

WISCONSIN PUBLIC SERVICE CORPORATION

Kewaunee Nuclear Power Plant

OPERATING PROCEDURE

NO. E-0-07 REV. N

TITLE: Safety Injection Actuation

DATE MAY 15 1984 PAGE 1 of 12

REVIEWED BY

W. J. Wittman

APPROVED BY

D. J. [Signature]

1.0 INTRODUCTION

This Emergency Procedure presents the automatic actions, the immediate operator actions and the diagnostic sequence which is to be followed in the identification of the following:

1. Spurious Actuation of Safety Injection
2. Loss of Reactor Coolant
3. Loss of Secondary Coolant
4. Steam Generator Tube Rupture

2.0 SYMPTOMS

- 2.1 Safety Injection Actuation
- 2.2 SI Pressurizer Lo Pressure SI Channel Alert
- 2.3 SI Containment Hi Press. SI Channel Alert
- 2.4 MN Steam Header 1A or 1B LO LO Press. SI Channel Alert

3.0 IMMEDIATE ACTION

- 3.1 Automatic
 - 3.1.1 Reactor and turbine trip
 - 3.1.2 Diesel generators start
 - 3.1.3 Safety Injection Sequence Initiates
 - 3.1.4 Containment Isolation Occurs
 - 3.1.5 Feedwater isolation occurs and the motor driven auxiliary feedwater pumps start.
 - 3.1.6 Service water headers 1A and 1B are isolated.
 - 3.1.7 In the event of HI containment pressure (4 PSIG) the Containment Fan Coil Emergency Discharge Dampers open.

850 80132 850701
PDR ADDCK 05000483
PDR
G

3.1.8 Main steam isolation occurs on:

1. Hi-Hi containment pressure at 17 psig
2. Hi-Hi steam flow AND safety injection
3. Hi steam flow AND Lo-Lo Tave (540°F) AND safety injection

3.1.9 In the event of hi-hi containment pressure (23 psig) containment spray will be actuated.

3.2 Operator

- 3.2.1 Perform the Immediate Operator Actions of E-0-04, Turbine and Reactor Trip
- 3.2.2 Verify safety injection pump discharge flow from at least one train is available (actual flow indication or pump discharge pressure and valve position indication).
- 3.2.3 Observe the SI and CI active status panels. Follow up any automatic action which did not occur.
- 3.2.4 If at any time RCS pressure DECREASES to 1500 psig or less AND safety injection flow is verified, TRIP both Reactor Coolant Pumps.

4.0 SUBSEQUENT ACTION

NOTE: Throughout the subsequent actions, the emergency plan implementing procedure should be reviewed to evaluate if the emergency response organization should be activated.

- 4.1 Verify both pressurizer spray valves are CLOSED.
- 4.2 Verify both pressurizer PORV's are CLOSED.
- 4.3 Maintain seal injection flow to both Reactor Coolant Pumps (verify adequate flow using labyrinth differential pressure).
- 4.4 Verify one component cooling pump is running.

