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ILLINOIS POWER COMPANY

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September 16, 1982

Mr. Cecil O. Thomas, Chief
Standardization & Special Projects Branch
Division of Licensing
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Thomas:

Clinton Power Station Unit 1
Docket No. 50-461

Enclosed are copies of the Illinois Power Company (IP) position papers regarding Outstanding Issues #10(c), 10(d) and 10(e) of the Clinton Power Station Safety Evaluation Report (Sections 6.2.4.1, 6.2.2, and 6.4/15.3/respectively). These papers were prepared in response to the NRC Staff's concerns in the CPS-SER regarding various containment leakage testing requirements and the acceptability of the proposed 12% containment Bypass Leakage Fraction.

A review of these issues has resulted in the following conclusions:

(1) Issue 10(c); Containment Leakage Testing (Vent & Purge Valves): It is IP's position that leakage tests of the CPS vent/purge valves (36" and 4"), beyond the requirements of the Type C tests in Appendix J to 10CFR50, are not necessary. As stated in Attachment 1, the CPS Butterfly valve sealing mechanism design is superior and thus precludes a need for such tests.

(2) Issue 10(d); Containment Leakage Testing (Secondary Containment): IP has committed to leakage testing of the secondary containment volume to verify the 194-sec. drawdown time to reestablish a-0.25 in. of water gauge pressure. This test will be performed as part of the preoperational testing program and periodically thereafter (at least once every 18 months per the CPS Technical Specifications).

(3) Issue 10(e); Containment Bypass Leakage: It is IP's position that a 12% Bypass Leakage Fraction is acceptable. Technical justification for this proposed change is provided along with resolution of Staff concerns regarding off-site and control room doses.

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The attached position papers are provided as documentation of IP's position on these outstanding issues. It is believed that these papers provide sufficient information to close issues 10c, d, and e. If you should have any questions, we stand ready to meet with your staff at their earliest convenience so that these issues can be closed out as expeditiously as possible.

Sincerely,

G. E. Wuller

G. E. Wuller
Supervisor - Licensing
Nuclear Station Engineering

GEW/TLR/em
Enclosure
cc: Mr. J. H. Williams, NRC Clinton Project Manager
Mr. H. H. Livermore, NRC Resident Inspector
Mr. L. C. Ruth, NRC Containment Systems Branch
Illinois Dept. of Nuclear Safety

(10c) Containment Leakage Testing (Vent & Purge Valves)

References: (1) Clinton Power Station - Safety Evaluation Report (CPS-SER), Section 6.2.4.1; February 1982.

(2) IP Letter U-0431, from G. E. Wuller to J. R. Miller, dated 3/10/82.

Issue

Reference 1 provides the NRC Staff's position and a brief description of the issue which is as follows:

> "As a result of numerous reports on the unsatisfactory performance of resilient seats in butterfly-type isolation valves because of seal deterioration, periodic leakage integrity tests of the 4-in. and 36-in. butterfly isolation valves in the purge system are necessary. Therefore, the applicant should propose a technical specification for testing the valves in accordance with the following testing frequency:
>
> > The leakage integrity tests of the isolation valves in the containment purge/vent lines shall be conducted at least once every three months for active valves and once every six months for inactive valves."

The purpose of the leakage integrity tests of the isolation valves in the containment purge lines is to identify excessive degradation of the resilient seats for these valves. Therefore, they need not be conducted with the precision required for the Type C isolation valve tests in 10 CFR 50, Appendix J. These tests would be performed in addition to the quantitative Type C tests required by Appendix J, and would not relieve the applicant of the responsibility to conform to the requirements of Appendix J.

Response

IP believes that leakage testing of these valves, beyond the requirements of the Type C tests described in Appendix J of 10 CFR 50, is not necessary. IP is committed to perform Type C Leakage Tests per 10 CFR 50 Appendix J at intervals no greater than every 24 months.

CPS-SER Outstanding Issue 10a addresses containment purge requirements during normal plant operations. Discussions with the staff on Issue 10a have indicated that the design and intended use(s) of the CPS Containment Vent/Purge system may change. The final resolution of Issue 10a may have some affect on the resolution of this issue (10c) by changing the classification (active vs. inactive) of the various valves in the purge system. However, the need to address, in general, the sealing design of the CPS valves with respect to the NRC concern about resilient seal performance and related leakage testing requirements is appropriate and is provided in the remainder of this paper.

