

COL-46

Plant Startup

Check Off List

<p>COL Completed</p> <p>Date _____ Time _____</p> <p>Comments: _____ _____ _____</p> <p>SWS _____ _____ _____</p>	<p><u>    <i>RW Huddy</i>    </u> Reviewed Re: TPC 83-27, #709, 5/13/83</p> <p><u>    <i>J. Finel</i>    </u> 5/18/83 SNSC Review / Date</p> <p><u>    <i>J. Cecconi</i>    </u> 5/24/83 Approved / Date</p>
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Reference Drawings:

Caution: This checkoff list is to be used in conjunction with plant operating procedures, not as a substitute for them. While steps are generally presented in the order in which they should be accomplished, it must be realized that certain steps may be performed concurrently. In all cases, Technical Specifications and Procedural Precautions and Limitation shall prevail.

1. This COL details all necessary steps for a startup from cold shutdown. For a startup from hot shutdown or following a trip, in general, only the circled items of Section I and II need to be completed.
2. Except where Technical Specification limits apply, the power levels indicated in Section IV are nominal values and represent guides to placing equipment into service.
3. Initial steps as completed, record data where indicated.



C. Conventional Plant

1. Main Turbine-Generator

- a. Filled with hydrogen per SOP 26.2. 1a \_\_\_\_\_
- b. Hydrogen seal oil system operating per SOP 26.3 1b \_\_\_\_\_
- c. Lube oil system in operation. 1c \_\_\_\_\_
- d. Unit on turning gear. 1d \_\_\_\_\_
- e. Main turbine drains open. (1e) \_\_\_\_\_
- f. Cylinder heating steam secured. (1f) \_\_\_\_\_

2. Condensate System

- a. Normal Hotwell level established. 2a \_\_\_\_\_
- b. System piping filled or being filled via Hotwell dump pump. 2b \_\_\_\_\_
- c. Isolate the Condensate Storage Tank from the Condenser. Install "Do Not Operate" tag in CCR on Condenser return to C.S.T. 2c \_\_\_\_\_

3. Boiler Feedwater

- a. Lube oil system in operation. 3a \_\_\_\_\_
- b. Seal injection system in service. 3b \_\_\_\_\_
- c. Feed pumps on turning gear. 3c \_\_\_\_\_

4. Circulating water pumps in operation.

- a. Weir positioned to maintain motor current (~ 75 to 80 amps). 4a \_\_\_\_\_
- b. De-Icing loops in service (if applicable). 4b \_\_\_\_\_
- c. Notify Unit #3 CRR to position the discharge canal gates to maintain between 1.5 ft. and 1.7 ft. 4c \_\_\_\_\_

NOTE: The gates must be adjusted within 4 hours after removing or placing in service any circulators.

D. Auxiliary Systems

- 1. Required electrical, instrument and control and support systems in operation or available as per plant operating procedures (POP 1.1, 1.2 or 1.3 as appropriate). (1) \_\_\_\_\_
- 2. Sufficient quantities of the following on hand or on order:
  - a. Diesel Fuel Oil 2a \_\_\_\_\_
  - b. Lube Oil 2b \_\_\_\_\_
  - c. Hydrogen 2c \_\_\_\_\_
  - d. Nitrogen 2d \_\_\_\_\_
  - e. Chemicals 2e \_\_\_\_\_

E. Administrative

- 1. If the shutdown was the result of a trip, the cause of the trip must be determined prior to start up:
  - a. First out annunciator recorded. (1a) \_\_\_\_\_
  - b. Proteus sequence of events log obtained and attached to COL. (1b) \_\_\_\_\_
  - c. First out cause of trip and proteus sequence of events cause of trip reconciled and agreed too by SWS and STA (1c) \_\_\_\_\_ SWS  
\_\_\_\_\_ STA

NOTE: If item 1c cannot be reconciled see SA0131 (Responsibilities).

