PLANT SHUTDOWN FROM FULL POWER TO HOT STANDBY

1.0 OBJECTIVE

To shutdown the unit from full power (Mode 1), or any intermediate load, to a Hot Standby condition (Mode 3).

2.0 REFERENCES

2.1 Unit 1 Technical Specifications

2.2 Unit 1 Environmental Technical Specifications

2.3 Unit 1 Technical Specifications Proposed Change #89

3.0 PREREQUISITES

3.1 The unit is at full load or at an intermediate load.

4.0 PRECAUTIONS AND LIMITATIONS

4.1 The positions of the control rod shall be maintained at or above the limits shown in Figure 3.5.2.1 except during low power physics tests. (Ref. 2.1, 3.5.2.A.).

4.2 All control rods shall be determined to be above the rod insertion limits shown in Figure 3.5.2.1 by verifying that each analog detector indicates at least 21 steps above the rod insertion limits, to account for instrument inaccuracies, at lease once per shift during operation. (Ref. 2.3, 4.1.)

4.3 An isotopic analysis for Iodine, including I-131, I-133, and I-135, shall be performed between 2 and 6 hours following a thermal power change exceeding 15% of the rated thermal power within a one hour time period. (Ref. 2.1, 4.1.B.)

4.4 Whenever reactor power is greater than or equal to 10% full power, three (3) reactor coolant pumps shall be in operation. Whenever reactor power is less than 10% of full power, operation with less than three (3) reactor coolant pumps operating shall be limited to less than 24 hours; except during low power physics testing. (Ref. 2.1, 3.1.2.D, E, and F.)

PLANT SHUTDOWN FROM FULL POWER TO HOT STANDBY

4.0 PRECAUTIONS AND LIMITATIONS (Cont'd)

4.5 CONSENSER - Salt Water Side.

4.5.1 The ΔT across the condenser during normal operation averaged on a daily basis shall not exceed 23°F. The maximum ΔT during normal operation shall not exceed 25°F. (Ref. 2.2, 2.1.1.)

4.5.2 The ΔT across the condenser during abnormal operations shall not exceed 25°F for more than 72 hours. The absolute limit for ΔT during abnormal operations is 38°F. (Ref. 2.2, 2.1.1.)

4.6 FEEDWATER

4.6.1 Steam generator water levels should be manually controlled when in the Hot Standby condition and maintained at ~50% level
as indicated on the narrow range recorders to prevent the feedrings from becoming uncovered.

4.6.2 If a steam generator feedring becomes uncovered, feedwater flow shall be reduced to <150 gpm to that steam generator if the following conditions exist:

.1 Feedwater temperature is <300°F.

.2 Feedwater flow is <1500 gpm to that steam generator.

NOTE: 1500 gpm is equivalent to ~35% load. If steam generator level can not be recovered with a flow rate of ≤150 gpm, reduce load or trip the reactor. If steam generator level is reduced to <10%, trip the reactor.

4.6.3 Failure to place the feedwater controls on MANUAL prior to tripping the turbine stop valves may result in a large volume of feedwater being added to the steam generators. This may result in a rapid cooldown of the reactor coolant.

4.7 HEATER DRAINS

4.7.1 Avoid prolonged periods of pump operation on miniflow only. This will cause flashing at the pump suction due to overheating.

PLANT SHUTDOWN FROM FULL POWER TO HOT STANDBY

4.0 PRECAUTIONS AND LIMITATIONS (Cont'd)

4.7.2 Maintain feedwater heater levels at or below normal setpoint to prevent turbine water intrusion.

4.8 TURBINE GENERATOR

4.8.1 Continued operation at loads <150 MWe is not recommended.

4.8.2 When it can be arranged, the turning gear and oil circulation system shall be kept in operation for not less than forty-eight hours after shutdown.

4.8.3 When continuous turning gear operation is not possible, the bearing oil circulation system must be operated for a minimum of eight hours after shutdown to prevent excessive bearing temperatures.

4.8.4 The vacuum breaker valve should not be opened until the turbine speed is less than 10%.

4.8.5 Except in an emergency, load should be reduced at a rate of decrease not exceeding the rate indicated on Attachment 8.1.

