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Change No. 3
License No. DPR-16

FEB 8 1972

Docket No. 50-219

Jersey Central Power & Light Company
ATTN: Mr. R. H. Sims, Vice President
Madison Avenue at Punch Bowl Road
Morristown, New Jersey 07960

Gentlemen:

Your letter dated September 10, 1970, submitted Proposed Change No. 3 to the Technical Specifications of Provisional Operating License No. DPR-16 for the Oyster Creek Nuclear Power Plant. The proposed change would allow a channel to be made inoperable for brief intervals during the performance of required tests and calibrations.

Based on our review of the proposed change, we made certain modifications to it to meet our licensing requirements. These modifications have been discussed with your staff. They entail mainly specifying a limit on the "brief interval" stated in your proposed change. We have concluded that implementation of the change, as modified, will not present significant hazards considerations not described or implicit in the Safety Analysis Report and that there is reasonable assurance that the health and safety of the public will not be endangered by operation in the manner proposed.

Accordingly, pursuant to Section 50.59 of 10 CFR Part 50, the Technical Specifications of Provisional Operating License No. DPR-16 are hereby changed as indicated in Attachment A.

Sincerely,

/s/

Donald J. Skovholt
Assistant Director for Reactor Operations
Division of Reactor Licensing

Enclosure:
Attachment A - Change to
Technical Specifications

cc: George F. Trowbridge, Esquire
Shaw, Pittman, Potts, Trowbridge & Madden
910 - 17th Street, N. W.
Washington, D. C. 20006

D-2/8/72

OFFICE ▶	DRL	DRL	DRL	DRL		
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DATE ▶	2/4/72	2/7/72	2/9/72	2/8/72		

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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

February 8, 1972

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Washington, D. C. 20006

ATTACHMENT A

CHANGE NO. 3 TO THE TECHNICAL SPECIFICATIONS

PROVISIONAL OPERATING LICENSE NO. DPR-16

JERSEY CENTRAL POWER & LIGHT COMPANY

DOCKET NO. 50-219

1. In the second line on page 3.1-2 after the word "instrumentation", add "and for channel test or calibration".

2. On page 3.1-3 before the paragraph beginning "Bypasses of inputs . . .", insert the following new subparagraph:

"4. When required for surveillance testing, a channel is made inoperable. In order to be able to test its trip function to the final actuating device of its trip system, the trip system cannot already be tripped by some other means such as a mode switch, interlock, or manual trip. Therefore, there will be times during the test that the channel is inoperable but not tripped. For a two channel trip system, this means that full reliance is being placed on the channel that is not being tested. The probability of the trip system failing to perform its function when required under this configuration can be made commensurate with a like probability under its normal configuration by limiting the operating time in the test mode. An acceptable test duration to meet this criterion is computed to be one hour based on the following considerations:

(a) the increased probability of an unsafe failure for a one-out-of-one trip system in comparison to a one-out-of-two trip system;

(b) the probability that the one channel being relied upon is itself inoperable at the beginning of the test;

(c) the probability that an event will occur that requires the trip system to function during the time spent in the test mode;

(d) an unsafe failure rate of 2.5×10^{-6} hr^{-1} (Sec. 4.1, p. 4.1-2) for the channel; and

(e) a test interval (time between tests) of one month."

3. On page 3.1-12, add the following sentence to the sentences defining the meaning of the single asterisk:

"When necessary to conduct tests and calibrations, one channel may be made inoperable for up to one hour per month without tripping its trip system."

4. On page 3.1-12, change the first exception stated in note c. to read as follows:

"If one APRM in a quadrant is inoperable, the other APRM channel in that quadrant may be made inoperable for up to one hour per month for test or calibration without inserting trips in its trip system provided that no control rod is moved outward during the calibration and/or test."