- 2. Required check off list completed as per OAD-5. (2) \_\_\_\_\_
- 3. Operability list reviewed and action initiate to clear all necessary work permits. (3) \_\_\_\_\_
- 4. Jumper Log reviewed and action initiated to clear all necessary jumpers. (4) \_\_\_\_\_
- 5. Necessary personnel notified of impending startup per SA0-124. (5) \_\_\_\_\_

6. Verify Health Physics subsection has removed all portable monitors from V.C.

6 \_\_\_\_\_

7. COL-1A - Trip section completed.

7 \_\_\_\_\_

8. Watch Supervisors permission granted for startup:

Date \_\_\_\_\_ Time \_\_\_\_\_

8 \_\_\_\_\_  
SWS Init.

1. RCS pressure raised to 400-450 psig.

1 \_\_\_\_\_

2. RCS OPS System operable.

2 \_\_\_\_\_

3. Pressurizer spray valves open and all heaters energized.

3 \_\_\_\_\_

4. Reactor Coolant Pumps started per SOP 1.3.

4 \_\_\_\_\_

5. RHR pumps shutdown and valves aligned per POP 1.1.

5 \_\_\_\_\_

6. Prior to exceeding 150°F place hot penetration cooling system in operation.

6 \_\_\_\_\_

7. Prior to Exceeding 200°F:

a. All seismic restraints operable per Technical Specification 3.12.

7a \_\_\_\_\_

b. Auto SI signal unblocked per SOP 10.1.2.

7b \_\_\_\_\_

c. Containment Integrity established per SOP 10.6.1.

7c \_\_\_\_\_

d. Steam Generator vents shut and N<sub>2</sub> purged off.

7d \_\_\_\_\_

e. Leakage detection and removal systems requirements met as per Technical Specifications 3.1.F.1.a.

7e \_\_\_\_\_

15

		<u>Initials</u>
f.	Total RCS leakage requirements met as per Technical Specifications 3.1.F.2.c.(1)	7f _____
g.	Leakage into the containment free volume requirements met as per Tech. Specs. 3.1.F.2.d.(1)	7g _____
h.	Engineering safety features initiation instrumentation setting limits requirements met as per Tech. Specs. 3.5.1 (Table 3.1)	7h _____
i.	Containment ambient temperature >50°F Tech. Specs. 3.6.c.	7i _____
j.	The Control Room Air Filtration System is operable.	7j _____
8.	Auxiliary feedwater system in operation, as per SOP 213 to maintain steam generator levels.	8 _____
9.	Chemical feed initiated as necessary.	9 _____
10.	Prior to exceeding 250°F:	
a.	RCS chemistry within specification as per SOP 8.1.	10a _____
b.	Pressurizer spray valves shut.	10b _____
11.	Hydrogen blanket established in volume control tank per SOP 8.1.	11 _____
12.	Complete SOP 8.5 Steam Generator Crevice Cleaning, if requested by Chief Operations Engineer or Operation Superintendent.	12 _____
13.	At 313°F RCS OPS system armed clears.	13 _____
14.	Steam bubble established in pressurizer as per SOP 3.3	14 _____
15.	Residual Heat Removal System isolated before exceeding 450 psig and/or 350°F as per SOP 4.2.1 and the RHR suction stop valves MOV 730 and 731 closed and de-energized.	15 _____

15 |

16. RCS pressure increased per heatup curve in RCS section of Graphs Book. 16 \_\_\_\_\_
- a. 1000 psig - SIS Accumulators in service with discharge MOV open and de-energized and feed switch locked in the de-energized position. 16a \_\_\_\_\_
- b. RCP seal bypass shut when flow 1 gpm. 16b \_\_\_\_\_
- c. 1900 psig - SI unblocked and high head pumps in auto. 16c \_\_\_\_\_
- d. Pressure control in Auto at 2235 psig. 16d \_\_\_\_\_
17. System heatup rate controlled to 50°F/hr using RCP and/or pressurizer heaters. 17 \_\_\_\_\_

NOTE: Administratively the heatup rate shall be as stated in the table below:

