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Docket No. 50-461

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Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Clinton Power Station Proposed Amendment of Facility Operating License No. NPF-62 (LS-96-001)

Dear Sir:

By letter dated August 12, 1994 (reference letter number U-602320) Illinois Power (IP) submitted an application for amendment of the Clinton Power Station (CPS) Operating License (License No. NPF-62) to incorporate a proposed change to the CPS Technical Specifications (Appendix A). IP proposed to revise Technical Specification (TS) 3.6.5.1, "Drywell," to allow drywell bypass leakage tests (DBLRTs) to be performed at intervals of up to ten years based, in part, on the demonstrated performance of the drywell barrier with respect to leak tightness.

IP indicated in its submittal that the requested change was being submitted as part of the cost beneficial licensing action (CBLA) program established by the NRC which provides for increased review priority to requests for changes requiring NRC review that involve high cost without a commensurate safety benefit. IP's request noted that while the proposed changes do have a safety benefit (e.g., as a result of occupational dose reduction due to reduced testing), the major benefit is economic. IP's letter identified that each DBLRT involves approximately 20 man-days of effort for set up and performance, including evaluation of the test results. During plant outages involving primary containment integrated leak rate tests (ILRTs), performance of a DBLRT requires approximately 15 hours critical path time. During non-ILRT outages, the required critical path time increases to approximately 24 hours. Rental of air compressors and other equipment necessary to conduct DBLRTs costs approximately $20,000. Based on the above, approval of this request will result in cost savings that exceed the threshold of $100,000 over the remaining life of the plant as established under the CBLA program.

IP had originally requested NRC review to support the fifth refueling outage (RF-5) which was conducted in March 1995. However, NRC review to support a permanent change could not be completed in sufficient time to support RF-5. Based on the large margin to the drywell bypass leakage limit, a one-time change to support RF-5 was subsequently approved as Amendment No. 96 dated March 1, 1995 and NRC

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continued its review of IP's permanent amendment request. In addition, NRC requested that this testing improvement be addressed generically for the Boiling Water Reactor (BWR)-6 product line (i.e., for Grand Gulf Nuclear Station, River Bend Station, Perry Nuclear Power Plant, and CPS).

On September 12, 1995, the BWR-6 licensees met with the NRC Staff to discuss generic aspects and justification for the proposed changes. Based on the results of that meeting, additional changes to the CPS TS are being proposed, consistent with the changes already docketed by the other BWR-6 licensees.

A description of the proposed change and the associated justification (including a Basis For No Significant Hazards Consideration) are provided in Attachment 2. A marked-up copy of the affected pages from the current TS is provided in Attachment 3. A marked-up copy of the affected pages from the current TS Bases is provided in Attachment 4. Further, an affidavit supporting the facts set forth in this letter and its attachments is provided in Attachment 1. Following NRC approval of this request, IP will revise the CPS TS Bases, in accordance with the TS Bases Control Program of TS 5.5.11, to incorporate the changes identified in Attachment 4. For clarity, the changes provided in Attachments 3 and 4 supersede, in their entirety, changes provided in IP letters U-602320 dated August 12, 1994 and U-602355 dated October 14, 1994.

IP has reviewed the proposed changes against the criteria of 10CFR51.22 for categorical exclusion from environmental impact considerations. The proposed changes do not involve a significant hazards consideration, or significantly increase individual or cumulative occupational radiation exposures. Based on the foregoing, IP concludes that the proposed changes meet the criteria given in 10CFR51.22(c)(9) for a categorical exclusion from the requirement for an Environmental Impact Statement.

Due to the refueling outage safety improvement and significant resource savings that can be realized by implementation of this proposed change, IP is requesting that this application be reviewed on a schedule sufficient to support the sixth refueling outage currently scheduled to begin October 13, 1996.

Sincerely yours,

Wilfred Connell

Wilfred Connell
Vice President

DAS/csm

Attachments

cc: NRC Clinton Licensing Project Manager
NRC Resident Office, V-690
Regional Administrator, Region III, USNRC
Illinois Department of Nuclear Safety

Attachment 1
to U-602549

Wilfred Connell, being first duly sworn, deposes and says: That he is Vice President of Illinois Power; that the application for amendment of Facility Operating License NPF-62 has been prepared under his supervision and direction; that he knows the contents thereof; and that to the best of his knowledge and belief said letter and the facts contained therein are true and correct.

Date: This 22nd day of February 1996.

Signed: Wilfred Connell
Wilfred Connell

STATE OF ILLINOIS } SS.
DeWitt COUNTY }

" OFFICIAL SEAL "
Jacqueline S. Matthias
Notary Public, State of Illinois
My Commission Expires 11/24/97

Subscribed and sworn to before me this 22nd day of February 1996.

Jacqueline S. Matthias
(Notary Public)

Background

Clinton Power Station (CPS) Technical Specification (TS) Surveillance Requirement (SR) 3.6.5.1.1 currently requires the drywell bypass leakage test (DBLRT) to be performed at least once per 18 months. Per this request for amendment of the CPS Operating License, Illinois Power (IP) proposes to revise the DBLRT frequency to be performance-based with an allowance to extend the DBLRT interval up to 10 years.

This amendment request supersedes IP's previous request to revise the frequency for performance of the DBLRT. IP's original request was submitted under IP letter U-602320 dated August 12, 1994. Additional correspondence, which culminated in issuance of a one-time change to eliminate the DBLRT for the fifth refueling outage (RF-5) only (reference Amendment No. 96 dated March 1, 1995), includes IP letters U-602355 dated October 14, 1994 and U-602410 dated February 6, 1995.

This request was prepared in conjunction with the other three Boiling Water Reactor (BWR)-6 plants (i.e., Grand Gulf Nuclear Station, River Bend Station, and Perry Nuclear Power Plant), and as such, includes a number of changes beyond those originally contained in IP's August 12, 1994 request. Namely, this request also includes proposed changes to the requirements for the drywell air lock addressed under TS 3.6.5.2, "Drywell Air Lock," to extend the testing intervals for the surveillances on drywell air lock overall leakage and interlock operability, relocate the specific leakage limits on the air lock barrel and door seals to the TS Bases, relocate the requirement to pressurize the drywell air lock to 19.7 psid prior to performance of the overall drywell air lock leakage test to the TS Bases, and other administrative changes. For clarity, the marked-up pages from the current TS and Bases are provided in Attachments 3 and 4 and supersede, in their entirety, marked-up pages provided in the IP letters referenced above.

