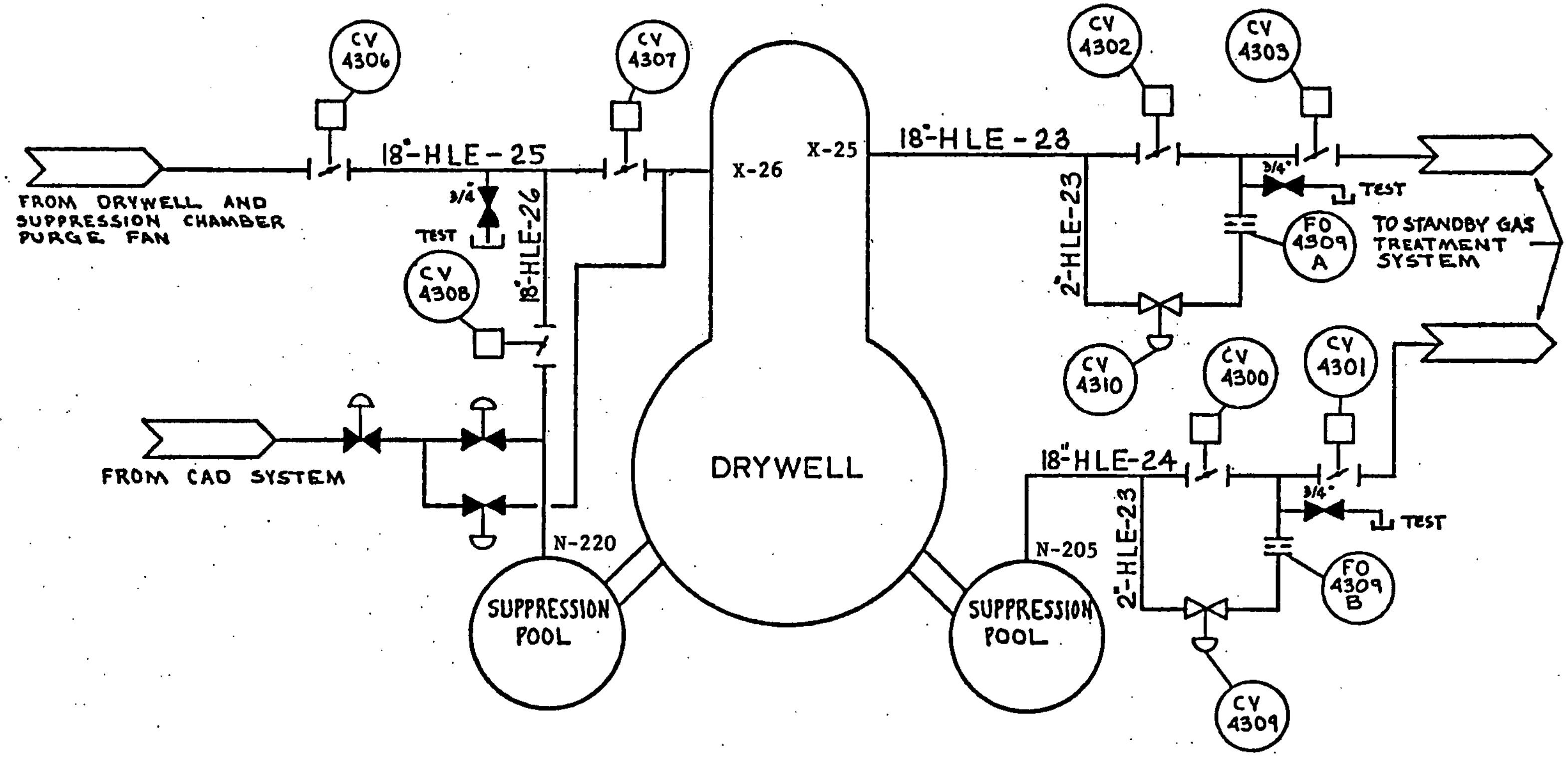
## DAEC TECHNICAL SPECIFICATION CHANGES

Based on the commitments addressed in the responses to Positions 1.4 and 4.1 in the response and review of the NRC sample Technical Specification (Reference 5), Iowa Electric will submit Technical Specification change requests incorporating the following:

1. Limiting purging as described in the response to Position 1.4 of the response.

2. Replacing the T-ring inflatable seals for purge isolation valves (CV-4300, CV-4301, CV-4302, CV-4303, CV-4306, CV-4307 and CV-4308) at intervals not to exceed 4 years.