MINIMUM PRESSURE AND MAXIMUM HEAT-UP RATE

<u>RCS Temp (°F)</u>	<u>RCS Pressure (PSIA)</u>	<u>Heatup Rate (°F/hr)</u>
70 - 350	≥ 375	50
350 - 450	≥ 900	30
450 - 550	≥ 1500	6
450 - 550	≥ 1825	15
450 - 550	≥ 2000	20
450 - 550	≥ 2250	30

18. Prior to exceeding 350°F:  
COL 46B completed. (18) \_\_\_\_\_  
COL 2A completed.
19. If reactor is to be brought critical before reaching 547°F, refer to Section III. 19 \_\_\_\_\_
20. Condensate system filling and venting complete. 20 \_\_\_\_\_
21. One condensate pump started, recirculating to condenser. 21 \_\_\_\_\_

- 22. Main Steam line warmup commenced. (22) \_\_\_\_\_
- 23. Gland sealing steam applied to main and boiler feed pump turbines. Gland seal exhaustor in operation. (23) \_\_\_\_\_
- 24. Steam jet air ejectors and priming jets in service. (24) \_\_\_\_\_
- 25. Above 400°F, warmup of main turbine commenced do not exceed 500 rpm. (25) \_\_\_\_\_
- 26. Boiler feed pump warmup commenced per SOP 21.1. (26) \_\_\_\_\_
- 27. Prior to exceeding 500°F, RCS activity verified to be  $\leq 10$  uCi/cc (If  $\geq 10$  uCi, must be  $\leq 60/\bar{E}$  uCi/cc and  $\bar{E}$  must be redetermined). 27 \_\_\_\_\_
- 28. When temperature reaches 547°F, steam dump control in pressure mode, set to maintain 1005 psig. (28) \_\_\_\_\_

III Reactor Startup

- 1. Critical boron concentration (\_\_\_\_\_ ppm) calculated per SOP 15.4 and established in RCS. 1 \_\_\_\_\_
- 2. System temperature for criticality (\_\_\_\_\_°F). 2 \_\_\_\_\_
- 3. Critical rod estimate performed (SOP-15.4). 3 \_\_\_\_\_
- 4. Rod drive power supplies established per COL-18 and SOP-16.1.2 4 \_\_\_\_\_
- 5. Containment egress checkoff completed per SOP 10.6.2. 5 \_\_\_\_\_
- 6. Precritical checkoff (COL-1) completed and signed off. 6 \_\_\_\_\_
- 7. Record the following data prior to pulling rods.

Count Rate: Ch. 31 \_\_\_\_\_ cps    Ch. 35 \_\_\_\_\_ amps.  
 CH. 32 \_\_\_\_\_ cps    Ch. 36 \_\_\_\_\_ amps. 7 \_\_\_\_\_

- |   | <u>Initials</u> |
|---|-----------------|
| 8. High Flux at shutdown alarm blocked.   | 8 _____         |
| 9. NIS recorder selected as per SOP-13.1.   | 9 _____         |
| 10. Announcement made of intention to withdraw rods.  | 10 _____        |
| 11. Shutdown and control banks withdrawn to achieve Criticality.  | 11 _____        |
| 12. Proper overlap noted between source and intermediate range. (1 decade minimum)  | 12 _____        |
| 13. Source range High flux trips blocked when permissive P-6 actuated.  | 13 _____        |
| 14. Power stabilized at $10^{-8}$ amps. Record the following:<br><br>Ch. 35 _____ amps.<br>Ch. 35 _____ amps.<br>Critical position: Control Bank _____,<br>steps. RCS temperature _____ °F. | 14 _____        |
| 15. Announcement of criticality.  | 15 _____        |
| 16. Power increased at $\leq 1$ DPM to establish desired heatup rate.   | 16 _____        |