Design Overview

As described in Updated Safety Analysis Report (USAR) Section 6.2.1, the Mark III containment design at CPS incorporates the drywell/pressure-suppression feature of previous BWR containment designs (Mark I and II) into a dry-containment type structure. The Mark III containment has three main features: (1) a drywell surrounding the reactor pressure vessel and a large part of the reactor coolant pressure boundary, (2) a suppression pool that serves as a heat sink during normal operational transients and accident conditions, and (3) a primary containment structure to prevent the uncontrolled release of radioactivity to the environment.

The drywell is a Class 1 seismic structure and features reinforced concrete walls and floor in a vertical right cylinder geometry. The ceiling is also reinforced concrete with a removable steel dome known as the drywell head. The floor is common with the primary containment basemat. The drywell encloses the reactor pressure vessel (RPV), the reactor

coolant recirculation loops, and branch connections of the reactor coolant system (RCS). The function of the drywell is to maintain a pressure boundary that forces steam from a loss of coolant accident (LOCA) through the 102 horizontal vents in the drywell wall into the suppression pool. The steam is condensed in the suppression pool, and the air forced from the drywell is released into the primary containment (i.e., wetwell). The pressure-suppression capability of the suppression pool assures that the peak LOCA temperature and pressure in the primary containment are kept below the design limits of 185 °F and 15 psig, respectively. The drywell also shields accessible areas of the primary containment from radiation originating in the reactor core and RCS.

Penetrations through the drywell enable the passage of piping, ventilation, and electrical cables. Electrical penetrations feature a sealing medium which surrounds the cables that pass through the penetration. Ventilation and piping penetrations feature manual, automatic, or check valves for isolation. Valves which prevent leakage from the drywell into the primary containment are considered drywell isolation valves since leakage through these valves contributes to the maximum allowable drywell leakage. Valves which prevent leakage from the drywell and primary containment to the secondary containment or environment are considered primary containment isolation valves. Leakage through these valves is determined in accordance with 10CFR50, Appendix J and contributes to the maximum allowable primary containment leakage rate. Leakage through primary containment isolation valves is not considered drywell leakage in the design basis analyses.

The drywell equipment hatch and drywell personnel air lock also penetrate the drywell boundary. The drywell equipment hatch is designed to be removed during plant outages and utilizes two compression seals to maintain leaktightness. The drywell air lock is designed to provide personnel access (ingress and egress) to the drywell for maintenance, while its safety function is to maintain drywell integrity. The drywell air lock features two doors. Each air lock door closes positively against the air lock structure by means of a latching mechanism. The drywell air lock door latching mechanisms are interlocked to each other to ensure that at least one door is maintained in the latched closed position, ensuring that the drywell air lock does not provide a gross leakage path and compromise drywell integrity. Each of the two drywell air lock doors utilizes two compression seals to minimize leakage.

The structural integrity of the primary containment is largely dependent on the drywell's ability to perform its safety function. Steam from a LOCA that bypasses the suppression pool would compress the air in the wetwell (i.e., the space between the exterior wall of the drywell and the interior wall of primary containment) and could result in excessive primary containment pressures. As described in USAR Section 6.2.1.1.5, the effect of steam bypass of the suppression pool on primary containment integrity has been evaluated. The allowable drywell leakage was evaluated for a spectrum of reactor system rupture sizes (areas), with and without containment spray and heat sinks. The limiting case was determined to be a small reactor system break which would not result in reactor

depressurization. Assuming the containment spray system and other heat sinks are available, the maximum allowable leakage path area ($A/\sqrt{k}$) was calculated to be 1.18 ft^2. [Drywell bypass leakage area is expressed in terms of the parameter $A/\sqrt{k}$, where A is the flow area of leakage (ft^2) and k is the geometric and friction loss coefficient.] An $A/\sqrt{k}$ of 1.18 ft^2 is equivalent to a bypass leakage rate of 136,400 scfm at a drywell design pressure of 30 psid and 43,120 scfm at 3 psid. For large break LOCA events, larger bypass leakage areas are allowable since the break would rapidly depressurize the reactor and terminate the blowdown. The maximum allowable leakage path area ($A/\sqrt{k}$) for the large break LOCA case was calculated to be 10.15 ft^2, a factor of eight larger than for the small break LOCA case. CPS TS 3.6.5.1, "Drywell," requires the drywell bypass leakage rate to be maintained less than that corresponding to the design limit area of 1.18 ft^2.

Reason for Request

The current testing requirements established for the DBLRT were originally based primarily on engineering judgment since no previous Mark III performance data were available. Surveillance requirements for new designs were established in order to conservatively satisfy regulatory practices until reliable performance of the design was established. The periodic surveillance for drywell bypass leakage was specified to be performed at least once per 18 months to coincide with refueling outages. In addition, the drywell bypass leakage surveillance program requirements were developed with correlations to the 10CFR50, Appendix J requirements in effect at the time for primary containment with increased conservatisms. The added conservatisms are excessive because the design basis allowable leakage for the drywell (i.e., 43,120 scfm at 3 psid) is much greater than that for the primary containment (i.e., 13 scfm at 9.0 psid). These elements combine to cause exhaustive and undue surveillance efforts for equipment and structures that are generally passive in performing their safety function and have very large margins to perform their safety functions.

Surveillance activities presently in effect to ensure the drywell safety function include drywell penetration configuration surveillances (i.e., valve line-ups); drywell structural integrity inspections; DBLRTs; multiple drywell air lock tests, including overall air lock leakage rate testing, air lock door seal leak rate testing, and air lock door interlock mechanism functional verification; monitoring drywell temperature; monitoring drywell differential pressure relative to the primary containment; and monitoring suppression pool temperature and level.

Based on the testing performed over the last ten years, the performance of the drywell structure at CPS has been excellent. Based on this demonstrated performance, IP believes that a reduction in the periodic testing requirements for the drywell is warranted. The results of DBLRTs conducted since initial plant startup, including four periodic tests, have revealed an $A/\sqrt{k}$ that is two orders of magnitude less than the allowable limit. (See

Table 2.) Each DBLRT involves approximately 20 man-days of effort for set up and performance, including evaluation of the test results. During plant outages involving primary containment integrated leak rate tests (ILRTs), performance of a DBLRT requires approximately 15 hours of critical path time. During non-ILRT outages, the required critical path time increases to approximately 24 hours. Rental of the necessary air compressors and equipment necessary to conduct DBLRTs costs approximately $20,000.