In the present design of the CPS Containment Vent/Purge System, the 4" Bypass valves are motor operated gate valves. As such, the type (and material used) of seating/sealing mechanism is different from the resilient type seals typically used on butterfly valves. In addition, the 4" lines are intended to be used only under post-LOCA conditions as a backup feedline to the Hydrogen Recombiners or for containment pressure control. Thus the Staff's concerns regarding seal deterioration of butterfly valve resilient seats is not applicable to the 4" bypass valves.

The 36" Butterfly-type Containment Vent/Purge Isolation valves are manufactured by Posi-Seal International, Inc. The heart of the Posi-Seal valve is the sealing mechanism, which consists of 2 parts. This combination includes a sealing ring and a backing ring. The sealing ring is made of an inert, low-friction, wear-resistant elastomer, called TEFZEL. The I.D. surface of the sealing ring serves to effect a seal against the valve disc, while its flange area securely locks the ring into a "T" slot within the valve body. The backing ring is an "O" ring made from a more resilient elastomer, typically BUNA-N or VITON. When the valve is closed, the backing ring preloads the sealing ring against the valve disc, which affords a static seal. System pressure acting within the "T" slot creates a piston action of the sealing ring, where system pressure is amplified at the sealing surface. Thus, dynamic sealing is accomplished. Hence, the higher the containment pressure, the tighter the seal. A simplified drawing illustrating this sealing design is provided in Figure 1.

Reference letter No. 2 provided the Staff with the IP position on Outstanding Issue No. 10a. In that submittal the results of a survey of butterfly valve failures in the industry, for the period from January 1979 to July 1981, were discussed. The failures ranged from excessive valve leakage to valve closure failures. The failure mechanisms (causes) range from worn/misaligned seals and seating surfaces to causes unknown. Of the 67 applicable Licensee Event Reports (LERs), only 2 (or 3%) LERs involved Posi-Seal valves. Neither of these two LERs was attributable to seal degradation. Both Posi-Seal LERs involved excessive leak rates, one due to a corroded valve disk and one due to a sealing ring misaligned during installation. Of the 67 LERs reviewed, over 50% were specifically attributable to performance failures of the <u>resilient</u> seats in butterfly-type valves. Only two LERs from this group involved degradation of teflon-type sealing mechanisms, both of which represented valves manufactured by Fisher Controls Co. It is IP's position, therefore, that the CPS Posi-Seal butterfly valves are not susceptible to this type of valve failure.

The four CPS containment ventilation and purge system 36" butterfly valves which provide the containment isolation function are as follows:

- 1VR001A - Containment Building HVAC outboard supply isolation valve
- 1VR001B - Containment Building HVAC inboard supply isolation valve
- 1VQ004A - Drywell Purge outboard exhaust isolation valve
- 1VQ004B - Drywell Purge inboard exhaust isolation valve

These valves are designed to exhibit a leakrate of no more than 0.015 scfm each when fully closed and subjected to a pressure of 9 psig across the valve (similar to the peak transient long-term pressure response of the containment during a DBA-LOCA).