4.8.6 Avoid at all times passing steam through the turbine with the rotor or spindle at rest.

4.8.7 Turbine water intrusion can occur during any phase of the turbine operation. Indicators may include turbine high vibration or eccentricity, steam line hammering, unusual turbine differential expansion, or sudden steam or metal temperature drops. Prompt operator action to isolate the source of water is required to prevent extensive turbine damage.

4.8.8 If water intrusion should occur during turning gear operation, attempt to maintain turbine on turning gear.

.1 If machine will not rotate, repeat attempt once per hour.

.2 Do not attempt to rotate machine by use of gantry crane.

4.8.9 The rate of change of load is determined at low loads by turbine metal temperature rate of change and at high loads by reactor capability.

PLANT SHUTDOWN FROM FULL POWER TO HOT STANDBY

4.0 PRECAUTIONS AND LIMITATIONS (Cont'd)

4.8.10 Operate the turbine-generator in compliance with Attachment 8.2, Load vs Backpressure Curve. During turbine startup, the initial warmup loading will be in accordance with Attachment 8.1 only when the condenser backpressure is less than 1.75" Hg. The generator will be loaded to 20 MW if backpressure is greater than 1.75" Hg.

4.9 MAIN CONDENSER

4.9.1 The difference in backpressure between the North and South exhaust trunks should not exceed 2" Hg. The difference in temperature between the North and South exhaust trunks should not exceed 30°F.

4.10 PRIMARY PLANT

4.10.1 Following a substantial change in reactor coolant boron concentration the pressurizer sprays must be operated to equalize pressurizer boron concentration with the Reactor Coolant System.

4.10.2 One shutdown group of rods must be at the withdrawn position (320 steps) whenever positive reactivity is being inserted by boron dilution, xenon decay, reactor coolant temperature change, or the withdrawl of control rods other than this shutdown group except for the following two cases:

.1 The Reactor Coolant System has been borated to at least the hot standby, xenon-free, boron concentration and is being maintained at Hot Standby.

.2 The Reactor Coolant System has been borated to the Cold Shutdown boron concentration.

4.10.3 When possible, it is desirable to maintain a shutdown group at the withdrawn position as additional shutdown margin.

4.10.4 Any plant changes which produce a sudden change in RCS temperature of the order of 5°F or in RCS boron concentration in the order of 10 ppm (by analysis) must be avoided.

4.10.5 Xenon level variations must be anticipated following a load decrease and boron concentration changes made as required to maintain the control bank 2 rods in the normal operating band.

PLANT SHUTDOWN FROM FULL POWER TO HOT STANDBY

4.0 PRECAUTIONS AND LIMITATIONS (Cont'd)

4.10.6 Any time a xenon transient resulting from a shutdown cannot be reasonably predicted, the Reactor Coolant System shall be borated to the Hot Standby, xenon-free condition.

4.10.7 The control rods should not be stepped fully into the core, but should be tripped within a few inches of the bottom. This will reduce the possibility of rod hang ups during initial rod withdrawl.

5.0 CHECK-OFF LISTS

5.1 Not Applicable.

6.0 INSTRUCTIONS

INITIALS

NOTE: Mark charts in accordance with SO1-14-8 prior to unit load reduction.

6.1 Inform the Energy Resource Supervisor and the Switching Center that Unit 1 is ready to reduce load; include estimated time of going off the line, and the expected rate of load reduction. _____

NOTE: The Energy Resource Supervisor and the Switching Center should be informed as far in advance as practicable when preparing to take the unit off the line.

6.2 Begin unit load reduction to 33% (150 MWe).

NOTE: Under normal operating conditions, the turbine load limit should be used for decreasing unit load. If the governor speed changer is used, maintain the load limit oil pressure $\leq$3.0 psig or 10% above governor oil pressure.

NOTE: Borate as necessary to maintain control rod position in accordance with Ref. 2.1, 3.5.2.1 and Ref. 2.3, 4.1.

PLANT SHUTDOWN FROM FULL POWER TO HOT STANDBY

6.0 INSTRUCTIONS (Cont'd) INITIALS

6.2.1 Start to reduce unit load as determined from Attachment 8.1. _____

NOTE: This curve is based on maintaining a rate of change of impulse chamber metal temperature which does not exceed 125°F/hour.

