

Table 1: VY Equipment Modifications Implemented for EPU

Modification	Description	Potential Impact on Transient Response?	Post Mod Testing	EPU Startup Testing	Further Tested by Load Reject Without Bypass / Main Steam Isolation Valve Closure
Main turbine - LP diaphragm replacement	Replace 8 th stage diaphragm of LP turbine	No	Vibration baseline measurements	Vibration monitoring	NA
Main turbine cross-around relief valves (CARVs) and Discharge Piping	Install higher capacity relief valves	No	In-service Leak check	Monitor temperature downstream of CARVs	No
Main generator -rewind	Rewind/upgrade main generator for CPPU conditions. Replace generator hydrogen coolers with upgraded coolers	No	<ul style="list-style-type: none"> Performance test AC Hi-Pot test each phase Pressure and vacuum testing Winding resistance Meggering 	<ul style="list-style-type: none"> Monitor generator and cooling 	<ul style="list-style-type: none"> No
Main condenser	<ul style="list-style-type: none"> Stake main condenser tubing to reduce the effects of flow induced vibration 	No	<ul style="list-style-type: none"> Leak check tubes Monitor chemistry 	<ul style="list-style-type: none"> Monitor chemistry 	<ul style="list-style-type: none"> No
Feedwater heater 4A/B shell side relief valve	<ul style="list-style-type: none"> Replace relief valves with larger capacity relief valve to accommodate increased feedwater flow 	No	<ul style="list-style-type: none"> Bench test valves Leak test installation 	NA	<ul style="list-style-type: none"> No
Steam dryer cover plate strengthening	<ul style="list-style-type: none"> Replace lower cover plates with thicker plates Add reinforcing stiffeners at lower cover plates and vertical hood sides Remove internal brackets in top inside corners of outer hoods Replace vertical hood and hood top plates with thicker plates Replace/Upgrade tie bars 	No	<ul style="list-style-type: none"> Inspection 	<ul style="list-style-type: none"> Vibration and moisture carryover monitoring during power ascension per power ascension test plan (PATP) 	<ul style="list-style-type: none"> No
Isolated phase bus duct cooling	<ul style="list-style-type: none"> Install a new isolated phase bus duct cooling system to remove bus duct heat under CPPU conditions 	No	<ul style="list-style-type: none"> Monitor bus duct cooling Flow tests 	<ul style="list-style-type: none"> Performance monitoring 	<ul style="list-style-type: none"> No

U.S. NUCLEAR REGULATORY COMMISSION

In the Matter of Entergy Nuclear Vermont Yankee LLC

Docket No. 50-271 Official Exhibit No. Entergy 39

OFFERED by: Applicant/Licensee Intervenor _____

NRC Staff

Other _____

IDENTIFIED on 9/13/06 Witness/Panel Nichols/Casillas

Action Taken: ADMITTED REJECTED WITHDRAWN

Reporter/Clerk MAC

DOCKETED ☐

USNRC ☐

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September 19, 2006 (3:37pm) ☐

