

**SUCCESS CRITERIA TABLES  
FROM NORTH ANNA IPE**



**TABLE 3.1.1-15  
TRANSIENT SUCCESS CRITERIA**

<u>Reactivity Control</u>	<u>Core Heat Removal Early</u>	<u>Late</u>	<u>Secondary Heat Removal</u>	<u>RCS (Integrity)</u>	<u>Containment Condition</u>
RPS Scram with < 2 rod failure to insert <sup>a</sup>	RCS - Natural Circ.		1/3 MFW pumps <sup>b,f</sup> OR 1/3 AFW pumps to 1/3 SGs <sup>c</sup>	RCS PORV Closure Note 1	Not Required
RPS Scram	1/3 Charging Pumps AND 1 RCS PORV (Feed & Bleed) <sup>e</sup>	Recirc. through 1/3 charging pumps - AND 1/2 Lo Head SI Pumps <sup>d</sup> (Note 3)	Not Required	Note 2	Recirculation through 1/2 IRS OR 1/2 ORS <sup>e</sup>

**Notes:**

1. Failure of RCS Integrity by failure of RCS PORV to close transfers to S2 event tree.
2. Feed & Bleed operation fails RCS Integrity through continued RCS PORV use.
3. For Transients, RCS depressurization before recirculation is not certain, so only high head safety recirculation is modeled. Also, ORS can be manually aligned to act as a backup for Lo Head Recirc for NAPS Unit 1.

**References:**

- |                      |                                 |
|----------------------|---------------------------------|
| a. WCAP-9691 p. A-11 | d. WCAP-9744                    |
| b. WCAP-9691 p. A-12 | e. Surry Analysis File 321MAF.1 |
| c. WCAP-9691 p. A-15 | f. NAPS UFSAR                   |

**TABLE 3.1.1-16  
LARGE LOCA SUCCESS CRITERIA**

<u>Reactivity Control</u>	<u>Core Heat Removal</u>		<u>Secondary Heat Removal</u>	<u>RCS Integrity</u>	<u>Containment Condition</u>
	<u>Early</u>	<u>Late</u>			
No Automatic Scram Required But Borated Water Injection Required for Long-Term Subcriticality	1/2 Low (a) Head SI Pumps AND 2/3 Accumulators	1/2 Low (a) Head SI Pumps In Low Pressure Recirculation Mode AND Changeover to hot leg Recirculation (d)	Not Required	Lost as Result of Initiator	1/2 Quench Spray(b) AND 1/2 Inside Recirc Spray  OR 1/2 Outside Recirc Spray(c)

**References:**

- (a) North Anna UFSAR
- (b) North Anna Analysis File 321MAF.N.1
- (c) MAAP analysis
- (d) ORS can be manually aligned to act as a backup for Lo Head Recirc for NAPS Unit 1.

**TABLE 3.1.1-17  
MEDIUM LOCA SUCCESS CRITERIA**

<u>Reactivity Control</u>	<u>Core Heat Removal</u>		<u>Secondary Heat Removal</u>	<u>RCS Integrity</u>	<u>Containment Condition</u>
	<u>Early</u>	<u>Late</u>			
RPS	1/3 Charging Pumps AND 2/3 Accumulators(a)	1/2 Charging Pumps AND 1/2 Low Head SI Pumps in Recirculation Mode(e)	Not Required	Lost as Result of Initiator	1/2 Outside Recirc Spray OR 1/2 Inside Recirc Spray(c)
RPS	1/3 Charging Pumps	1/3 Charging Pumps AND 1/2 Low Head Safety Injection Pumps in Recirculation Mode(e)	1 AFW Pump to 1/3 SG(f)	Same	Same
RPS	3/3 Accumulators AND 1/2 Low Head SI Pumps(b)	1/2 Low Head SI Pumps In Recirculation Mode (e)	Steam Dump Through 2 SG AOVs with 2 AFW Pumps(d)	Same	Same

**References:**

- (a) WCAP-9601
- (b) WCAP-9754
- (c) North Anna Analysis File 321MAF.N.1
- (d) The AFW arrangement at NAPS requires two steam dump valves and two AFW pumps for success.
- (e) ORS can be manually aligned to act as a backup for Lo Head Recirc for NAPS Unit 1.
- (f) Beynon, 1988