Description of Proposed Change

In accordance with 10CFR50.90, the following changes to the CPS TS are proposed:

1. For the DBLRT, current SR 3.6.5.1.1 is being revised to delete the Note which provides a one-time allowance to eliminate the DBLRT for RF-5 and to revise the frequency to be performance-based. The proposed performance-based frequency will allow the interval between performances of DBLRTs to be increased from the current limit of 18 months up to 10 years with requirements for more frequent testing if drywell performance degrades. Specifically, IP proposes that the frequency column of current SR 3.6.5.1.1 be revised to read as follows:

   > "24 months following 2 consecutive tests with bypass leakage greater than the bypass leakage limit until 2 consecutive tests are less than or equal to the bypass leakage limit AND 48 months following a test with bypass leakage greater than the bypass leakage limit AND 120 months"

   A Note has also been added which modifies the 120-month frequency to state that SR 3.0.2 (which provides for extensions up to 25% of the frequency) is not applicable for extensions greater than 12 months. This limits the allowable extension on the 10-year interval to 12 months, rather than 30 months.

2. For the drywell air lock door seals, current SR 3.6.5.2.1 has been revised to relocate the separate air lock door seal leakage limit of 2 scfh to the TS Bases. The door seal leakage will continue to be considered part of the overall drywell bypass leakage addressed by LCO 3.6.5.1. Thus, this SR has been moved to LCO 3.6.5.1 and renumbered as SR 3.6.5.1.1.

3. For the overall drywell air lock leakage, current SR 3.6.5.2.3 has been revised to relocate the separate overall air lock (barrel) leakage limit of 2 scfh to the CPS TS Bases. The overall air lock leakage will continue to be considered part of the overall drywell bypass leakage addressed by LCO 3.6.5.1. Thus, this SR has been moved to LCO 3.6.5.1 and renumbered as SR 3.6.5.1.2. In addition, the requirement to pressurize the drywell air lock to 19.7 psid prior to performance of

the overall air lock leakage test has also been relocated to the TS Bases. Further, the frequency for this test has been revised from at least once per 18 months to at least once per 24 months.

4. For the drywell air lock interlock mechanism, the frequency for current SR 3.6.5.2.2 is being revised from at least once per 18 months to at least once per 24 months.

5. LCO 3.6.5.2 Actions Note 2, LCO 3.6.5.2 Required Action C.1, and LCO 3.6.5.3 Actions Note 4 have been deleted since these Specifications no longer address drywell leakage. The drywell leakage is entirely addressed by LCO 3.6.5.1. The Notes and Required Action proposed for deletion constitute unnecessary cross-references. As such, their deletion is purely administrative. As a result of deletion of LCO 3.6.5.2 Required Action C.1, current Required Actions C.2 and C.3 have been renumbered C.1 and C.2, respectively.

6. As a result of moving current SR 3.6.5.2.1 and SR 3.6.5.2.3 to LCO 3.6.5.1, the following administrative changes are being made:

   a) current SR 3.6.5.1.1 has been renumbered to SR 3.6.5.1.3;
   b) current SR 3.6.5.1.2 has been renumbered to SR 3.6.5.1.4; and
   c) current SR 3.6.5.2.2 has been renumbered SR 3.6.5.2.1.

The proposed changes are reflected on a marked-up copy of the affected pages from the CPS TS provided in Attachment 3. In addition, changes to the CPS TS Bases, consistent with the proposed TS changes, are provided in Attachment 4.

Justification for Proposed DBLRT Frequency Change

As described in USAR Section 6.2.6.5.1, the purpose of the periodic DBLRTs is to verify that steam leakage bypassing the suppression pool is less than the maximum allowable design leakage for the full range of postulated primary system breaks over the life of the plant. Surveillance criteria and schedules were developed without previous operating experience for the Mark III primary containment design. Since limited operating experience existed, drywell surveillance frequencies were developed primarily based on engineering judgment which resulted in overly conservative acceptance criteria and testing frequencies.

Surveillance requirements developed for new designs were initially established in order to conservatively satisfy regulatory practices until reliable performance of the design was established. The periodic surveillance for drywell bypass leakage was specified to be performed at least once per 18 months to coincide with refueling outages. In addition, the drywell bypass leakage surveillance program requirements were developed with

correlations to the 10CFR50, Appendix J requirements for primary containment which were in effect at the time with increased conservatisms. The added conservatisms are excessive because the design basis allowable leakage for the drywell (i.e., 43,120 scfm at 3 psid) is much greater than that for the primary containment (i.e., 13 scfm at 9.0 psid). These elements combine to cause exhaustive and undue surveillance efforts for equipment and structures which are generally passive in performing their safety function and have very large margins to perform their safety functions.

Surveillance activities presently in effect to ensure the drywell safety function include drywell penetration configuration surveillances (i.e., valve line-ups); drywell structural integrity inspections; DBLRTs; multiple drywell air lock tests, including overall air lock leakage rate testing, air lock door seal leak rate testing, and air lock door interlock mechanism functional verification; monitoring drywell temperature; monitoring drywell differential pressure relative to the primary containment; and monitoring suppression pool temperature and level.

Historical Surveillance Results

The preoperational testing of the drywell has confirmed the adequacy of the drywell design at CPS. With the drywell pressurized to its design pressure of 30 psig, drywell structural strain and displacements were extensively monitored. Evaluation of the test results concluded that the drywell remained essentially elastic throughout the test and actual displacements were considerably smaller than predicted by design. Additionally, post-test examination of the drywell surfaces revealed only slight cracking of the concrete (which was determined to be insignificant) with no signs of distress or damage to either the concrete structure or the steel liner. The measured leakage rate was 1,358 scfm at 30 psid (equivalent to an $A/\sqrt{k}$ of 0.0067 ft^2), which is significantly less than the acceptance criterion of 13,640 scfm and the design limit of 136,400 scfm at 30 psid.