IV. Power Increased to Full Power

- |  |         |
|--|---------|
| 1. Main Turbine rolled to 1800 rpm.  | 1 _____ |
| 2. Second condensate pump started.   | 2 _____ |
| 3. First main boiler feed pump operating (per SOP 21.1) with feedwater control in manual.                    | 3 _____ |
| 4. Auxiliary feedwater pumps shutdown and aligned for automatic operation.                                   | 4 _____ |
| 5. Moisture separators/reheaters aligned for hot or cold startup, as appropriate, per POP-1.3, and SOP 18.1. | 5 _____ |
| 6. Hydrogen cooling, bus duct cooling and main transformer auxiliaries in service.                           | 6 _____ |

Initials

NOTE: The tap changer should be in the manually mode and set to the neutral position prior to the generator field being applied.

Note \_\_\_\_\_

7. Generator synchronized and 30-40 MWe load picked up. 7 \_\_\_\_\_
8. Bus sections 1 through 4 transferred to Unit Auxiliary Transformer before exceeding 40 MWe. 8 \_\_\_\_\_
9. Moisture separator/reheaters warmed up, and aligned for operation per POP-1.3 and SOP 18.1 between 70-90 MWe. 9 \_\_\_\_\_
10. Steam taps aligned to drains collecting tank. 10 \_\_\_\_\_
11. Steam Dump controls reset and placed in "TEMPERATURE" mode when steam dump valves have fully shut. 11 \_\_\_\_\_
12. Intermediate range and low range power range reactor trips blocked when permissive P-10 allows. 12 \_\_\_\_\_
13. At  $\sim$  100 MWe:
  - a. Cylinder heating steam established. 13a \_\_\_\_\_
  - b. Exhaust hood spray valves closed. 13b \_\_\_\_\_
14. At  $\sim$  15%, Lo Pwr. Auto Rod Control Stop - cleared. 14 \_\_\_\_\_
15. Feedwater control in "Auto". 15 \_\_\_\_\_
16. At 200 MWe:
  - a. Turbine drains closed. 16a \_\_\_\_\_
  - b. Feedwater heater drains cascading. 16b \_\_\_\_\_
  - c. Reset low pressure steam dump valves. 16c \_\_\_\_\_
17. At  $\sim$  220 MWe, first heater drain pump in service. 17 \_\_\_\_\_

Initials

- |     |   |     |       |    |
|-----|---|-----|-------|----|
| 18. | At ~ 250 MWe boiler feed pumps seal injection booster pumps shutdown and placed in "Auto".  | 18  | _____ |    |
| 19. | At ~ 300 MWe, flash exaporator in service per SOP 29.5.   | 19  | _____ |    |
| 20. | At ~ 350 MWe second boiler feed pump in service.  | 20  | _____ |    |
| 21. | Prior to 50% reactor power.   | 21  | _____ |    |
|     | a. Four RCP's in service  | 21a | _____ |    |
|     | b. Quadrant power tilt performed at greater than 40% reactor power.   | 21b | _____ |    |
| 22. | At ~ 600 MWe, second heater drain pump in service.  | 22  | _____ | 16 |
| 23. | Prior to 75% reactor power, incore detector map completed (if required).  | 23  | _____ | 16 |
| 24. | a. At 90% power axial flux distribution in target level.  | 24a | _____ |    |
|     | b. 90% (4 loop) or 65% (3 loop) excore axial off set detection system - recalibration requirements as per Technical Specifications 3.11.B. (Table 4.1-1) met. | 24b | _____ |    |
| 25. | At 95% power heat balance performed as per SOP 15.1.  | 25  | _____ |    |

Startup completed to \_\_\_\_\_ & Power

Date \_\_\_\_\_ Time \_\_\_\_\_

SRO \_\_\_\_\_

Following Documents Attached:

SOP 15.4 (ECP and Boron Concentration)

COL 46B (Plant Heatup)

COL 1 (Pre-Criticality)

Proteus Sequence of Events Log (Trip Only)

COL 2A Backseat Valves

Other COL's designated by Operations Engineer or  
Watch Supervisor.