TABLE 3.1.1-18  
SMALL LOCA

<u>Reactivity Control</u>	<u>Core Heat Removal</u>		<u>Secondary Heat Removal</u>	<u>RCS Integrity</u>	<u>Containment Condition</u>
	<u>Early</u>	<u>Late</u>			
RPS	1/3 Charging Pumps(a)	1/3 Chargin- Pumps AND 1/2 Low Head SI Pumps In Recircu- lation Mode(f)	1/3 AFW pumps to 1/3 SG	Lost as Result of Initiator	1/2 Outside Recirc Spray OR 1/2 Inside Recirc Spray(d)
RPS	1/3 Chargin- ing Pumps AND 1 RCS PORV(d)	Same	Not Required	Same	Same
RPS	3/3 Accumu- lators AND 1/2 Low Head SI Pumps(c)	1/2 Low Head SI Pumps in Recircu- lation(f)	Steam Dump Through 2 SG ADV's with 2 AFW Pumps(e)	Same	Same

References:

- (a) WCAP-9601
- (b) WCAP-9744
- (c) WCAP-9754
- (d) North Anna Analysis File 321MAF.N.1
- (e) The AFW arrangement at NAPS requires two steam dump valves and two AFW pumps for success.
- (f) ORS can be manually aligned to act as a backup for Lo Head Recirc for NAPS Unit 1.
- (g) For very small breaks no Containment heat removal is required.

**TABLE 3.1.1-19  
SUCCESS CRITERIA FOR ATWS**

<u>Reactivity Control</u>	<u>Core Heat Removal</u>		<u>Secondary Heat Removal</u>	<u>RCS Integrity</u>	<u>Containment Condition</u>
	<u>Early</u>	<u>Late</u>			
Reactor Power < 40% (a)					
Manual Rod Insertion OR Deenergize MG Set OR Emergency Boration	RCS	RCS	1 of 3 Aux. Feedwater, OR 1 Main Feedwater Pump	RCS PORV Reclosure	None
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Reactor Power > 40% (a) Feedwater Available (1 of 2 Trains)					
Manual Rod Insertion OR Deenergize MG SET OR Emergency Boration	Same		Main Feedwater Continued Operation	RCS PORV Reclosure	None

TABLE 3.1.1-19 (Continued)  
SUCCESS CRITERIA FOR ATWS

<u>Reactivity Control</u>	<u>Core Heat Removal</u> <u>Early</u> <u>Late</u>	<u>Secondary Heat Removal</u>	<u>RCS Integrity</u>	<u>Containment Condition</u>
Reactor Power > 40%(a) Feedwater Not Available				
Manual Rod Insertion OR Deenergize MG Set OR Emergency Boration	Same	2 Aux. Feed Pumps to 2 SG(c)	AMSAC(b) AND Adequate Pressure Relief with Subsequent Valve Reclosure	None

References:  
(a) WCAP-11993  
(b) NAPS UFSAR



**TABLE 3.1.1-20  
STEAM GENERATOR TUBE RUPTURE SUCCESS CRITERIA**

<u>Reactivity Control</u>	<u>Core Heat Removal</u>		<u>Secondary Heat Removal</u>	<u>RCS Integrity</u>	<u>Containment Condition</u>
	<u>Early</u>	<u>Late</u>			
RPS	RCS Natural Circulation, (a, f)		1/3 AFW pumps to 1/2 SG	Achieved by cooldown and depress. & isolation of affected SG	Not Required
RPS	1/3 Charging Pumps	1/2 RHR(g) Pumps	1/3 AFW pumps to 1/2 SG	Containment bypassed (core intact)	Same
RPS	1/3 Charging Pumps AND 1 RCS PORV(d)	Recirc.(f) through 1/3 Charging Pumps AND 1/2 Lo Head SI Pumps(h)	Not Required	Lost as a result of induced LOCA	1/2 Outside Recirc Spray OR 1/2 Inside Recirc Spray

**TABLE 3.1.1-20 (Continued)  
STEAM GENERATOR TUBE RUPTURE SUCCESS CRITERIA**

<u>Reactivity Control</u>	<u>Core Heat Removal</u>		<u>Secondary Heat Removal</u>	<u>RCS Integrity</u>	<u>Containment Condition</u>
	<u>Early</u>	<u>Late</u>			
RPS	3/3 Accumulators AND 1/2 Low Head SI Pumps(c)	1/2 RHR Pumps	Steam Dump Through 2 SG ADV with 2 AFW Pump(e)	Containment bypassed (core intact)	Not Required

**References:**

- (a) North Anna Analysis File 321MAF.N.1
- (b) WCAP-9744
- (c) WCAP-9754
- (d) North Anna Analysis File 321MAF.N.1
- (e) The AFW arrangement at NAPS requires two steam dump valves and two AFW pumps for success.
- (f) With Successful Faulted SG Isolation and No Stuck Open Safety Relief Valve
- (g) With failure of Faulted SG Isolation and/or Stuck Open Safety Relief Valve
- (h) ORS can be manually aligned to act as a backup for Lo Head Recirc for NAPS Unit 1.