In addition to preoperational testing, multiple periodic DBLRTs have been performed since the initial startup of CPS. The periodic DBLRTs are performed with the drywell isolated from primary containment and the air space exterior to the drywell near atmospheric pressure. Because of the impact on plant availability of performing this test at 30 psid, the periodic DBLRTs are performed at a reduced pressure of 3.0 psid. Testing is conducted at this reduced pressure so that the water level in the suppression pool remains slightly above the first row of horizontal vents in the drywell wall. The drywell is maintained at the test pressure (approximately 3 psid) for a minimum of 1 hour to allow the drywell atmosphere to stabilize. Afterwards, the drywell leakage rate is determined using the air flow or pressure decay methods. The drywell leakage rate is deemed acceptable if the measured leakage rate over 4 hours is less than or equal to 4,312 scfm, which is 10% of the maximum allowable leakage of 43,120 scfm at 3 psid. (The corresponding allowable leakage rate limit is reduced from 13,640 scfm to 4,312 scfm to account for the reduced differential pressure with the drywell at 3.0 psid.) These periodic

DBLRTs have consistently proven the reliability of the drywell. The measured leakage rates over the six separate tests have been significantly less than both the allowable and design limits (see Table 2). Except for the initial low pressure drywell leakage test, the calculated drywell bypass leakage has been less than 1% of the allowable limit and 0.1% of the design limit.

Based on the historical test results, the actual drywell bypass leakage is of such a small magnitude that containment design pressure would not be exceeded in the event of a small break LOCA, even if the containment spray system and other heat sinks were not available. The actual $A/\sqrt{k}$ is less than 4% of the design $A/\sqrt{k}$ limit of 0.02 ft^2 for this scenario.

Applicability of Performance-Based Approach

Performance-based testing allows a desired system/component performance goal to be achieved in a manner which may be more effective than regulatory-driven approaches of the past. It introduces program flexibility that may be necessary to optimize other performance objectives as well. As noted in NUREG-1493, "Performance-Based Containment Leak-Test Program," decreasing the prescriptiveness of some requirements may increase effectiveness by providing flexibility to implement more cost-effective safety measures.

As stated above, the overall goal of the DBLRT is to ensure that leakage from the drywell to primary containment will be within acceptable limits should the drywell become pressurized under postulated accident conditions. Overall performance goals for such a test therefore include acceptance criteria for the leakage rate, which provide a high level of confidence that the leakage will be within the design limit when challenged. The CPS TS currently contain acceptance criteria for the drywell bypass leakage rate which establish a high level of confidence that the leakage rate will be within the design basis limit if challenged. No change to this acceptance criteria is proposed by this request; however, a surveillance test interval extension is proposed. Both the current and proposed testing approaches help to ensure that excessive drywell leakage which could compromise primary containment is effectively eliminated and not a significant contributor to overall plant risk.

The proposed changes consider several factors important for an effective performance-based test approach. The proposed change recognizes that past performance is an important means of identifying and correcting performance problems. In over ten years of operation, CPS has not exceeded the very conservatively established drywell bypass leakage rate limits. Furthermore, no adverse trends in drywell bypass leakage rate have been observed. In addition, the risk impact of postulated drywell bypass leakage is small. This is due to the low frequency of events that could challenge containment integrity

due to drywell leakage, the high probability that the drywell will perform its intended function, and design margins available to primary containment failure due to overpressurization caused by drywell leakage. Finally, the drywell is essentially a passive barrier. As a result, the proposed testing approach, which is based on performance criteria, provides assurance that the overall performance goals will be met. Existing plant administrative and maintenance programs ensure that performance problems will be addressed in a timely manner and that the testing schedule will be adjusted, if necessary, to ensure ongoing acceptable performance.

Safety Assessment

This request is based on the excellent performance of the drywell as demonstrated over the past ten years of plant operation. Numerous periodic DBLRTs have confirmed that drywell bypass leakage does not exceed the design limit, nor approach the more conservative acceptance limit specified by the TS. Historical test data demonstrate the high reliability of the drywell structure and its isolation components.

The proposed changes do not introduce any new accident scenarios or failure modes, do not affect other accident mitigation functions, nor do they contribute to the probability of the initiating accident. Although drywell bypass leakage can occur through potential cracks in the drywell structure and through drywell isolation valves, the proposed changes do not significantly increase the probability that the drywell will not be able to perform its design function when required.

The design basis allowable leakage rate for the limiting event for the drywell is extremely high (i.e., 43,120 scfm at 3 psid). An even higher allowable leakage can realistically be accommodated due to the margins in the primary containment design. By comparison, the maximum allowable primary containment leakage rate is approximately 13 scfm at 9.0 psid. The insensitivity of the primary containment's ability to perform its safety function when compared to the rate of drywell leakage provides a substantial margin to loss of the drywell safety function that is not normally available for safety systems. Individual passive and active mechanisms which provide assurance of drywell integrity are addressed separately below.

Passive Drywell (Structural) Integrity

As discussed above, the preoperational test of the drywell at CPS confirmed the adequacy and conservatism of the drywell design. With the drywell pressurized to its design pressure of 30 psig, drywell structural strain and displacements were extensively monitored. Evaluation of the test results concluded that the drywell remained essentially elastic throughout the test and actual displacements were considerably smaller than predicted by design. Post-test examination of the drywell surfaces revealed only slight

cracking of the concrete (which was determined to be insignificant) with no signs of distress or damage to either the concrete structure or the steel liner. The measured leakage rate (at 30 psid) was 1,358 scfm (equivalent to an $A/\sqrt{k}$ of 0.0067 ft^2), which is significantly less than the acceptance criterion of 13,640 scfm and the design limit of 136,400 scfm at 30 psid. Therefore, the design and construction of the drywell was determined to be sufficient to withstand the design pressure.

Although the drywell experienced slight cracking of the concrete during the performance of the structural integrity test, additional cracking of the drywell is not expected during the remaining life of the plant. The drywell is typically exposed to less than 0.9 psid during normal plant operation and 3 psid (nominally) during DBLRTs. These pressures are considerably lower than the structural integrity test pressure of 30 psid and are less likely to initiate a crack or cause an existing crack to grow. Potential cracking of the BWR-6 drywell was studied in NEDO-10977, "General Electric Company, Drywell Integrity Study: Investigation of Potential Cracking for BWR/6 Mark III Containment," August 1973. This study concluded that under normal operational conditions only minor surface cracking of the structure will occur, that this cracking is the result of drying shrinkage of the concrete, and that no through-wall cracking will occur. Visual inspections of the drywell surfaces at CPS since performance of the structural integrity test have not identified additional cracking or other abnormalities and thus, support the findings of NEDO-10977. Based on the above, additional cracking of the drywell structure is not expected due to testing or operation and it is not considered credible for the drywell structure to begin to leak sufficiently to impact the design drywell bypass leakage limit.

