TABLE 3.6.3-1 (Continued)

PRIMARY CONTAINMENT ISOLATION VALVES

VALVE FUNCTION AND NUMBER	VALVE GROUP(a)	MAXIMUM ISOLATION TIME (Seconds)
a. Automatic Isolation Valves (Continued)		
Equipment Drain (Radioactive)	4	15
EDR-V-19 EDR-V-20		
Floor Drain (Radioactive)	4	15
FDR-V-3 FDR-V-4		
Fuel Pool Cooling/Suppression Pool Cleanup	4	35
FPC-V-149 FPC-V-153(f) FPC-V-154(f) FPC-V-156		
Reactor Recirculation Hydraulic Control(e) (ℓ)	4	15
HY-V-17A,B HY-V-18A,B HY-V-19A,B HY-V-20A,B HY-V-33A,B HY-V-34A,B HY-V-35A,B HY-V-36A,B		
Traversing Incore Probe	4	5
TIP-V-1,2;3,4,5		
TIP V-15		

TABLE 3.6.3-1 (Continued)

PRIMARY CONTAINMENT ISOLATION VALVES

VALVE FUNCTION AND NUMBER	VALVE GROUP(a)	MAXIMUM ISOLATION TIME (Seconds)
d. Other Containment Isolation Valves (Continued)		
Radiation Monitoring		N.A.
PI-V-X72f/1		
PI-V-X73e/1		
Transversing Incore Probe System		N.A.
TIP-V-6		
TIP-V-7,8,9,10,11(e)		