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OFFICE OF SECRETARY ☐

RULEMAKINGS AND ☐

ADJUDICATIONS STAFF

Modification	Description	Potential Impact on Transient Response?	Post Mod Testing	EPU Startup Testing	Further Tested by Load Reject Without Bypass / Main Steam Isolation Valve Closure
HP feedwater heater replacement	<ul style="list-style-type: none"> #1A, #1B, #2A, and #2B feedwater heater replacement 	No	<ul style="list-style-type: none"> Pressure test Visual inspection Magnetic particle testing Radiography In-service inspection Thermal performance demonstration 	<ul style="list-style-type: none"> Performance monitoring 	<ul style="list-style-type: none"> No
Residual heat removal service water (RHRSW) system	<ul style="list-style-type: none"> Modify RHRSW pumps (Train A and B) Motor Bearing Oil Coolers piping to recover Service Water flow from the coolers 	No	<ul style="list-style-type: none"> Visual Inspection Particle Testing Ultrasonic Flow Testing In-Service Inspection 	NA	<ul style="list-style-type: none"> No
NSSS/torus attached piping	<ul style="list-style-type: none"> Upgrade particular NSSS and torus attached piping supports 	No	<ul style="list-style-type: none"> Welds to be examined by visual, liquid penetrant, magnetic particle, as applicable 	NA	<ul style="list-style-type: none"> No
Flow induced vibration (FIV)	<ul style="list-style-type: none"> Install FIV instrumentation 	No	<ul style="list-style-type: none"> Verify installation 	<ul style="list-style-type: none"> Collect EPU data and analyze 	<ul style="list-style-type: none"> No
Reactor recirculation (RR) system runback	<ul style="list-style-type: none"> Provide rapid runback of RR pump from high power on trip of condensate or feedwater pump 	No	<ul style="list-style-type: none"> Channel Calibration Test with breakers in "test" and RR system not operating 	NA	<ul style="list-style-type: none"> No
Condensate demineralizer	<ul style="list-style-type: none"> Install condensate demineralizer filtered bypass strainer to permit one demineralizer to be removed under CPPU conditions 	No	<ul style="list-style-type: none"> Monitor chemistry Establish flow baseline measurements 	<ul style="list-style-type: none"> With filtered bypass in service, monitor flows under various EPU conditions Monitor reactor water chemistry 	<ul style="list-style-type: none"> No
Feedwater system suction pressure trip	<ul style="list-style-type: none"> Protect feed pumps (RFP) with two sequential levels of low suction pressure trips at various time delays to ensure only one pump trips at a time and for high power RR pump runback to ~60% on loss of a Feed Pump Modify trip logic to prevent common mode failure due to loss of RFP low flow circuits 	No	<ul style="list-style-type: none"> Channel calibration Test with breakers in "Test" position 	NA	<ul style="list-style-type: none"> No
Cooling tower/fan motors	<ul style="list-style-type: none"> Replace fan blades with more efficient blades and drive motors with upgraded higher performance motors 	No	<ul style="list-style-type: none"> Cooling tower performance monitoring 	NA	<ul style="list-style-type: none"> No

Modification	Description	Potential Impact on Transient Response?	Post Mod Testing	EPU Startup Testing	Further Tested by Load Reject Without Bypass / Main Steam Isolation Valve Closure
EQ Upgrades	<ul style="list-style-type: none"> Reroute feed to SRV monitor to new breaker 	No	<ul style="list-style-type: none"> Voltage check and megger 	NA	<ul style="list-style-type: none"> No
Grid Stability	<ul style="list-style-type: none"> Increase the rating (million volt-ampere (MVA)) of the Vermont Yankee-Northfield 345kV line from 896 MVA to a minimum rating of 1075 MVA Increase MVA rating on the Ascutney-Coolidge 115 kV line from 205 MVA to 240 MVA Addition of 60 MVAR of shunt capacitors at the Vermont Yankee 115 kV bus Modification to provide a second primary protection scheme on the Vermont Yankee north bus Addition to provide a second primary protection scheme on the Vermont Yankee main generator Independent pole tripping on the Vermont Yankee 381 breaker Addition of out of step protection for the Vermont Yankee generator 	No	<ul style="list-style-type: none"> Voltage checks Logic checks Relay calibration 	<ul style="list-style-type: none"> In-service testing of the 345kV and 115 kV primary/ secondary protective relay, line carrier system (Monthly) 	<ul style="list-style-type: none"> No
Main turbine - HP flow path	<ul style="list-style-type: none"> Replace HP Turbine steam path (new HP diaphragms and rotor) New control cams, camshafts and hydraulics New control valve settings Modify control valve operating mechanism with 5% margin above CPPU Modify turbine control and overspeed setpoint for CPPU conditions New Hydrogen Coolers 	No	<ul style="list-style-type: none"> Factory 120% trip test Overspeed testing Control and stop valve response testing Vibration baseline measurements EPR and MPR tuning 	<ul style="list-style-type: none"> Overspeed testing Vibration monitoring EPR and MPR Testing per Power Ascension Test Plan (PATP) Control and stop valve testing 	<ul style="list-style-type: none"> No