WISCONSIN PUBLIC SERVICE CORPORATION

Kewaunee Nuclear Power Plant

OPERATING PROCEDURE

NO. E-0-07

TITLE: Safety Injection Actuator

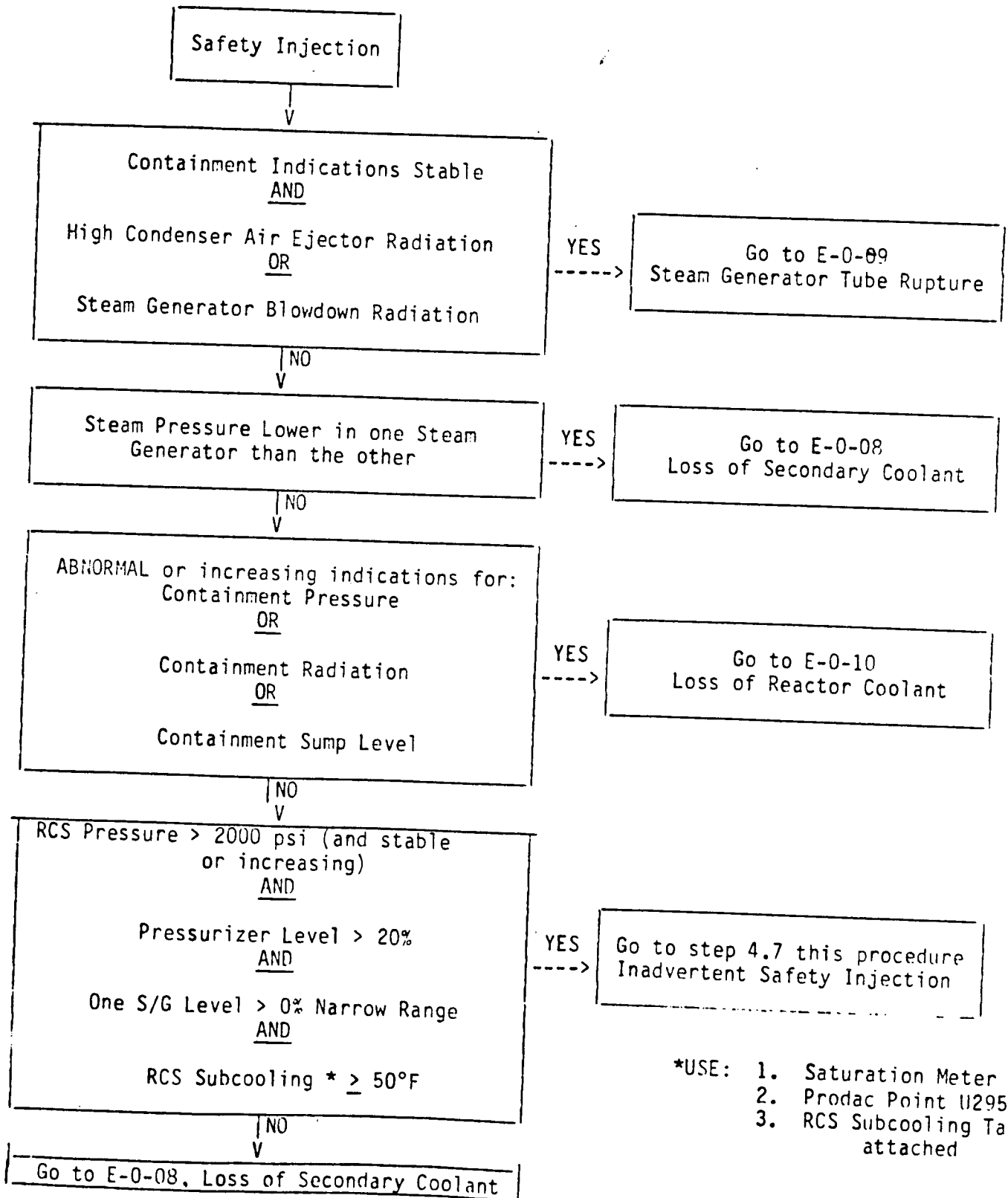
DATE
MAY 15 1984

PAGE 3 of 1

4.5 Verify that those valves and dampers not on the containment isolation status panel are CLOSED:

RC-402	Pressurizer steam space sample line
RC-403	Pressurizer steam space sample line
RC-412	Pressurizer liquid space sample line
RC-413	Pressurizer liquid space sample line
RC-422	RCS hot leg, loop B sample line
RC-423	RCS hot leg, loop B sample line
AS-1	Containment Atmosphere Sample Isolation
AS-2	Containment Atmosphere Sample Isolation
AS-32	Containment Atmosphere Sample Isolation
TAV-12	Cont. Purge and Vent Supply Damper
RBV-5	Cont. Purge and Vent Exhaust Damper

4.6 Identify the accident with the aid of this logic chart:



- *USE:
1. Saturation Meter
 2. Prodac Point U2956
 3. RCS Subcooling Table attached

4.7 If due to HI containment pressure the Reactor Coolant Pumps loose cooling air flow, then monitor Reactor Coolant Pump motor temperature to determine if the pumps must be tripped.

IF RCP motor winding temperatures reach 155°C, THEN the RCP shall be tripped.

4.8 After an inadvertant safety injection:

4.8.1 RESET SI and STOP affected equipment

NOTE: If a blackout occurs after SI RESET, SI is disabled and must be manually initiated. Verify that NPSH exists for operating pumps.

NOTE: After SI has been reset, the reactor trip breakers must be reclosed to re-enable an automatic SI actuation. If a condition exists where actual SI is required, manually initiate SI. After reclosing the reactor trip breakers status light 449051001 (AUTOMATIC SI DISABLED) should be out.

4.8.2 Close the Containment Fan Coil Emergency Discharge Dampers if they have opened.

4.8.3 RESET containment isolation.

4.8.4 OPEN instrument air to containment isolation valve IA-101.

4.8.4 Using Appendix A Step A.3 check all the valves which receive a containment isolation signal and position them either OPEN or CLOSED as required for the present plant conditions.

4.8.6 Using Appendix B check all components which receive a SI signal and position them as required for present plant conditions.

4.8.7 OPEN both reactor coolant pump seal water return containment isolation valves CVC-211 and CVC-212.

4.8.8 Re-establish normal charging and letdown to maintain pressurizer water level and RCS pressure at values reached when SI is terminated.