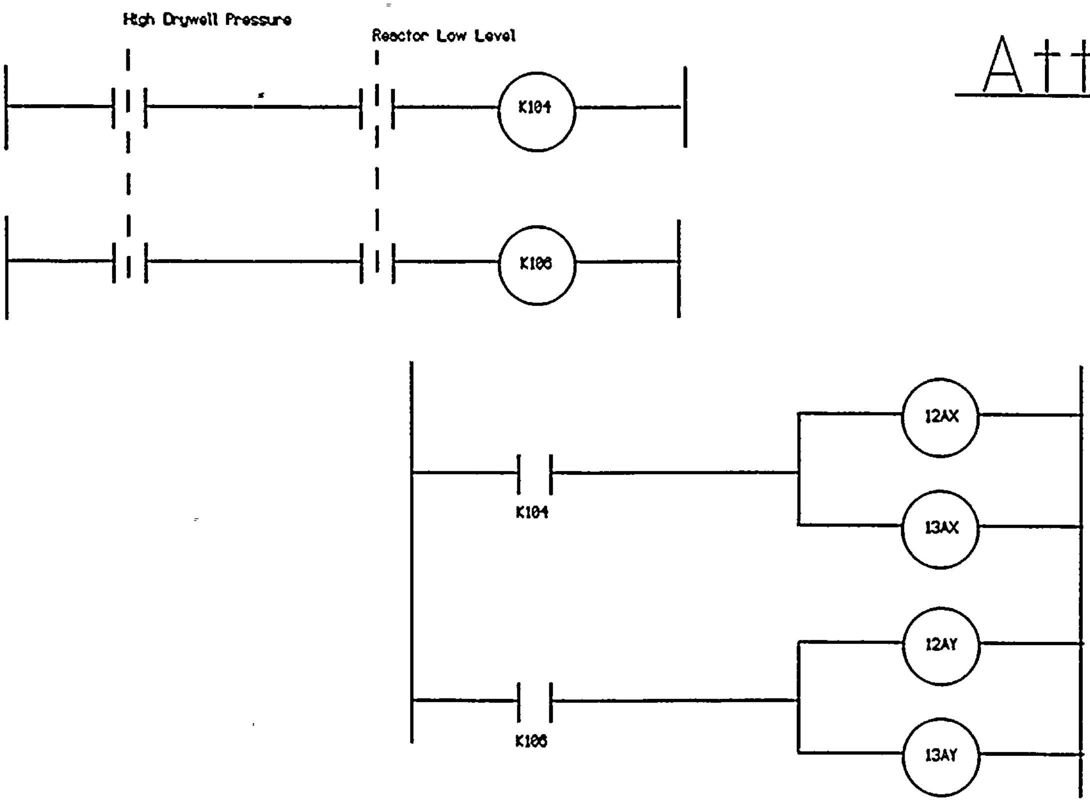
TABLE NOTATIONS

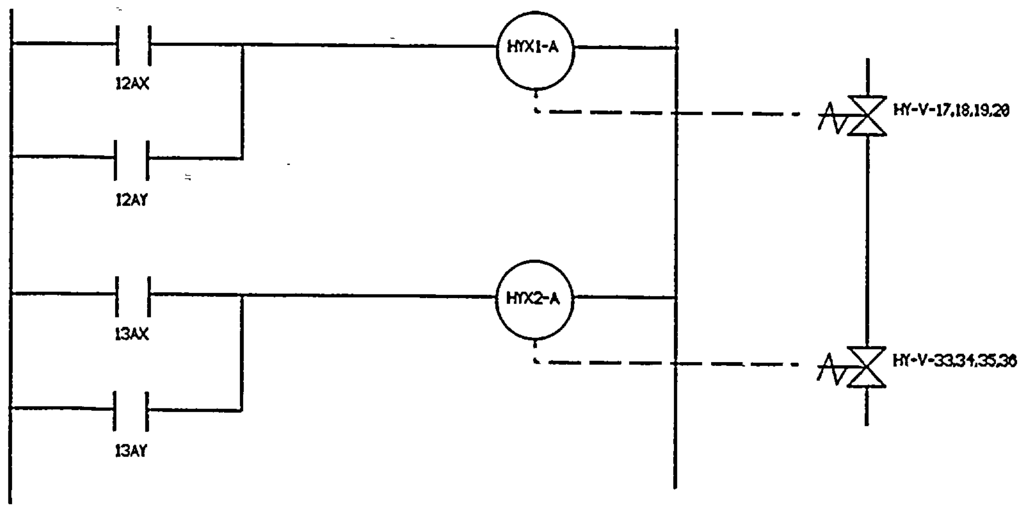
*But greater than 3 seconds.
#Provisions of Technical Specification 3.0.4 are not applicable.

(a) See Technical Specification 3.3.2 for the isolation signal(s) which operate each group.
(b) Valve leakage not included in sum of Type B and C tests.
(c) May be opened on an intermittent basis under administrative control.
(d) Not closed by SLC actuation signal.
(e) Not subject to Type C Leak Rate Test.
(f) Hydraulic leak test at 38.2 psig.
(g) Not subject to Type C test. Test per Technical Specification 4.4.3.2.2
(h) Tested as part of Type A test.
(i) May be tested as part of Type A test. If so tested, Type C test results may be excluded from sum of other Type B and C tests.
(j) Reflects closure times for containment isolation only.
(k) During operational conditions 1, 2 & 3 the requirement for automatic isolation does not apply to RHR-V-8. Except that RHR-V-8 may be opened in operational conditions 2 & 3 provided control is returned to the control room, with the interlocks reestablished, and reactor pressure is less than 135 psig.

(ℓ) The isolation logic associated with the reactor recirculation hydraulic control containment isolation valves need not meet single failure criteria for OPERABILITY for a period ending no later than May 15, 1995.

Attachment 4





Circuit normally energized
Shown in De-Energized Condition

SAFETY ASSESSMENT OF HYDRAULIC LINE FAILURE VS SAFETY ASSESSMENT OF POTENTIAL CORRECTIVE ACTIONS

This analysis compares the increased risk from continued operation with the current containment isolation logic design (potential containment bypass path) with the increase in risk associated with possible corrective actions. The containment bypass scenario is presented in terms of containment failure probability coincident with core damage from a large LOCA while the corrective actions are presented in terms of increased core damage frequency. The bypass scenario requires a LOCA and a sequence of equipment failures, the corrective actions involve somewhat more probable events such as loss of feedwater or turbine trip.

Containment Bypass Scenario

Lack of two completely independent, automatically actuated isolation valves on the Recirculation Flow Control Valve (FCV) hydraulic lines implies that during a demand for containment isolation these hydraulic lines could present a direct path from containment to the environment.