As additional support, it has been noted that the issues associated with the passive structural integrity of the drywell are quite similar to those addressed for the primary containment in determining the appropriate Type A testing interval under 10CFR50, Appendix J, Option B. Similar to the primary containment, absent actual accident conditions, structural deterioration is a gradual phenomenon which requires periods of time well in excess of the proposed 10-year DBLRT interval. The passive structural integrity of the primary containment was confirmed in NUREG-1493 which formed the basis for recent NRC approval of a Type A testing interval up to 10 years under 10CFR50, Appendix J, Option B.

Active Drywell Integrity

As previously discussed, the drywell is equipped with various penetrations to enable the passage of various piping, ventilation, and electrical cables. Drywell penetrations are designed to ASME Code Class 2 and Seismic Category I requirements. The drywell piping penetrations are also designed with two isolation valves in series, typically with one valve in the drywell and another either outside primary containment or in the wetwell. High energy lines that extend into the wetwell, such as the main steam lines and feedwater

lines, are encapsulated by guard pipes to direct energy to the drywell in case of a piping rupture. Drywell electrical penetrations are sealed with a high strength/density material that will prevent leakage, as well as provide radiation shielding.

The active components which could contribute to drywell leakage and potentially result in exceeding the maximum allowable drywell bypass leakage are the drywell isolation valves. These valves prevent leakage from the drywell into the primary containment; therefore, any leakage through these valves contributes to the maximum allowable drywell leakage. As stated above, valves which prevent leakage from the drywell and primary containment to the secondary containment or environment are considered primary containment isolation valves. Leakage through primary containment isolation valves is tested in accordance with 10CFR50, Appendix J and contributes to the maximum allowable primary containment leakage. Leakage through primary containment isolation valves is not considered drywell leakage in the design basis analyses since it does not contribute to primary containment pressurization. The proposed extension to the DBLRT interval will only impact the potential for excess leakage through those valves that are considered to be drywell isolation valves and does not impact or overlap the testing of valves required by 10CFR50, Appendix J.

The effect of leakage though drywell isolation valves on the total drywell leakage rate is dependent on the size of the associated penetration flow path (i.e., small penetrations have a smaller potential impact on drywell leakage than do large penetrations). The allowable drywell leakage rate is so large that any penetration flow path less than or equal to 10 inches in diameter can have only a negligible impact on the total drywell bypass leakage. The basis for this conclusion with respect to each of these categories of penetration flow path sizes (i.e., $\leq$ 10 inches versus > 10 inches), is provided below.

Penetration Flow Paths $\leq$ 10 inches in diameter:

To demonstrate the effect of an excessively leaking 10-inch drywell penetration on compliance with the allowable drywell bypass leakage, the drywell post-LOCA vacuum relief subsystems will be used as an example. At CPS, each drywell post-LOCA vacuum relief subsystem consists of two check valves in series, each isolating a 10-inch drywell penetration. There are four separate 10-inch drywell penetrations. The calculated effective $A/\sqrt{k}$ for each of these subsystems for forward flow (i.e., flow from the primary containment into the drywell) is 0.217 ft^2 (i.e., 18.4% of the design limit). As a result, all four 10-inch penetration flow paths would have to fail fully open in order to challenge the allowable drywell bypass leakage limit of 1.18 ft^2. This result is very conservative since it does not take into account the lower effective $A/\sqrt{k}$ that the penetration flow paths would have if the flow through the penetration was reverse flow (i.e., the direction of drywell bypass flow) through the check valves.

Per SR 3.6.5.3.3, the position of drywell isolation valves is required to be verified prior to entering Mode 2 from Mode 3 or 4, if not performed in the previous 92 days. In addition, stroke-time testing of power-operated and automatic drywell isolation valves is required to be performed in accordance with the Inservice Testing Program per SR 3.6.5.3.4. Further, verification that each automatic drywell isolation valve automatically actuates to the required position on an automatic isolation signal is required at least once per 18 months per SR 3.6.5.3.5. These SRs are not affected by this request and continue to provide assurance that drywell isolation valves are either in their proper position or will automatically close when required.

The probability that a penetration flow path will leak excessively, thus contributing to defeating the drywell safety function when called upon, was evaluated in the docketed submittal for the Grand Gulf Nuclear Station. IP has reviewed that evaluation and concurs with the conclusion that the potential for excessive drywell leakage to develop through penetration flow paths ≤ 10 inches in diameter due to an extended test interval will not realistically affect the ability of the drywell to perform its safety function. This conclusion was based on the fact that extending the DBLRT test interval does not affect the probability that a valve will fail to close or is failed open prior to the event and that the probability of four or more drywell penetration flow paths concurrently leaking excessively is negligible.

Penetration Flow Paths > 10 inches in diameter:

Having screened out all drywell penetration flow paths ≤ 10 inches in diameter, the remaining penetration flow paths that could affect the ability of the drywell to perform its safety function can be individually reviewed. The following are the drywell penetration flow paths that are > 10 inches in diameter:

1. Drywell head and drywell equipment hatch penetrations - 2 penetration flow paths total.	These penetrations are sealed by double O-ring seals. Since these penetrations are typically opened each refueling outage, the seals will continue to be required to be leak tested each refueling outage by Technical Specifications LCO 3.6.5.1 (via SR 3.0.1 which requires performance of appropriate post-maintenance testing to assure that LCO 3.6.5.1 continues to be met).

2. Drywell air lock - 1 penetration flow path.	The leakage rate through the drywell air lock will continue to be determined at least once every refueling outage per proposed SR 3.6.5.1.2.
3. Main Steam, Feedwater, and RHR shutdown cooling suction lines - 7 penetration flow paths total.	These penetrations are isolated by primary containment isolation valves and are equipped with guard pipes between the drywell and primary containment walls. Thus, these pathways cannot result in overpressurization of the primary containment (wetwell).
4. Low Pressure Coolant Injection (LPCI) A, B, and C injection lines - 3 penetration flow paths total.	These lines are isolated by RCS Pressure Isolation Valves (PIVs) and primary containment isolation valves. The PIVs are required to be leak tested every 18 months per SR 3.4.6.1.
5. Drywell Vent and Purge supply and exhaust lines - 2 penetration flow paths total.	These are 24-inch penetration flow paths with an effective $A/\sqrt{k}$ of approximately 1.0 ft^2. These valves are required to be verified to be closed every 31 days, except under certain safety-related conditions by SR 3.6.5.3.1 and SR 3.6.5.3.2. These penetrations are further discussed below.

As can be seen from the above, the drywell vent and purge supply and exhaust penetration flow paths are the only significant drywell penetration flow paths whose surveillance interval could be adversely affected by the proposed DBLRT frequency change. IP believes that the potential for excessive drywell vent and purge supply and exhaust penetration leakage to result in primary containment failure due to excessive drywell leakage is not significant as discussed below.