4.8.9 If after securing safety injection and attempting to transfer to normal pressurizer pressure and level control:

- a. Reactor coolant pressure drops below 1815 psig, OR
- b. Pressurizer level drops below 10% level, OR
- c. Reactor coolant subcooling is $<50^{\circ}\text{F}$ (use: Saturation meter, Prodac point U2956, or RCS Subcooling Table).

THEN MANUALLY INITIATE SAFETY INJECTION and go to Step 4.6 to re-evaluate corrective action.

4.8.10 Flush the SI Pump suction piping using SP 33-098.

4.8.11 Reset Air compressor 1A by going to OFF then back to AUTO on the Control Room Control Switch.

APPENDIX A

A.1 Upon a safety injection signal the following events occur:

- a. SI pump suction valves from the boric acid tank OPEN (SI-2A and SI-2B).
- b. Containment fan coil units service water return motor operated valves OPEN.
- c. Component cooling heat exchanger service water inlet valves OPEN.
- d. Within one minute after power is available to buses 1-5 and 1-6, the following equipment is operating.

EQUIPMENT

Motor Operated Valves
 Safety Injection Pumps
 RHR Pumps
 ICS Pumps and Discharge MV's*
 SBV and AUX. Bldg. SV Equipment
 SW Pumps 1A1 and 1B1
 Containment Fan Coil Units and Dome Recirc. Fans
 Aux. Feedwater Pumps
 Component Cooling Pumps
 SW Pumps 1A2 AND 1B2
 Control room A/C
 Aux. and Turb. Bldg. Fan Coil Unit
 Air Compressors 1B and 1C*
 *Starts only on pressure demand signal

- e. A low level alarm in the boric acid tank is received at 68%. On low-low level in the boric acid tank (10%), the suction valves from the RWST (SI-4A and SI-4B) will OPEN and the suction valves from the Boric Acid Tanks (SI-2A and SI-2B) will CLOSE to transfer the suction of the SI pumps from the boric acid tank to the RWST.
- f. When RCS pressure decreases below 700 psig, each accumulator will begin discharging its contents to the loop cold legs.

A.2 The following ventilation action occurs:

- a. Shield building ventilation systems start and draw a measurable H₂O vacuum in the annulus.
- b. The containment purge and ventilation supply and exhaust isolation valves are closed (See A.3m).
- c. The four containment fan coil units start.
- d. The containment dome ventilation fans start.

- e. The auxiliary building supply and exhaust fans and air conditioning unit are tripped. However, the spent fuel pool supply and exhaust fans operating will not be tripped.
- f. The auxiliary building special ventilation system starts.
- g. All turbine and auxiliary building fan coil units will start.
- h. Control room air conditioning units and post-accident recirculation fans will start and the non-accident fresh air damper, ACC-5, will close. The operator can select recirculation or fresh air inlet. If safety injection has not been reset or if a High Radiation signal from radiation monitor RE-23 or a Steam Exclusion signal persists, the control switch must be held in the "fresh air" position to allow the introduction of fresh air to the control room areas.
- i. To support diesel operation, the following ventilation action occurs:
 - (1) Diesel generator ventilation supply fans start.

A.3 Containment isolation occurs which isolates the following penetrations:

- a. Pressurizer Relief Tank

MG(R)-512	PRT to gas analyzer
MG(R)-513	PRT to gas analyzer
MU-1010-1	Reactor make-up to PRT
NG-302	N2 supply to PRT
- b. Excess Letdown Heat Exchanger

CC-653	Component cooling return
--------	--------------------------
- c. SI Accumulators

NG-107	N2 supply to accumulators
--------	---------------------------
- d. Reactor Coolant Pumps

CVC-211	Seal water return to VCT
CVC-212	Seal water return to VCT
- e. CVCS Letdown Line

LD-4A	Letdown orifice isolation
LD-4B	Letdown orifice isolation
LD-4C	Letdown orifice isolation
LD-6	Letdown flow to letdown heat exchanger isolation

f. Primary Sampling System

- **RC-402 Pressurizer steam space sample line
- **RC-403 Pressurizer steam space sample line
- **RC-412 Pressurizer liquid space sample line
- **RC-413 Pressurizer liquid space sample line
- **RC-422 RCS hot leg, loop B sample line
- **RC-423 RCS hot leg, loop B sample line

g. Reactor Coolant Drain Tank

- MG(R)-503 RCDT to gas analyzer isolation
- MG(R)-504 RCDT to gas analyzer isolation
- MG(R)-509 RCDT to gas analyzer isolation
- MG(R)-510 RCDT vent line isolation
- RC-507 RCDT pumps' discharge line isolation
- RC-508 RCDT pumps' discharge line isolation

h. Containment Sump A

- MD(R)-134 Cont. Sump A pumps' discharge header isolation
- MD(R)-135 Cont. Sump A pumps' discharge header isolation

i. Instrument Air System

- IA-101 Inst. Air to Containment Isolation

j. Internal Containment Spray System

- ICS-201 Spray pump test line to RWST
- ICS-202 Spray pump test line to RWST

k. Steam Generators

- BT-31A S/G 1A Sample Line Isolation
- BT-32A S/G 1A Sample Line Isolation
- BT-31B S/G 1B Sample Line Isolation
- BT-32B S/G 1B Sample Line Isolation
- BT-2A S/G 1A Blowdown Line Isolation
- BT-3A S/G 1A Blowdown Line Isolation
- BT-2B S/G 1B Blowdown Line Isolation
- BT-3B S/G 1B Blowdown Line Isolation