Situation: The recirculation FCV hydraulic lines are designed for an internal pressure of 2200 psig and the system is designed and constructed to operate as a closed loop:

- o Each of the two FCV Actuator Hydraulic Power Units, HY-HP-3A and -B is installed outside containment
- o Supply to the actuators, installed inside containment, is maintained at 1800 psig so the "pre-accident" integrity of the piping is confirmed
- o Isolation of the hydraulic supply lines is achieved with two series isolation valves
    - isolation of each of the four sets of two series valves in line "A" is dependent upon Div "1" actuation
    - isolation of each of the four sets of two series valves in line "B" is dependent upon Div "2" actuation
    - valves are functionally tested each refueling

Calculation of Conditional Containment Failure Probability:

- o Initiating event: Large LOCA (3E-4/yr)
- o Probability that Large LOCA originates with Recirculation pump discharge piping = 0.1 (based on estimate that recirculation pump discharge piping represents 10% of large in-containment piping)

SAFETY ASSESSMENT OF HYDRAULIC LINE FAILURE VS SAFETY ASSESSMENT OF POTENTIAL CORRECTIVE ACTIONS

- o Conditional failure probability of hydraulic piping inside containment given failure of recirculation piping = 1.0

  Note: Failure is assumed to result from movement of the pump discharge piping initiating a hydraulic line failure at the actuator - no credit is given for the ameliorating effects of the flexible hose connections between the valve actuators and the hydraulic lines inside containment. There are actually no postulated breaks that would cause failure of the hydraulic lines.

- o Probability that the hydraulic lines will fail outside containment is assumed to be 1.0 (a factor of 1E-2 could be justified for equivalent instrument line break accidents). There are actually no postulated breaks that would cause failure of the hydraulic lines.

- o Probability that one of the two actuation systems fails on demand = 2 * 8.3E-3

  Note: calculated as follows: 1.27E-6/hr[1] * 13,140 hrs between tests (18 mo test interval) * 1/2 (finds average probability over the interval)

[1] Relay failure rate taken from NPRDS, NUREG/CR-2815 gives 1E-6 per hour.

- o Conditional probability of core damage given a Large LOCA = 1E-4

The annual calculated frequency for this containment bypass scenario coincident with core damage from a large LOCA is 5E-11 per year (less than the Individual Plant Evaluation (IPE) truncation value of 1E-9/yr).

Other LOCA core melt scenarios may be more frequent, but in other scenarios the conditional probability of hydraulic line failure will be lower because there will be less dependency between the initiating event and induced failure of the piping. Based on the missile hazards analysis performed for piping inside containment, the hydraulic lines are not a target of any LOCA originated missiles or jets and so will not fail inside containment as a result of the large LOCA. Additionally, the lines are small (< 3/4"), releases through these lines will be much smaller than any considered previously for equipment qualification purposes. Therefore, a sequence of events involving core damage, rupture of the lines and failure of ECCS equipment caused by steam and radiation releases through the open hydraulic lines is not considered to be credible.

Attachment 5

SAFETY ASSESSMENT OF HYDRAULIC LINE FAILURE VS
SAFETY ASSESSMENT OF POTENTIAL CORRECTIVE ACTIONS

Safety Assessment of Corrective Actions

a) Manual Shutdown

The WNP-2 IPE assumes 0.5 manual shutdowns per year. Based on this initiator frequency the total core damage frequency due to manual shutdown events is calculated to be 4.5E-8 per year. Based on a sensitivity study using the WNP-2 IPE model, an increase in manual shutdown frequency to 1.5 per year increases its total contribution to core damage frequency to 15.8E-8 per year.

b) Operation with Hydraulic Isolation Valves Closed

Isolation of the hydraulic lines (closure of the isolation valves) for the rest of this cycle can be used as a compensatory measure, however, this would result in loss of all recirculation flow control. As a result, the plant would be unable to respond to a relatively minor transient in the feedwater system. This means that a feedwater transient would initiate a plant SCRAM and has the potential for increasing risk.

Feedwater transients are typically encountered about 3 times per year, and as a result, plant trips could be expected to increase from a current level of 4 per year to 7 per year. This assumes that the plant would be unable to respond to even a minor transient. Based on a sensitivity study using the WNP-2 IPE model, even a single event increase resulting in a plant SCRAM will increase core damage frequency by approximately 3E-7 per year.

Conclusion:

Manual shutdown and/or isolation of the hydraulic lines is not recommended. The increase in risk from the potential corrective actions is greater than the risk of allowing plant operation in the current configuration.