6.2.2 At ~ 75% of full power, change the Mode of Operation Switch to the MID position. _____

NOTE: Alarm ALERT-SWITCH MODE OF OPERATION to MID-RANGE will annunciate at 80% of full power.

6.2.3 At less than 70% load, remove the Reheater Steam Dump System from service in accordance with Operating Instruction SO1-6-1, "Reheater Steam Dump System." _____

6.2.4 Remove the Flash Evaporators from service, if applicable, in accordance with Operating Instruction SO1-7-13, "Flash Evaporators." _____

6.3 Prior to reducing turbine load below 150 MWe (33%), check that the reheater controller RMC-3, is aligned for automatic as follows:

6.3.1 Right hand switch in AUTOMATIC. _____

6.3.2 Left hand switch in HOT REHEAT. _____

NOTE: When turbine load is decreased to approximately 150 MWe, the reheat controller pressure setpoint will start to decrease.

NOTE: If reheater automatic control is not desired, manual control may be used.

6.4 Establish a unit load reduction from 150 MWe to 45 MWe over a two hour period.

NOTE: While reducing load, monitor crossover steam temperature to insure a cooldown rate of 100°F per hour is not exceeded.

PLANT SHUTDOWN FROM FULL POWER TO HOT STANDBY

6.0 INSTRUCTIONS (Cont'd) INITIALS

6.5 When turbine load is reduced to ~ 20% (~ 90 MWe), perform the following:

6.5.1 Open the turbine drain valves. _____

6.5.2 Verify that the reheater tube side vents are routed to the main condenser. _____

6.5.3 Verify that the reheater warmup steam control valves are open. _____

NOTE: When reheater tubeside pressure reaches approximately 33%, the alarm ALERT SWITCH REHEAT CONTROL TO HOLD will be actuated. Do not switch to hold as continued automatic cooldown is desired.

6.5.4 Shutdown the Heater Drain Pumps in accordance with Operating Instruction SO1-7-5. _____

6.5.5 Transfer the Mode of Operation Switch to the LOW position. _____

NOTE: Insure all NIS power range channels are indicating ≤ 20% power.

6.5.6 Transfering rod control to the MANUAL position.

.1 Change rod group selector switch to MANUAL. _____

.2 When in MANUAL, select CB-2 on the Overlap Control switch. _____

NOTE: Maintain Tavg within ±2°F of Tref.

6.5.7 Transfer feedwater control for each steam generator to MANUAL by:

CAUTION: If a steam generator feedring becomes uncovered (<26% narrow range level), and feedwater temperature is <300°F, reduce flow to ≤150 gpm in that steam generator. If level can not be recovered, trip the reactor.

PLANT SHUTDOWN FROM FULL POWER TO HOT STANDBY

6.0 INSTRUCTIONS (Cont'd) INITIALS

NOTE: Observe feedwater flow and steam generator level on associated recorder during this operation to assure no major swings/changes.

.1 Adjust Manual Control Knob to "0" nullmeter indication on RMC. _____

NOTE: This operation balances manual control signal with automatic output.

.2 Transfer the feedwater controller to MANUAL. _____

NOTE: Observe controller output meter during and after transfer.

.3 Slowly start to increase steam generator levels to ~ 50%, as indicated on the narrow range recorders. _____

NOTE: Always observe feedwater flow when changing control setting.

6.5.8 Establish steam dump system in shutdown mode.

.1 Transfer steam dump mode switch to PRESSURE CONTROL - Atmosphere and Condenser. _____

.2 Verify or set PC-418A in AUTOMATIC at ~ 930 psig. _____

6.5.9 Open the extraction steamline drain trap bypass valves in accordance with Operating Instruction SO1-7-15, "Main and Extraction Steam System." _____

6.5.10 Transfer 4160 volt buses 1A and 1B from the unit auxiliary transformers A and B to the station auxiliary buses 1C and 2C in accordance with Operating Instruction SO1-9-2, "4160V System Operations." _____

6.6 Check that the reheater drain receiver drains transfer to the condenser when reheater tubeside pressure is reduced to within 15 psig of the associated first point heater shellside pressure. _____

PLANT SHUTDOWN FROM FULL POWER TO HOT STANDBY

6.0 INSTRUCTIONS (Cont'd) INITIALS

6.7 When turbine load reaches ~ 45 MWe, verify closed or close the reheater live steam supply control valves: CV-124, CV-125, CV-126 and CV-127. _____

6.8 Reduce turbine load to 40 MWe and close the reheater live steam isolation valves MOV-14, MOV-15, MOV-16 and MOV-17. _____

NOTE: Allow turbine crossover temperature to stabilize before continuing with turbine load reduction.