POSI - SEAL
SEALING SYSTEM MECHANISM

"POSI-SEAL"®

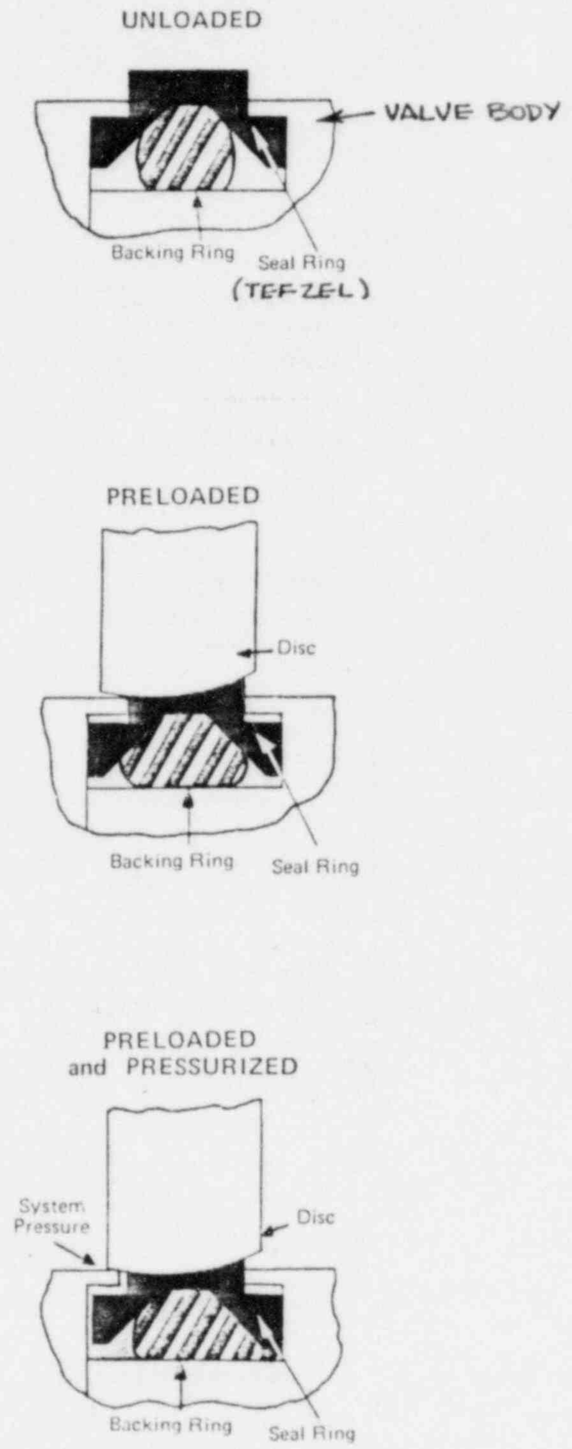

FIGURE 1

(10d) Containment Leakage Testing (Secondary Containment)

Reference: Clinton Power Station, Safety Evaluation Report, Section 6.2.2; February 1982

Issue

The NRC Staff will require the applicant to commit to leakage testing of the secondary containment volume to verify the 194-sec. drawdown time required to reestablish a -0.25 in. of water gauge pressure.

Response

Illinois Power is committed to leakage testing of the secondary containment volume.

The Clinton Power Station (CPS)-FSAR Sections 6.2.3, 6.2.6.5.2, 6.2.6.5.3, and 14.2.12.1.35 describe the tests to be performed on the Standby Gas Treatment System (SGTS) during the preoperational testing phase. Part of the objective of this test will be to verify that the SGTS can achieve and maintain the secondary containment volume at -0.25 in. of water gauge pressure within 194 seconds .

The CPS Technical Specifications, Section 4.6.6.1c, will include the following words:

"SECONDARY CONTAINMENT INTEGRITY shall be demonstrated by, at least once per 18 months, verifying that one standby gas treatment subsystem will draw down the secondary containment to greater than or equal to 0.25 inches of vacuum water gauge (with respect to atmospheric pressure) in less than or equal to 194 seconds."

The CPS Technical Specifications are presently under development and will be included in the CPS-FSAR, as Chapter #16, upon completion. The 18 month frequency for testing is identical to that stated in the GE-Standard Technical Specifications for the BWR/6 product line (Section 4.6.6.1c).

Illinois Power believes that the above commitment should be sufficient to close this issue.

(10e) Containment Bypass Leakage

References:

(1) Clinton Power Station - Safety Evaluation Report (CPS-SER), Sections 6.4 and 15.3.1; February 1981.

(2) NUREG-0800 (Rev. 2), "Standard Review Plan", Section 6.4 - "Control Room Habitability System"; July 1981.

(3) IP Letter U-0415, from G. E. Wuller to J. R. Miller; dated 2/23/82.

(4) NRC Letter from J. R. Miller to G. E. Wuller; dated 3/15/82.

Issue

Illinois Power (IP) proposes the use of a 12% Bypass Leakage Fraction as a Technical Specification limit. The Staff requires that the CPS Technical Specifications limit the bypass fraction to no more than 4% of the containment leakage.

Response

It is IP's position that a 12% Bypass Leakage Fraction is acceptable for CPS and proposes that such a value be incorporated into the CPS Technical Specifications, in Section 3.6.1.2c.

References #1 & 2 provide detailed information regarding the NRC Staff's concerns on this issue. Reference Letter #3 transmitted IP's position on the issue (which included offsite dose calculations assuming an 11% bypass fraction). Reference Letter #4 stated the Staff had two concerns remaining for resolution of this issue:

(1) The amount of allowed bypass leakage for CPS is limited by GDC 19. At that time, the Staff's computed control room doses indicated that greater than 4% Bypass leakage resulted in thyroid doses to the Control Room operators that exceeded the 30 Rem limit.

(2) The main steamline isolation valve (MSIV) leakage was not believed to have properly treated in the Reference 3 calculation. The letter states:

> "The Illinois Power report quotes Regulatory Guide 1.96, in a manner to imply that main steam line isolation valve leakage is not to be included in computed LOCA doses. That guide, however, merely states that the transit time of leakage through isolated steam lines to the turbine building is

larger than two hours. That position allows main steam line leakage collection systems to be manually operated. In the Clinton design, all cumulative steam line leakage is released to the secondary containment whenever the leakage collection system is actuated and the staff's model follows Standard Review Plan 15.6.5, Appendices A and D."