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

FEB 9 1972

Files (Docket No. 50-219)
THRU: R. J. Schemel, Chief, ORB #1, DRL

SAFETY REVIEW OF CHANGE REQUEST NO. 3, OYSTER CREEK REACTOR

By Change Request No. 3 dated September 10, 1970, the licensee has requested a change in the Technical Specifications to permit one channel in a trip system to be made inoperable briefly for testing and calibration. The proposed change would allow testing of each channel to the final actuating device of its trip system. Presently, the Technical Specifications state that whenever a channel is inoperable, its trip system shall be tripped in order to maintain the same degree of reactor plant protection. Although this procedure is normally acceptable and will continue to be followed in all cases not covered by this proposed change, it does not allow complete surveillance testing of a reactor plant protection system. If a trip system, in which a channel is to be rendered inoperable for testing purposes, is tripped throughout the testing period by manual trip or an interlock, the actuation of the trip system by the channel being tested cannot be verified.

The logic configuration for the major reactor protection systems is one-out-of-two twice that is either one of two channels can trip a trip system and it requires two trip systems to be tripped to perform the protective function. When one channel is made inoperable, the one trip system becomes a one-out-of-one configuration. Therefore, full reliance for protection system performance is placed on the remaining channel in that trip system.

This condition is addressed in IEEE-279, Section 4.11 as follows:

> "Exception: 'One-out-of-two' systems are permitted to violate the single failure criterion during channel bypass provided that acceptable reliability of operation can be otherwise demonstrated. For example, the bypass time interval required for a test, calibration, or maintenance operation could be shown to be so short that the probability of failure of the active channel would be commensurate with the probability of failure of the 'one-out-of-two' systems during its normal interval between tests."

The computation of the test duration that would comply with the above criterion is given in the appendix to this evaluation. The computation is based on the following:

(1) the increased probability of an unsafe failure of a one-out-of-one trip system in comparison to a one-out-of-two trip system;

(2) the probability that the one channel being relied upon is itself inoperable at the beginning of the test;

(3) the probability that an event will occur requiring the trip system to function during the time spent in the test mode;

(4) an unsafe failure rate of 2.5×10^{-6} hr^{-1} (Sec. 4.1, p. 4.1-2 of the Technical Specifications) for the channel; and

(5) a test interval (time between tests) of one month.

The results derived in the appendix show that if a channel is made inoperable for a period of one hour without tripping its trip system, and without knowing the condition of its redundant channel in that trip system, the joint probability of the one-out-of-one system being failed and an event occurring that requires the system to function is commensurate with the joint probability of the one-out-of-two system being failed and an event occurring that requires the system to function during the 730 hours between tests.

The logic systems that do not use the one-out-of-two twice configuration require only a single trip system to trip in order to perform their functions. Where there are two trip systems for these functions, each trip system operates redundant systems, e.g., core spray and containment spray. Therefore when testing a channel in one of these trip systems, the redundant system provides protection for the duration of the test. The time limitation for operation in this mode is already specified in the Limiting Conditions for Operation of these systems. Where there is only a single trip system for a function, e.g., reactor building isolation and standby gas treatment, the system is actually operated for the test.

There are two systems that require special consideration because they do not fall under any of the above categories. These are the Offgas System Isolation and the Rod Block. The Offgas System Isolation is actuated by a two-out-of-two trip system. Therefore when one channel is made inoperable during test, the trip system cannot perform its function. Manual isolation would be relied upon during the short test duration, using the one operable instrument channel and the stack monitors for operator information. The Rod Block function of the APRM's require that one of the two APRM's in the same quadrant must be operable. Therefore if one is inoperable and it is necessary to test the other, no control rod withdrawal is allowed during the test.

Since it is desirable to verify the actuation of the final trip device of a trip system during the surveillance test of a channel and since it can be shown that the system reliability can be maintained during the performance of this test by limiting the time involved, we have modified the proposed change to specify the time limit and have also modified the basis of the specification to reflect these considerations.

Based on the above evaluation, we have concluded that implementation of the proposed change, as modified, will not present significant hazards considerations not described or implicit in the Safety Analysis Report and that there is reasonable assurance that the health and safety of the public will not be endangered.

T. V. Wambach

T. V. Wambach
Operating Reactors Branch #1
Division of Reactor Licensing

Enclosure:
Computation of the Test Duration

cc: D. J. Skovholt
R. H. Vollmer
R. J. Schemel
T. V. Wambach
S. A. Teets
M. Jinks (2)

COMPUTATION OF TEST DURATION

If r is the unsafe failure rate of a channel

$p = 1-e^{-rt}$, where p is the probability that the channel is failed in the unsafe mode at time, t.