NOTE: A reheater hot shutdown should be performed in accordance with Operating Instruction SO1-6-2, "Turbine Reheater Operation."

6.9 Under MANUAL control, adjust control rod position to maintain average Tavg at 530°F to 535°F.

6.10 Verify or adjust steam dump control to maintain a stable reactor power level.

6.11 Decrease turbine load to ~ 36 MWe (8%).

6.11.1 Verify closed the reheater warmup steam control valves; CV-128, CV-129, CV-130 and CV-131. _____

NOTE: Reheater tubeside pressure should decrease ~ 2% and crossover temperature should decrease ~ 35°F.

6.11.2 Allow temperature to stabilize before continuing with turbine load reduction.

6.11.3 Shutdown a feedwater pump and a condensate pump. _____

.1 Close the manual bonnet vent valve for HV-853A or HV-853B when the feed pump is depressurized. _____

6.11.4 Start the turbine auxiliary oil pump. _____

NOTE: The auxiliary oil pump cannot be stopped until turbine speed is < 600 R.P.M.

6.12 Notify the Energy Resource Supervisor and Switching Center that the unit is ready to be taken off the line. _____

NOTE: The Energy Resource Supervisor and Switching Center should be informed of status of unit at this time and the Energy Resource Supervisor will give permission to take the unit off the system.

PLANT SHUTDOWN FROM FULL POWER TO HOT STANDBY

6.0 INSTRUCTIONS (Cont'd) INITIALS

6.13 With the turbine load limit, reduce generator load to ~20 MWe. _____

6.14 Remove the Power System Stabilizer and Voltage Regulator from service as follows:

NOTE: Voltage regulator should be near or at null and stable.

6.14.1 Depress the "POWER SYSTEM STABILIZER OFF" pushbutton. _____

6.14.2 Adjust regulator output to zero using the exciter field rheostat.

6.14.3 Depress the "TEST" pushbutton. _____

6.14.4 Stop the mag-a-stat motor generator by depressing the "OFF" pushbutton. _____

6.15 Removing the generator from the line.

6.15.1 If turbine tests are planned, remove the generator from the line by opening the Unit 1 220 KV CB-4012 and CB-6012. _____

.1 Complete SO1-12.9-3, "Off-Line Turbine Trip Testing" as directed by the Watch Engineer. N/A if not to be done. _____

.2 Complete SO1-12.9-6, "Turbine Control Valve Leakage Test" as directed by the Watch Engineer. N/A if not to be done. _____

NOTE: This test may also be done on the turning gear.

6.15.2 If no turbine tests are planned, reduce steam flow to zero with the load limit. _____

NOTE: Verify the "Turbine No Load" alarm is received.

PLANT SHUTDOWN FROM FULL POWER TO HOT STANDBY

6.0 INSTRUCTIONS (Cont'd) INITIALS

6.15.3 After approximately 60 seconds, verify a turbine no-load trip. If trip is not received, trip the turbine from the Unit Trip pushbutton. _____

NOTE: The Unit Trip will also trip the Unit 1 220 KV CB-4012 and CB-6012 and the exciter field breaker.

6.15.4 Approximately 60 seconds after the no-load turbine trip (stop valve closure), verify a generator anti-monitoring trip. If generator trip is not received trip the generator by opening the Unit 1 220 KV CB-4012 and CB-6012. _____

6.16 Following turbine/generator trip, verify turbine speed is decreasing from the turbine speed indicator and/or recorder. _____

6.17 The plant is now in Startup condition (Mode 2). These conditions may be maintained, if desired, or the shutdown may continue to Hot Standby.

6.17.1 If it is desired to maintain Startup (Mode 2) conditions, maintain the following:

.1 Steam Generator Levels ~ 50%.

.2 Reactor Thermal Power $\leq$ 5%.