The drywell vent and purge system drywell isolation valves are large (10-, 24-, and 36-inch) Posi-seal butterfly valves that are normally closed when the plant is in Mode 1, making them essentially passive isolation devices. These valves also receive an isolation signal in the event of a LOCA or high radiation condition in any of various plant areas. Operability of this automatic isolation capability is required to be verified by SR 3.6.5.3.5. The drywell vent and purge supply isolation valves are required to be verified to be sealed closed at least once per 31 days while in Modes 1, 2, or 3 per SR 3.6.5.3.1. Although the CPS TS permit opening the drywell vent and purge exhaust isolation valves for specified safety-related reasons while in Modes 1, 2, or 3 (reference SR 3.6.5.3.2), this allowance is typically utilized only during plant shutdown in preparation for refueling outages. SR 3.6.5.3.2 requires the position of the drywell vent and purge exhaust isolation valves to be verified at least once per 31 days. In addition, the Inservice Testing Program and TS contain requirements (SR 3.6.5.3.4) for testing the exhaust isolation valves' ability to close. These requirements are also not affected by this proposed change. Since these valves are cycled infrequently, degradation of the sealing capability of these valves is not expected due to cycling.

Notwithstanding the above, the drywell bypass leakage area design limit of 1.18 ft^2 would not be exceeded even if the drywell vent and purge exhaust penetration flow path is full open in conjunction with other drywell bypass leakage equal to 10% of the drywell bypass design leakage limit (i.e., at the TS limit) since the effective $A/\sqrt{k}$ for this penetration is estimated to be approximately 1 ft^2 (i.e., 1.0 ft^2 + 0.118 ft^2 = 1.118 ft^2). Further, additional margin to primary containment failure exists due to the primary containment's ability to withstand pressures much greater than the 15 psig design value.

PRA Evaluation

The proposed changes have no significant impact on the CPS Individual Plant Examination (IPE) conducted per NRC Generic Letter 88-20. The IPE considered overpressurization failure of primary containment as part of the primary containment performance assessment. Due to the magnitude of acceptable drywell leakage and the extremely low probabilities of achieving such leakage as discussed above, primary containment failure due to pre-existing excessive drywell leakage was considered a non-significant contributor to primary containment failure. In the beyond design-basis "severe accident," primary containment overpressurization failure can occur with or without pre-existing excessive drywell bypass leakage. This is due to physical phenomena associated with potentially extreme environmental conditions inside primary containment following a severe accident. However, the calculated frequency of such extreme conditions is very small. The proposed changes do not impact the IPE evaluated phenomena causing primary containment overpressurization failure, nor do they significantly increase the probability that the drywell has pre-existing excessive leakage. Notwithstanding, an increase in drywell bypass leakage would be detected by on-line monitoring capabilities, such as those described below.

On-Line Qualitative Monitoring Capability

Due to the demonstrated leaktight performance of the drywell, CPS is able to monitor the integrity of the drywell during normal plant operation. This is possible due to the existence of small instrument air system leaks and from normal operation of pneumatic controls and operators in the drywell that pressurize the drywell, creating a differential pressure between the drywell and primary containment.

For example, at the time of IP's August 12, 1994 submittal, the drywell was being pressurized at rate of approximately 0.04 psi/hr. The drywell was being vented approximately once per day when pressure approaches the upper TS limit of 1.0 psid. Based on application of the ideal gas law and known data, such as the drywell pressurization rate and the drywell leakage measured during the fourth refueling outage (RF-4), the total amount of instrument air inleakage was calculated to be between 21.5 and 22.5 scfm. The rate of drywell pressurization remained essentially constant since drywell closeout from RF-4. Pressurization rates following RF-5 have also remained consistent with those observed following RF-4.

This steady drywell pressurization rate allows qualitative monitoring of the drywell leakage rate. An increase in this rate would be indication of an increase in the instrument air system leakage into the drywell since it is improbable that the drywell would become more leaktight. Conversely, a decrease in this rate would be evidence of a larger drywell leakage area. The maximum drywell leakage rate that would still maintain a differential pressure between the drywell and wetwell must be less than the instrument air inleakage rate (which after RF-4 was 23 scfm). The $A/\sqrt{k}$ for a 23 scfm leak at 0.2 psid is 0.0025 ft^2 or 0.2 % of the allowable leakage area. Because of this large margin to the allowable drywell leakage rate, it has been concluded that as long as the drywell continues to pressurize, regardless of the rate, drywell integrity is always assured. This ability to qualitatively assess the integrity of the drywell during normal plant operation provides further support to extending the DBLRT interval.

In order to provide added assurance that the drywell has not seriously degraded between the performance of DBLRTs, a qualitative assessment of the drywell leak tightness will be performed at least once per operating cycle. The first assessment will be performed prior to Operating Cycle 7. By checking for gross leakage, this assessment will provide an indication of the ability of the drywell to perform its design function. As a check for gross leakage, the assessment may not identify drywell leakage that is masked by plant conditions, or identify leakage through systems that are not communicating with the drywell atmosphere at the time of the assessment. For example, minor increases in drywell bypass leakage could be masked by a small leak in the instrument air system inside the drywell. The assessment would not be detailed enough to account for such minor changes. However, as demonstrated above, as long as the drywell continues to pressurize, regardless of the rate, drywell integrity is always assured.

Increased Surveillance Frequency

Following a DBLRT where the drywell bypass leakage rate is greater than the limit, and necessary repairs, DBLRTs will be required to be performed at an increased frequency (every 4 years). As previously discussed, the only types of failures that could result in the drywell bypass leakage rate limit not being met would be gross failures of several systems. The effectiveness of the repairs following the failed test will be assured by the TS requirement to restore the as-left leakage to ≤ 10% of the drywell leakage limit. Due to the gross nature of the failures which would be required to result in a failure of a DBLRT, the corrective action would be expected to be a one-time action (e.g., modify programs to prevent reoccurrence). Additionally, a large margin for degradation will be provided by restoring the leakage to ≤ 10% of the allowable drywell leakage. Therefore, the proposed 4-year frequency for DBLRTs following a single test failure provides an adequate level of assurance of the availability of the drywell and provides an economic incentive for the utility to ensure that the failures which caused the drywell failure are resolved.