Modification	Description	Potential Impact on Transient Response	Modeled in Transient Analysis	Post Mod Testing	EPU Startup Testing	Further Tested by Turbine Trip / Main Steam Isolation Valve Closure
Electronic pressure regulator (EPR) setpoint change	<ul style="list-style-type: none"> • Change in EPR setpoint control range and zero power setpoint based on higher steam line differential pressure (dp) • Rescale bypass relay to account for bypass valve capability of 89% of total steam flow • Expand EPR control band from current range of 900 to 1000 psig a new range of 850 to 1000 psig • Install signal isolators to minimize EPR output test wiring fault from negatively affecting EPR operation • Add second notch filter function to programmable logic controller (PLC) software and tune to remove an 8.8 Hz signal 	Yes	Yes	<ul style="list-style-type: none"> • Wire continuity checks • PLC calibration • EPR and MPR tuning 	<ul style="list-style-type: none"> • EPR and MPR testing per PATP 	<ul style="list-style-type: none"> • No

Modification	Description	Potential Impact on Transient Response	Modeled in Transient Analysis	Post Mod Testing	EPU Startup Testing	Further Tested by Turbine Trip / Main Steam Isolation Valve Closure
Main steam line high flow set-point	<ul style="list-style-type: none"> • Respan transmitters to encompass new 140% steam flow values • Replace the 4 transmitters used to provide 40% set-point for MSL high flow reduced function with more accurate transmitters • Setpoint changes for 140% isolation at new steam flows • Install new indicators on master trip units 	Yes	Yes	<ul style="list-style-type: none"> • Channel calibration • Test circuit logic 	<ul style="list-style-type: none"> • TS required channel check and calibration 	<ul style="list-style-type: none"> • No
Neutron monitoring setpoints - APRM and RBM	<ul style="list-style-type: none"> • APRM flow biased SCRAM setpoints and rod block limits require changes due CPPU • APRMs require recalibration reflecting CPPU rated power operation • RBMs require recalibration reflecting CPPU rated power operation 	Yes	Yes	<ul style="list-style-type: none"> • Channel calibration • Test circuit logic 	<ul style="list-style-type: none"> • TS required channel check and calibration 	<ul style="list-style-type: none"> • No
Rod worth minimizer (RWM) - setpoint	<ul style="list-style-type: none"> • Setpoint change to maintain the setpoint at the same absolute value of steam flow due to the range changes of the associated instruments 	Yes	Yes	<ul style="list-style-type: none"> • Channel calibration • Test circuit logic 	<ul style="list-style-type: none"> • TS required channel check and calibration 	<ul style="list-style-type: none"> • No
Turbine first stage pressure	<ul style="list-style-type: none"> • Setpoint changes for the SCRAM bypass 	Yes	Yes	<ul style="list-style-type: none"> • Channel calibration • Test circuit logic 	<ul style="list-style-type: none"> • No. (TS required channel check and calibration) 	<ul style="list-style-type: none"> • No

Modification	Description	Potential Impact on Transient Response	Modeled in Transient Analysis	Post Mod Testing	EPU Startup Testing	Further Tested by Turbine Trip / Main Steam Isolation Valve Closure
Feedwater Isokinetic Probes	<ul style="list-style-type: none"> • Replace Sample Probes 	No	No	<ul style="list-style-type: none"> • Leak Check process boundary 	<ul style="list-style-type: none"> • No 	<ul style="list-style-type: none"> • No
Feedwater Pump Automatic Trip	<ul style="list-style-type: none"> • Trip Feedwater Pump on Loss of Condensate Pump 	No	No	<ul style="list-style-type: none"> • Circuit/Logic Tests 	<ul style="list-style-type: none"> • Yes - Condensate Pump Trip Test 	<ul style="list-style-type: none"> • No