.3 Maintain Tave at 525°F - 535°F by steam dump and/or pressurizing downstream of the 24" maintenance steam block valves through the bypass valves.

.4 RCS pressure at ~ 2085 psig.

6.17.2 If desired to continue shutdown to Hot Standby perform the following:

.1 Establish and maintain a shutdown margin of > 1% $\Delta K/K$.

.2 Maintain steam generator levels ~ 50%.

PLANT SHUTDOWN FROM FULL POWER TO HOT STANDBY

6.0 INSTRUCTIONS (Cont'd) INITIALS

6.17.2.3 Maintain Tave at 525°F - 535°F by RCP operation, steam dump and/or pressurizing downstream of the 24" maintenance steam block valves through the bypass valves.

.4 Maintain RCS pressure at ~ 2085 psig.

6.18 If desired, the Auxiliary Feedwater System may be placed in service and the remaining main feed pump may be stopped.

6.18.1 Close the manual bonnet vent valve for HV-853A or HV-853B, as applicable, when the feedpump is depressurized. _____

6.19 When turbine speed decreases to <600 RPM, verify the following:

6.19.1 Turbine Supervisory Recorder transfers from bearing vibration to eccentricity. _____

6.19.2 Turbine oil temperature set point transfers from 115°F to 85°F. _____

NOTE: If turbine oil temperature as seen on R-3, Turbine Temperature, point 15 is not observed to decrease, manual transfer will be required.

6.20 When the turbine comes to rest:

6.20.1 Monitor the automatic opening of the field breaker. _____

6.20.2 Verify engagement of the turning gear. _____

6.20.3 Verify starting of the turning gear motor. _____

6.21 Start the turning gear oil pump and stop the auxiliary oil pump. _____

6.22 Change the generator hydrogen supply regulator control setpoint to 30 psig. _____

6.23 Complete switching to provide an alternate source of auxiliary electrical power.

6.23.1 Notify the Switching Center of switching procedure. _____

PLANT SHUTDOWN FROM FULL POWER TO HOT STANDBY

6.0 INSTRUCTIONS (Cont'd) INITIALS

6.23.2 Check open Unit 1 CB-4012 and CB-6012. _____

6.23.3 Check open 4160V ACB's 11A04 and 11B04. _____

6.23.4 Open the generator motor operated disconnect switch. _____

6.23.5 Close Unit 1 CB-4012 and CB-6012. _____

6.24 Check generator comutator rings for hydrogen using SO1-12.3-20, "Testing For Presence of Explosive Mixtures of Hydrogen Gas." N/A if checked within the previous 6 months. _____

6.25 Evaluate and complete Surveillance Instruction SO1-12.9-9, "Safety Injection System Check Valve Tests," if performance of the test is required. N/A if not required. _____

6.26 Complete SO1-12.9-4, "Generator Seal Oil Back-Up Supply Testing" as directed by the Watch Engineer. N/A if not to be done. _____

6.27 Maintain conditions as stated in Step 6.17 or continue the shutdown, if desired, as per SO1-3-5, "Plant Shutdown From Hot Standby to Cold Shutdown.

COMMENTS: _____

_____

COMPLETED BY: _____ DATE: _____

APPROVED BY: _____ DATE: _____
Watch Engineer

7.0 RECORDS

7.1 Operating charts will be cut as per SO1-14-8 and reviewed by the Watch Engineer. They will then be filed in the Startup Package if the unit is not to be taken below Hot Standby conditions.

PLANT SHUTDOWN FROM FULL POWER TO HOT STANDBY

8.0 ATTACHMENTS

8.1 Recommended Times To Change From One Steady State Load To Another. (1 Page)

8.2 Recommended Operational Regions for Nuclear Units with Double-Flow Low Pressure Ends With 40" Last Row Blades. (1 Page)