3. Perform purge system isolation leakage integrity surveillance testing once every three months as described in the response to Position 4.1.




CONTAINMENT PURGE ISOLATION SYSTEM

FIGURE 1

DRYWELL/TORUS PURGE BYPASS VALVE CONTROL

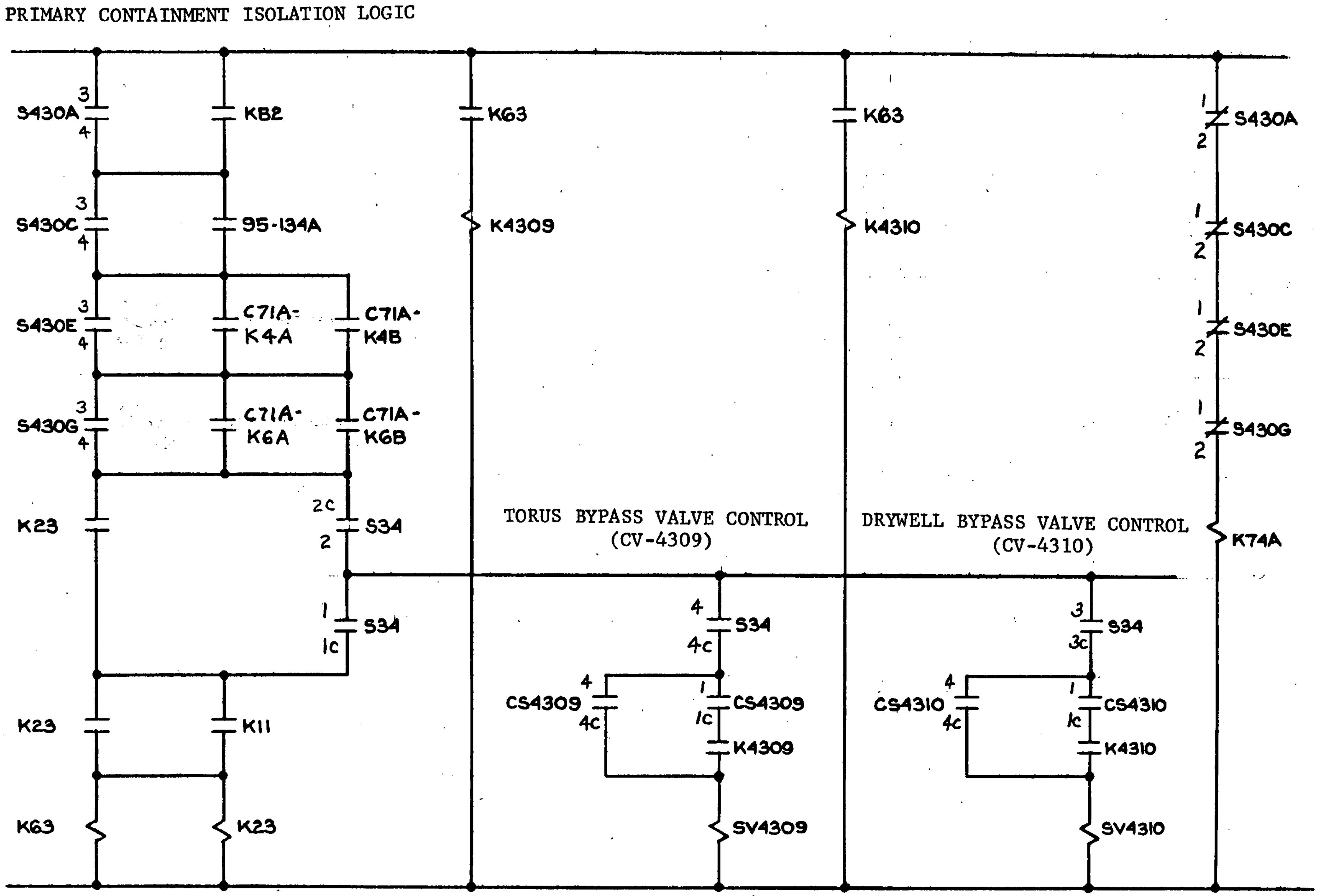


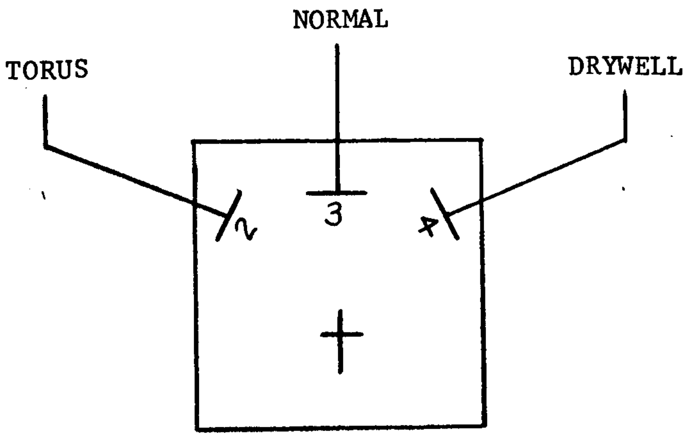

FIGURE 3

| COMPONENT ID | FUNCTION | OPERATION |
|---|---|---|
| KB2 | Parameter trip | Contact opens on refueling floor high radiation |
| S430A | KB2 override | Keylock switch * |
| 95-134A | Parameter trip | Contact opens on reactor bldg. ventilation high radiation or equipment failure |
| S430C | 95-134A override | Keylock switch * |
| C71A-K4A&B | Parameter trip | Contacts open on high drywell pressure |
| S430E | C71A-K4A&B override | Keylock switch * |
| C71A-K6A&B | Parameter trip | Contacts open on reactor low water level |
| S430G | C71A-K6A&B override | Keylock switch * |
| K11 | Trip logic reset | Keylock switch |
| K23 | Seal-in | ---- |
| K74A | Prevents K11 reset if trip overridden | Opens on close of S430A,C,E,or G |