Using Taylor's expansion:

$$p = 1-\left(1-rt+\frac{r^2t^2}{2!}-\frac{r^3t^3}{3!}+\cdots\right)$$

For $rt \ll 1$
$p \approx rt$

For the remainder of this analysis, rt will be assumed to be much less than one. For example, a failure rate of 2 per year results in an rt of less than 0.2 for a time period of one month.

When the channels, each with an unsafe failure probability of p, are placed in a logic system, the unsafe failure probability of the logic system, P, can be developed from the necessary failure combinations of the channels. For (1 out of 2) x 2 Logic:

$$P_{1/2 \times 2} = 2p^2 - p^4$$

$$P_{1/2 \times 2} \approx 2p^2 \quad \text{for } p \approx rt \ll 1$$

When one channel of the above system is inoperable, the logic degrades to: (1 out of 1)+(1 out of 2). For this system:

$$P_{(1/1)+(1/2)} = p + p^2 - p^3$$

$$P_{(1/1)+(1/2)} \approx p \quad \text{for } p \approx rt \ll 1$$

$$\therefore P_{1/2 \times 2} \approx 2(rt)^2$$

$$P_{(1/1)+(1/2)} \approx rt$$

When a channel in a 1/2 x 2 system is made inoperable for test purposes at the end of a test interval, T, the remaining channel in that one-out-of-two portion of the system already has a probability of failure equal to rT. Therefore the probability that the scram system will be failed at the end of the test duration, τ, is:

$P_{(1/1)+(1/2)}(\tau) \approx rT + r\tau$, for testing of the 1st channel of a 1/2 subsystem not knowing the condition of the 2nd channel.

$P_{(1/1)+(1/2)}(\tau) \approx r\tau$, for testing the 2nd channel of a 1/2 subsystem having just verified the operability of the 1st channel.

Let F = the probability of failure to scram when required.
and S = the probability a scram is required during time, Δt

If σ is the average scram rate, i.e., scrams per unit of time when considered for operating times at conditions representative of testing conditions (not during start-ups, shutdowns, or other gross maneuvers),

then: $S = \sigma \Delta t$
and: $F = SP$

Let T = the time from completion of testing until the start of the next testing, i.e., the test interval.

τ = the time from the start of channel testing until the completion of testing, i.e., the test duration.

F_T = the probability of failure to scram when required during the test interval.

F_τ = the probability of failure to scram when required during the test duration.

Then $F_T = \int_0^T \sigma\, dt\, (P_{1/2 \times 2})$

$= \int_0^T \sigma (2)(rt)^2\, dt = \frac{2\sigma r^2 T^3}{3}$

$F_\tau = \int_0^\tau \sigma\, dt \left[P_{(1/1)+(1/2)}\right] = \int_0^\tau \sigma (rT + rt)\, dt$

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$F_{\tau} = \sigma r T \tau + \sigma r \tau^2/2$, during testing of the 1st channel of a 1/2 subsystem not knowing the condition of the 2nd channel

$F_{\tau} = \int_0^{\tau} \sigma dt\,(rt)$
$= \sigma r \tau^2/2$, during testing of the 2nd channel of a 1/2 subsystem having just verified the operability of the 1st channel

The criterion to be applied for permissible length of test duration is that the probability of failure to scram when required during the test duration be commensurate with the probability of failure to scram when required during the test interval.

$F_T = F_{\tau}$

$\frac{2\sigma r^2 T^3}{3} = \sigma r T \tau + \sigma r \tau^2/2$, for the 1st channel

$\frac{2\sigma r^2 T^3}{3} = \sigma r \tau^2/2$, for the 2nd channel

For the 1st channel: $\frac{2}{3} r T^3 = T\tau + \tau^2/2$

For T = 1 month = 730 hours and r = 2.5×10^{-6} hr^{-1} (OC-1 Tech. Specs. Sec. 4.1)

τ = 0.9 hours.

For the 2nd channel: $\frac{4}{3} r T^3 = \tau^2$

τ = 36 hours