H E Morgan

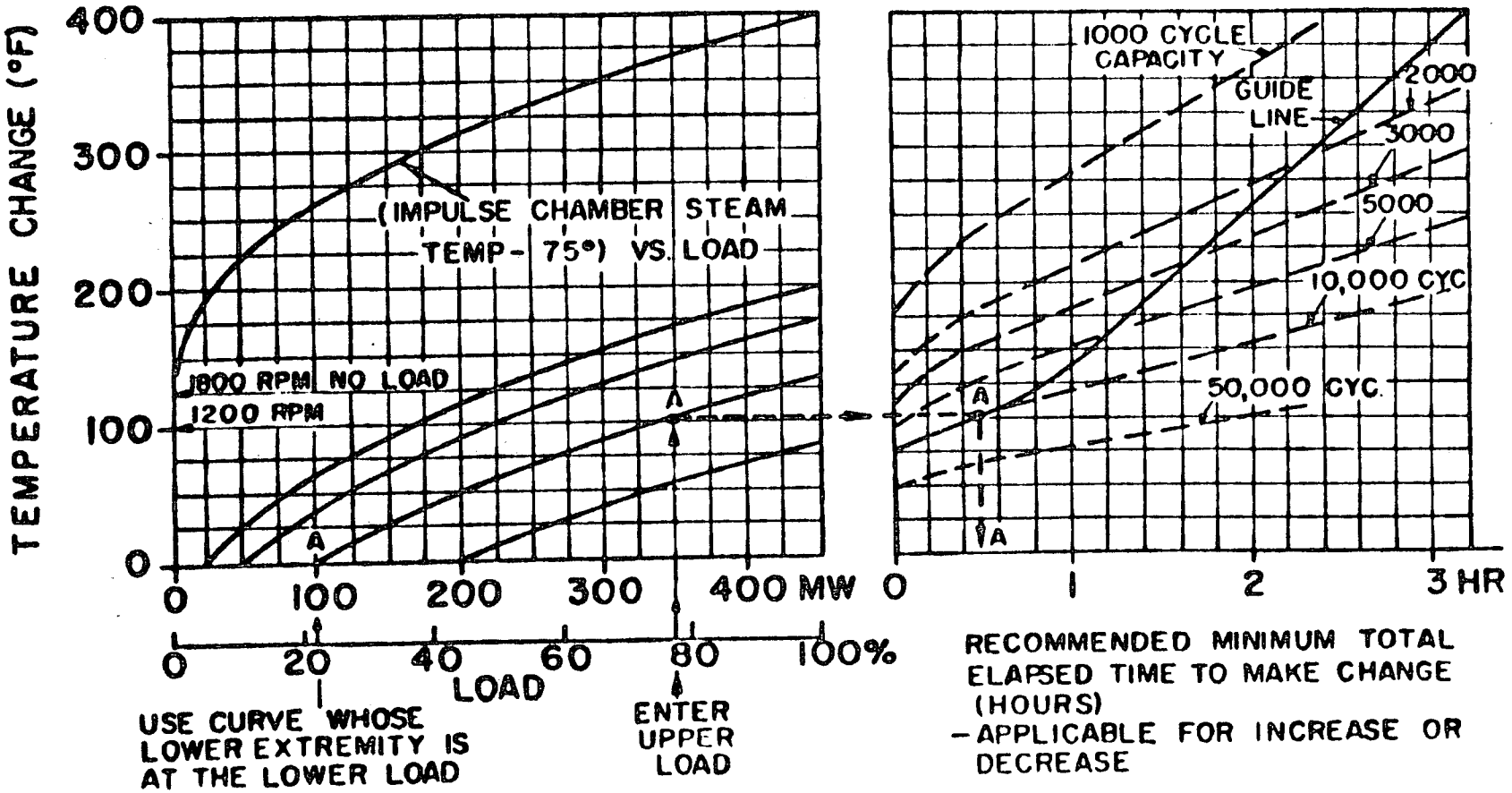
H. E. MORGAN
OPERATIONS MANAGER

NUS/er

RECOMMENDED TIMES TO CHANGE FROM ONE STEADY STATE LOAD TO ANOTHER

EXAMPLE "A" TIME TO CHANGE FROM 100 MW STEADY STATE TO 350 MW IS 30 MINUTES.

FIRST DETERMINE CHANGE IN IMPULSE CHAMBER STEAM TEMP FROM LEFT SIDE CURVES, THEN PROJECT HORIZONTALLY TO "GUIDE LINE" AT RIGHT



RECOMMENDED OPERATIONAL REGION FOR NUCLEAR UNITS WITH DOUBLE - FLOW LOW PRESSURE ENDS WITH 40" LAST ROW BLADES