



# ANO-1 Seal Failure

Chapter 17.0  
B&W Cross-Training Course  
R-326C

# OBJECTIVES

1. Describe how control room instrumentation can be used to determine RCP seal failures.
2. Explain the different methods that can be used to initiate High Pressure Injection.
3. Explain why isolation of the Core Flood Tanks is necessary during plant cooldown.

- Observation and trend of seal flows and pressures can be used to determine seal failures.
- Methods to place HPI In-Service:
  - ❑ Manually placing HPI in service => Individual Components.
  - ❑ Manual Actuation of ESFAS
- CFTs should be isolated during plant cooldown to ensure an inadvertent injection from the CFTs.

# Appendix – Sequence of Events

Time	Event
0145 (0)	The reactor operator observes a step decrease in makeup tank level. RCP "C" Seal Failure diagnosed. RCS Leakage ~10-20 gpm. Power reduction at 5%/min. initiated.
0214 (+29 min)	Unit loads transferred to offsite power.
0220 (+35 min)	Letdown isolated.
0225 (+40 min)	Extra operations staff called in to aid in placing the unit Cold Shutdown
0227 (+42 min)	NRC Emergency Response Center and resident inspector notified. Increase in leak rate observed. Increased reduction rate to 20%-30%/min.
0247 (+62 min)	Generator off line.
0248 (+63 min)	RCP "C" stopped. RCS leakage increases to ~250-300 gpm.
0250 (+65 min)	Reactor manually tripped from 10% power. Manually started 2 additional makeup pumps. Opened all HPI MOVs. Cycled "C" RCP lift pumps four times. After 4th start of lift pumps, RCS leakage decreases. Started RCS cooldown
0254 (+69 min)	Isolated RCP "C" seal return. Increased seal injection flow to quench steam from failed seal. RB pressure increases from atmospheric pressure to 15.2 psia.
0256 (+71 min)	Placed RB emergency coolers in service.
0301 (+76 min)	Stopped RCP "A".

# Appendix – Sequence of Events

Time	Event
0305 (+80 min)	Stopped "C" makeup pump, closed all HPI MOVs, established normal makeup with 2 makeup pumps with suction supply from BWST.
	"B" OTSG Steamline Break Isolation and Control (SLBIC) actuation at 600 psig due to high RCS cooldown.
	Steam driven EFW pump starts. Raised header pressure to >600 psig. Bypass SLBIC. Steam pressure >650 psig, SLBIC automatically resets. SLBIC actuated on low pressure (<600 psig) Raised header pressure to >600 psig. SLBIC successfully bypassed.
0320 (+95 min)	Steam driven EFW pump stopped. Aux. Feedwater pump placed in service.
0800 (+375 min)	Containment entry to power up and close CFT outlet valves. CFTs inject some water prior to isolation.
0900 (+435 min)	Unit in cold shutdown