1. Containment

VB-10A	Power Operated Vacuum Breaker 1A
VB-10B	Power Operated Vacuum Breaker 1B
**AS-1	Containment Atmosphere Sample Isolation
**AS-2	Containment Atmosphere Sample Isolation
**AS-32	Containment Atmosphere Sample Isolation
MD(R)-323A/MV-32390	D.D.T. to Contmt. 1A Isol. MV
MD(R)-323B/MV-32391	D.D.T. to Contmt. 1B Isol. MV
WG-310/SV-33655	D.D.T. to Vent Outside Contmt. Isol. Vlv.
WG-311/SV-33654	D.D.T. to Vent Inside Contmt. Isol. Vlv.
CVC-54/SV-33651	VCT Vent to Contmt. Isol. Vlv.

m. Purge and Ventilation

RBV-1	Cont. Purge and Vent Supply Isolation
RBV-2	Cont. Purge and Vent Supply Isolation
RBV-4	Cont. Purge and Vent Exhaust Isolation
RBV-3	Cont. Purge and Vent Exhaust Isolation
**TAV-12	Cont. Purge and Vent Supply Damper
**RBV-5	Cont. Purge and Vent Supply Damper

NOTE: Double asterisk items are not on the containment isolation panel and must be checked on the vertical panels.

APPENDIX B - SI ACTUATION

3.1 Check all components and position as required for present plant conditions:

DESCRIPTION	TRAIN A	TRAIN B
SI A Accumulator Discharge MV	SI-20A	SI-20B
Component cooling heat exchanger outlet MV	CC-6A	CC-6B
Loop A cold leg injection MV	SI-11A	SI-11B
S.W. to component cooling heat exch. MV	SW-1300A	SW-1300B
Reactor vessel injection	SI-302A	SI-302B
B. A. T. Outlet	SI-2A	SI-2B
FW to steam generator	FW-12A	FW-12B
B. A. T. series valve	SI-3	NA
Safety Injection Pump	1A	1B
Residual Heat Removal Pump	1A	1B
SV filter discharge heating coil	1A	1B
SV exhaust fan	1A	1B
SBV exhaust fan	1A	1B
SBV recirc. fan	1A	1B
Service water pump	1A1	1B1
Containment fan-coil unit	1C	1A
Containment fan-coil unit	1D	1B
Containment Dome Vent fan	1A	1B
Fan-coil S.W. return MV	SW-930A	SW-903C
Fan-coil S.W. return MV	SW-903B	SW-903D
Aux. Feedwater Pump	1A	1B
Component cooling pump	1A	1B
Service Water Pump	1A2	1B2
Spent Fuel Pump	1A	1B
Battery Room Fan-Coil Unit	1A	1B
Control Rm. Post Acc. Recirc. Fan	1A	1B
Control Room Air Conditioner	1A	1B
Turbine Building Fan Coil Unit	1A	1B
RHR Pump Pit Fan-Coil Unit	1A	1B
Aux. Bldg. Mezzanine Fan-Coil Unit	1A	1B
Aux. Bldg. Basement Fan-Coil Unit	1A	1B
Rod Drive Room Fan-Coil Unit	1A	1B

REACTOR COOLANT SYSTEM
 SUBCOOLING TABLE

WIDE RANGE RCS PRESSURE PSIG	T-SAT DEG F	50 DEG SUBCOOLING DEG F
2300	657	607
2250	654	604
2200	650	600
2150	647	597
2100	644	594
2050	640	590
2000	637	587
1950	633	583
1900	630	580
1850	626	576
1800	622	572
1750	618	568
1700	614	564
1650	610	560
1600	606	556
1550	602	552
1500	598	548
1450	593	543
1400	588	538
1350	584	534
1300	579	529
1250	574	524
1200	569	519
1150	563	513
1100	558	508
1050	552	502
1000	546	496
950	540	490
900	534	484
850	527	477
800	520	470
750	513	463
700	505	455
650	497	447
600	489	439
550	480	430
500	470	420

USE INCORE THERMOCOUPLES
 FOR TEMPERATURE

ATTACHMENT 7

EMERGENCY OPERATING PROCEDURE

E-0-10

LOSS OF REACTOR COOLANT