STARTUP REPORT

FOR

WOLF CREEK GENERATING STATION POWER RERATE AND T_{avg} INCREASE

INTRODUCTION

This report describes the testing that supported the increase in Reactor Coolant System (RCS) full power average temperature (T_{avg}) from 581.2 °F to 586.5 °F, and an associated increase in reactor thermal output from 3480 to 3565 MWt, at the Wolf Creek Generating Station (WCGS). This report is a supplement to the Startup Report submitted on February 18, 1994 (letter ET 94-0020, from F. T. Rhodes, WCNOC to NRC) and is submitted as required by Sections 6.9.1.1, 6.9.1.2, and 6.9.1.3 of the WCGS Technical Specifications. The previous report, submitted under letter ET 94-0020, indicated that the generator output breakers had been modified due to revised amperage requirements. Although this had been identified as a pre-outage (the sixth refueling outage) task, subsequent analysis indicated that this modification would not be required, and was not performed.

The license amendment request for approval to operate with limiting safety system settings relating to the RCS average temperature increase was submitted on February 7, 1994 (letter NA 94-0018, from R. C. Hagan, WCNOC to NRC). This submittal contained evaluations demonstrating that the Nuclear Steam Supply System and Balance of Plant systems had been reviewed and found capable of meeting all applicable safety design bases and power generation bases as defined in the Updated Safety Analysis Report, at the uprated conditions. This submittal was subsequently approved and issued by the NRC on March 3, 1994, as Amendment No. 72 to the WCGS Operating License.

This report represents the results of implementation of Amendment No. 72 to the WCGS Operating License. The primary goal of the T_{avg} increase program was to obtain an increase in electrical output.

Reactor thermal output presented in this report is based on feedwater flow that, due to venturi fouling, was indicating about 1.4 % higher than actual.

IMPLEMENTATION OF THE POWER RERATE

Changes were made to the WCGS Technical Specifications concerning T_{avg} limits, Axial Flux Difference limits, Over-Power and Over-Temperature ΔT trip setpoints, and instrument accuracy and response times.

An engineering calculation was performed to determine the minimum allowable RCS flow indication (less than 0.5% adjustment) for the density change due to increase in design T_{cold} from 549.3 °F to 554.8 °F. No change was made to the low flow trip setpoints because there was sufficient conservatism in the present setpoint to accommodate the flow change due to coolant density decrease in the cold leg of the RCS (a density decrease results in a conservative change in the indication from the prior calculation based on 549.3 °F for T_{cold}).

Flux maps were taken before rerate implementation to verify core parameters were within acceptable limits, and compared to 3565 MWt rated power to predict post-rerate acceptability. Results showed sufficient margin existed to allow escalation to the Rated Thermal Power level (3565 MWt).

Baseline data and component rescaling for the T_{avg} increase was commenced on March 7, 1994, and final data at the new T_{avg} and necessary component rescaling was completed on March 17, 1994. Procedure and software changes were prepared prior to implementation of the T_{avg} increase and issued as directed by the implementing procedure. Implementation was conducted under temporary procedure, TP-EN-159, "Power Uprate and Tavg Increase." Rescaling of components was accomplished at approximately 3480 MWt. This was done prior to commencement of power increase to the design uprate power value of 3565 MWt. Plant calorimetric data was taken and Power Range Nuclear Instrumentation (NI's) adjusted whenever changes were made which could affect accuracy of the NI's. Major component and transmitter rescaling and recalibration, along with power ascension to 3565 MWt, were completed on March 10, 1994. Turbine Control Valves were 95 % open at the power level of 3565 MWt. Rescaling and recalibration of selected components that were determined to be outside the desired tolerance limits, were completed at the full power level.

The power uprate and T_{avg} increase resulted in electrical output of about 1221 MWe at the Rated Thermal Power level, an increase of about 29 MWe.

TESTING

Testing included collecting baseline and full power data for the following components: vibrations for the turbine generator, feedwater pumps, condensate pumps, and reactor coolant pumps (RCP); walk downs and inspection of pipe hangers for predetermined feedwater, condensate, and steam lines; trending using the plant computer for predetermined primary and secondary component parameters; and biological shield surveys at the maximum achieved power level. The results of the testing showed the plant operated at the new increased T_{avg}, within expected ranges, and there was no noticeable increase in vibration or component degradation at Rated Thermal Power.

Balance of Plant data was taken for condensate, feedwater, main steam, and reheat steam systems. The values for this data remained within expected levels at Rated Thermal Power. The generator and associated components were monitored during the uprate and component values remained at acceptable levels. Pipe hanger inspections on feedwater and steam lines showed no adverse pipe movements as a result of changes in flows and temperatures. The biological shield survey at Rated Thermal Power based on feedwater flow calorimetric showed no change in containment radiation levels at the monitored points.

Flux maps were again taken at the maximum achieved power level to verify core parameters were within acceptable limits. Results showed acceptable margins existed for F_q and $F_{\Delta h}$, and the core to be performing within acceptable design limits.

Initial full power ΔT's were extrapolated from measured values at approximately 3480 MWt and compared with expected full power ΔT's following implementation. The differences were small enough to maintain initial calibration until after implementation. Final values for ΔT's were determined at Rated Thermal Power, and the necessary adjustments implemented.

Turbine Impulse pressure and T_{ref} were rescaled to Rated Thermal Power with T_{avg} equal to T_{ref} where current values were greater than one-half of allowable tolerances of the current scaling.