Following two consecutive DBLRTs where the drywell bypass leakage rate is greater than the limit, and necessary repairs, the DBLRTs will be required to be performed at the current frequency of every refueling outage. This frequency must be maintained until two consecutive DBLRTs find the drywell bypass leakage rate to be less than the limit.

Proposed Air Lock Changes

Drywell leakage rate requirements are the essence of drywell operability as required by LCO 3.6.5.1. Since all drywell leakage rate surveillances are proposed to be addressed by LCO 3.6.5.1, leakage rates discovered outside limits will always clearly result in entering the Actions for drywell inoperability (i.e., LCO 3.6.5.1). LCO 3.6.5.1 provides the appropriate required actions if drywell leakage is not met by requiring the commencement of a plant shutdown to Cold Shutdown if the leakage is not corrected within one hour. Movement of current SR 3.6.5.2.1 and current SR 3.6.5.2.3 to LCO 3.6.5.1 is considered an administrative format change only.

The requirements for the drywell air lock and air lock door seals to meet specific leakage limits are proposed to be relocated to the TS Bases. The ability of the drywell to perform its safety function is not dependent on the air lock meeting a specific leakage limit. The limiting case for drywell bypass leakage is based on the total leakage through all drywell leakage paths, other than the suppression pool vents. Total drywell bypass leakage from all leakage paths (including the air lock) must not exceed the drywell bypass leakage limit. The extremely conservative drywell air lock leakage requirements are only a subset of the total drywell bypass leakage limit. If the total drywell bypass leakage criteria is met, no additional corrective action should be required by the TS. In the TS Bases, the relocated

limits will be maintained in accordance with 10CFR50.59 and will be subject to the change control provisions of the TS Bases Control program identified in TS 5.5.11. Thus, these requirements will be adequately controlled.

The current SR 3.6.5.2.3 Note 2 requirement that the air lock leakage test at 3 psid be preceded by pressurizing the air lock to 19.7 psid has also been relocated to the TS Bases. The 19.7 psid pressure does not occur during the limiting event which determines the maximum allowable drywell bypass leakage rate (i.e., the small break LOCA). The allowable drywell bypass leakage rate for the event during which the air lock could experience this pressure differential (i.e., during a large break LOCA) is eight times higher. In the TS Bases, the relocated information will be maintained in accordance with 10CFR50.59 and will be subject to the change control provisions of the TS Bases Control program identified in TS 5.5.11. Thus, this requirement will be adequately controlled.

The drywell air lock overall leakage surveillance and interlock surveillance frequencies are being changed from 18 months to 24 months. The proposed leakage rate testing frequency is consistent with the guidance for testing primary containment air locks in Nuclear Energy Institute (NEI) 94-01, "Industry Guideline for Implementing Performance-Based Option of 10CFR50, Appendix J." The drywell air lock is tested in a manner similar to the primary containment air locks, even though the drywell air lock is not a direct leakage path from primary containment and, therefore, 10CFR50, Appendix J test requirements do not apply. The drywell air lock's use is limited during plant operation due to radiation and temperature in the drywell. Since sufficient confidence in the door's sealing capability is assured considering past performance and the air lock door usage is very low throughout an operating cycle, it is justified to allow performance of these tests at refueling outage intervals, whether the unit is on a 18-month or a 24-month refueling cycle.

The Actions Notes in the drywell air lock LCO (LCO 3.6.5.2) and the drywell isolation valve LCO (LCO 3.6.5.3) which identify that the Actions required by the drywell LCO (LCO 3.6.5.1) must be taken when the drywell bypass leakage limit is not met are being deleted. These Notes are no longer required with the relocation of all drywell leakage rate testing requirements to the drywell LCO. Also, LCO 3.6.5.2 Required Action C.1 and its associated completion time is deleted for the same reason. As discussed above, drywell leakage rate is the essence of drywell operability as required by LCO 3.6.5.1. Leakage rates discovered outside limits will always clearly result in entering the Actions for drywell inoperability (i.e., LCO 3.6.5.1) since all drywell leakage rate surveillances will be addressed under LCO 3.6.5.1. As a result, deletion of these Notes and current LCO 3.6.5.2 Required Action C.1 is considered to be an administrative format change only.

<u>Basis for No Significant Hazards Considerations</u>

In accordance with 10CFR50.92, a proposed change to the operating license (Technical Specifications) involves no significant hazards consideration if operation of the facility in accordance with the proposed change would not: (1) involve a significant increase in the probability or consequences of any accident previously evaluated; (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. This request is evaluated against each of these criteria below.

(1) The proposed changes do not involve a change to the plant design or operation. As a result, the proposed changes do not affect any of the parameters or conditions that contribute to initiation of any accidents previously evaluated. Therefore, the proposed changes cannot increase the probability of any accident previously evaluated.

The proposed changes do potentially affect the leaktight integrity of the drywell, a structure used to mitigate the consequences of a loss of coolant accident (LOCA). The function of the drywell is to force the steam released from a LOCA through the suppression pool, limiting the amount of steam released to the primary containment atmosphere. This serves to limit the containment pressurization due to the LOCA. The leakage of the drywell is limited to ensure that the primary containment does not exceed its design limits of 185°F and 15 psig. Because the proposed change to replace the current 18-month frequency for performing drywell bypass leakage tests (DBLRTs) with a performance-based frequency does not alter the plant design, the proposed change does not directly result in an increase in the drywell leakage. However, decreasing the test frequency can increase the probability that a large increase in drywell bypass leakage could go undetected for an extended period of time. This potential has been evaluated, and IP has determined that the proposed change to the DBLRT frequency will not result in the potential for undetected, large increases in leakage, as further discussed below.

There are several potential drywell bypass leakage paths. These include potential cracks in drywell concrete structure, the drywell vacuum breakers, and various penetrations through the drywell structure. Based on the results of the structural integrity test conducted at the design pressure of 30 psig as part of the preoperational test program, additional cracking of the drywell is not expected during the remaining life of the plant. Ventilation and piping penetrations (including the drywell vacuum breaker penetrations) are designed to ASME Code Class 2 and Seismic Category I requirements. These penetrations are typically designed with two isolation valves in series with one valve in the drywell and another either outside primary containment or in the wetwell. Technical

Specification (TS) Surveillances Requirements (SRs) require, as applicable, periodic verification of drywell isolation valve position, stroke time, and automatic isolation capability. High energy lines that extend into the wetwell, such as the main steam lines and feedwater lines, are encapsulated by guard pipes to direct energy back into the drywell in case of a piping rupture. Electrical penetrations are sealed with a high strength/density material that will prevent leakage, as well as provide radiation shielding.