| S34 | NORMAL-TORUS-DRYWELL bypass selector | 3-Position keylock switch (see Figure 4) |
| CS4309 | Valve control switch | 3-Position keylock switch (see Figure 4) |
| CS4310 | Valve control switch | 3-Position keylock switch (see Figure 4) |

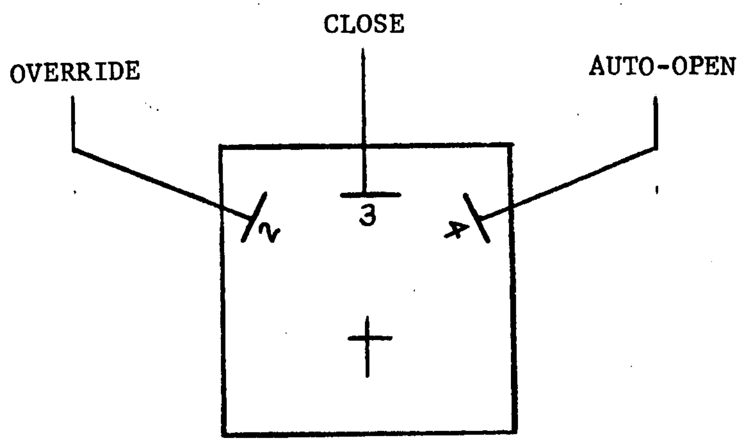
* Note: NORMAL POSITION - contacts 3/4 OPEN, contacts 1/2 CLOSED
BYPASS POSITION - contacts 3/4 CLOSED, contacts 1/2 OPEN

KEY to FIGURE 3

<u>CONTACT DEVELOPMENT FOR SWITCHES (S-34, CS-4309, and CS-4310)</u>




S-34




CS-4309 & CS-4310

| CONTACTS (HANDLE END) | | POSITION 4 | POSITION 3 | POSITION 2 |
|---|---|---|---|---|
| 1c ┤├ 1  2c ┤├ 2 | 1 | | X | |
| | 2 | X | | X |
| 3c ┤├ 3  4c ┤├ 4 | 3 | X | X | |
| | 4 | | X | X |
| 5c ┤├ 5  6c ┤├ 6 | 5 | X | | X |
| | 6 | | | |

S-34

| CONTACTS (HANDLE END) | | POSITION 4 | POSITION 3 | POSITION 2 |
|---|---|---|---|---|
| 1c ┤├ 1  2c ┤├ 2 | 1 | X | | |
| | 2 | | | X |
| 3c ┤├ 3  4c ┤├ 4 | 3 | X | | |
| | 4 | | | X |

CS-4309 & CS-4310

NOTE : (X) Indicates contacts are closed

FIGURE 4