IP has worked closely with the Staff to provide resolutions to these concerns. It is IP's position that these concerns have been resolved. A discussion of the resolution of these issues follows:

(1) Control Room Doses

CPS-SSER #1, Section 6.4, addresses resolution of Outstanding Issue #11 on control room doses following a postulated LOCA:

"In addition to the primary ventilation system, the control room HVAC recirculation system would be in operation during radiological emergencies to remove radioactive iodine from the control room atmosphere. This system is not in strict conformance with Regulatory Guide 1.52; however, an iodine decontamination efficiency of 70% (independent of chemical form) is appropriate provided that (1) the filter trains will be leak tested and (2) the iodine removal efficiency of the activated charcoal will be determined by laboratory tests in accordance with Sections 5 and 6 of Regulatory Guide 1.52, Revision 2. These requiements will be incorporated into the Technical Specifications.

The staff has evaluated the control room doses following a postulated loss-of-coolant accident in accordance with SRP Section 6.4 (NUREG-0800). The calculated thyroid and whole-body doses are within the guidelines of GDC 19."

A telecon, between IP's E. W. Kant/T. L. Riley and the NRC reviewer, Ken Dempsey, on 4/23/82, indicated that the NRC control room dose recalculation was performed incorporating a 12% Bypass fraction and, as stated above, the doses were acceptable. IP has recalculated the control room doses with a 12% Bypass fraction and taking credit for the Control Room HVAC recirculation system charcoal filter units. The results of the recalculation are stated below:

	Doses (Rem)	NRC Limit
Whole Body-Gamma	3.48	5
Thyroid I-131	4.68	30
Beta	28.18	75

Since the above doses are below the NRC limits, it is IP's position that the NRC concern is adequately resolved.

(2) MSIV Leakage

A major source contributor to the Bypass Leakage source term is the MSIV-Leakage Control System (LCS) exhaust. The design of the CPS MSIV-LCS has been modified to essentially eliminate this source contributor as a concern. The original CPS design had the exhaust from the MSIV-LCS routed into an RHR cubicle. The Standby Gas Treatment System (SGTS) would then take suction from this cubicle such that, following the 194-sec. drawdown time, this leakage would all be filtered leakage. The design of the MSIV-LCS has been modified such that the exhaust is routed directly to a suction header of the SGTS, via a hardpiped connection. Immediately following actuation of the SGTS during a LOCA this leakage becomes filtered leakage, thus eliminating this source term from the secondary containment. Provided as an attachment to this position paper is the appropriate piping and instrumentation diagram (M05-1070) showing this design change. IP will revise FSAR Figure 6.7-1 in the near future. Therefore, it is IP's position that the above described modification adequately resolves this NRC concern.

Technical justification for the proposed increase in the Bypass Leakage Fraction, from 5% to 12%, can be made on two major points:

(1) ALARA - Occupational Dose Considerations

Illinois Power believes that the NRC position is more restrictive than NRC's own regulations and in fact detracts from optimum plant nuclear safety. Specifically a 4 percent bypass leakage limit will contribute to a real increase in plant personnel exposure, whereas it is not required for meeting the off site dose limits resulting from a low probability loss-of-coolant accident.

The valves and penetrations in the designated bypass paths have a design leakage of about 1/3 of the NRC proposed 4% bypass leakage limit. However, after several years of plant operation, it is likely that the leakage rate in these valves will approach the 4% limit. Therefore a very rigorous surveillance and maintenance program will be required which would tend to increase the radiation exposure of plant personnel.

The Clinton plant has committed (a) to comply with nuclear regulations that plant personnel doses be kept as low as reasonably achievable (ALARA) as well as (b) to meet regulations concerning calculated offsite does.

A 12 percent bypass leakage limit would permit a more reasonable level of valve leakage surveillance and maintenance; this would therefore minimize unnecessary radiation exposure of plant personnel.

(2) Plant Availability

A more reasonable bypass fraction limit should result in increased plant availability by reducing the number of forced outages required because technical specification limits cannot be met.

The offsite doses have been shown to be in conformance with the 10 CFR 100 requirements. The Reference #3 letter provides additional information regarding appropriate conservatisms in the bypass leakage calculation and the dose conversion factor calculations.

It is IP's belief that this position paper provides adequate information and documentation to justify the use of a 12% bypass leakage fraction and, therefore, close-out issue 10e.