The proposed changes for the drywell air lock involve relocation of the separate limits on the drywell air lock barrel and seal leakage rates to the TS Bases, relocation of the requirement to pressurize the air lock to 19.7 psid prior to performance of the air lock overall (barrel) leakage test, and changing the frequency for these tests from 18 months to 24 months. While the proposed changes will eliminate separate TS limits on leakage of the drywell air lock, the overall drywell bypass leakage TS limit (which includes leakage through the air lock) is not affected by this proposed change. The limiting scenario for drywell bypass leakage is a small break LOCA which results in drywell pressures of approximately 3 psid. Only a large break LOCA can create drywell pressures of 19.7 psid. For this event, the allowable drywell bypass leakage rate is over eight times larger than for a small break LOCA. Thus, relocation of these requirements to the TS Bases will continue to provide adequate control of these requirements. The proposed air lock overall leakage rate testing frequency is consistent with the guidance for testing primary containment air locks in Nuclear Energy Institute (NEI) 94-01, "Industry Guideline for Implementing Performance-Based Option of 10CFR50, Appendix J." The drywell air lock is tested in a manner similar to the primary containment air locks, even though the drywell air lock is not a direct leakage path from primary containment and, therefore, 10CFR50, Appendix J test requirements do not apply. The drywell air lock's use is limited during plant operation due to radiation and temperature in the drywell. Since sufficient confidence in the door's sealing capability is assured considering past performance and the air lock door usage is very low throughout an operating cycle, it is justified to allow performance of these tests at refueling-outage intervals, whether the unit is on a 18-month or a 24-month refueling cycle.

Operational experience has shown that the leak tightness of the drywell has been maintained well below the allowable leakage limits at CPS. The TS limit of 10% of the design $A/\sqrt{k}$ provides a large margin for degradation. Drywell performance to date suggests that drywell degradation, even with a ten-year interval between tests, will not exceed this margin. The most recent DBLRT performed during the fourth refueling outage (RF-4) measured a drywell bypass leakage rate of 0.07% of the design limit.

An analysis was also conducted to determine the potential risk to the public from unacceptable drywell bypass leakage going undetected as a result of the proposed change. Based on this probabilistic risk analysis, for several different accident scenarios, the risk of radioactivity release from containment was found to be insignificant.

Based on the above, IP has concluded that the proposed changes will not result in a significant increase in the consequences of any accident previously evaluated.

(2) The proposed change does not involve a change to the plant design or operation. As a result, the proposed change does not affect any of the parameters or conditions that could contribute to initiation of any accidents. Drywell bypass leakage cannot, of itself, create an accident. Thus, it has been concluded that the proposed change cannot create the possibility of an accident not previously evaluated.

(3) The NRC has provided standards for determining whether a no significant hazards consideration exists as stated in 10CFR50.92(c). These proposed changes involve the withdrawal of operating restrictions previously imposed because acceptable operation of the Mark III primary containment design had not been demonstrated at the time of initial licensing. As published in the Federal Register (FR) regarding no significant hazards consideration criteria, granting of a relief based upon demonstration of acceptable operation from an operating restriction that was imposed because acceptable operation had not yet been demonstrated does not involve a significant hazards consideration (reference 48 FR 14870).

The proposed change only affects the frequency of measuring the drywell bypass leakage rate and does not change the bypass leakage rate limit. The proposed change could potentially increase the probability that a large increase in drywell bypass leakage could go undetected for an extended period of time. However, operational experience has shown that the leaktightness of the drywell has been maintained well below the allowable leakage limits. In addition, there are TS surveillances which require, as applicable, periodic verification of drywell isolation valve position, stroke time, and automatic isolation capability. Further, qualitative methods (such as periodic verification that the drywell pressurizes, which ensures that the drywell leak rate is less than the instrument air leak and usage rates) are available to provide assurance that the drywell leakage rate is being maintained within limits. The CPS TS require the drywell leakage rate measured during DBLRTs to be less than or equal to 10% of the design limit. This request does not affect this required margin. Nor does it affect the existing margin between the primary containment design pressure and the actual pressure at which primary containment would fail.

With respect to proposed changes to the drywell air lock overall leakage testing and interlock testing requirements, the proposed leak test frequencies are consistent with the guidance for testing primary containment air locks in NEI 94-01. Due to the limited use of the drywell air locks during plant operation, it is justified to allow performance of interlock operability testing on a refueling outage basis, whether the unit is on an 18-month or a 24-month refueling cycle. The separate limits on the drywell air lock and barrel are being relocated from the TS, these limits are being controlled under 10CFR50.59 and the TS Bases Control program of TS 5.5.11. Leakage through these pathways will continue to be a part of the overall drywell bypass leakage limited by LCO 3.6.5.1.

An analysis was also conducted to determine the potential risk to the public from the proposed change. Based on this probabilistic risk analysis, for several different accident scenarios, the risk of radioactivity release from containment was found to be insignificant.

As a result, IP has concluded that the proposed changes will continue to assure that the drywell bypass leakage will be within design limits if challenged and therefore, will not result in a significant reduction in the margin of safety.

Based on the foregoing, IP concludes that this request does not involve a significant hazards consideration.

Table 1

CPS Design Features

Drywell design pressure	30 psig
Primary containment design pressure	15 psig
Design drywell bypass leakage - small break LOCA with one containment spray	1.18 ft^2 (A / √k) 43,120 scfm at 3 psid 136, 400 scfm at 30 psid
Design drywell bypass leakage - large break LOCA with no Containment Spray	10.15 ft^2 (A / √k)

Table 2

PREVIOUS RESULTS OF CPS DRYWELL BYPASS LEAKAGE RATE TEST

TEST DATE	LEAK RATE (at 3.0 psig)	RATIO TO DESIGN LIMIT	CALCULATED $A/\sqrt{k}$
01/86	273.0 scfm[1]	0.63%	0.0075 ft^2
11/86	20.8 scfm	0.05%	0.0006 ft^2
04/89 (RF-1)	18.8 scfm	0.04%	0.0005 ft^2
03/91 (RF-2)	21.9 scfm	0.05%	0.0006 ft^2
05/92 (RF-3)	18.0 scfm	0.04%	0.0005 ft^2
11/93 (RF-4)	30.2 scfm	0.07%	0.0008 ft^2

[1] The leakage rate from the initial test was primarily attributed to a defective electrical penetration seal that was later repaired. Subsequent tests have found the drywell leakage to consistently be between 18 and 30 scfm.