

2.5.5 Control Systems Not Required for Safety

2.5.5.1 Design Description

The non-safety PCMS provides for automatic and manual control of non-safety-related plant components, and monitoring of non-safety-related plant instrumentation. The operational VDUs which are part of the PCMS, provide monitoring and control for safety-related plant components and instrumentation, including monitoring and control for the credited manual operator actions. The PCMS regulates conditions in the plant automatically in response to changing plant processes and load demand to establish and maintain the plant operating conditions within the prescribed limits. The PCMS controls and monitors neutron flux, temperatures, pressures, liquid levels, flows and other process parameters through-out the plant.

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The PCMS is fully redundant to ensure credible single malfunctions do not result in loss of any control, monitoring or alarm functions. The PCMS is powered from two non safety-related UPSs to ensure reliability.

~~The PCMS is tested to meet the environmental, seismic and EMI/RFI conditions without loss of function. The PCMS hardware and software are developed in accordance with a design process and QA program that ensure highly reliable equipment and safe operation. These programs encompass the entire product life cycle including software verification and validation, configuration management, and cyber security.~~

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~~Some safety related signals used by the PSMS are also used by the PCMS for control functions. The PCMS includes signal selection logic that ensures a single failed protection channel does not cause erroneous control system actions.~~

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1. The functional arrangement of the PCMS is as described in the Design Description of Subsection 2.5.5.1 and in Table 2.5.5-2.

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2. Deleted.

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3. Deleted.

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4. For a control command to be generated from the PCMS Operational VDUs for safety related components, two distinct operator actions, at a minimum, are required.

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2.5.5.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.5.5-1 describes the ITAAC for the control systems not required for safety.

Table 2.5.5-1 Control Systems Not Required for Safety Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 1 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
<p><u>The functional arrangement of the PCMS is as described in the Design Description of Subsection 2.5.5.1 and in Table 2.5.5-2.</u></p> <p>The following systems are controlled and monitored by the PCMS:</p> <ul style="list-style-type: none"> • Red Control • Pressurizer Pressure Control • Pressurizer Water Level Control • Steam Generator Water Level Control • Turbine Bypass Control • Balance of Plant Control • Turbine Electro-Hydraulic Governor Control • Turbine Protection Control • Electrical System Control • Auxiliary Equipment Control <p>Safety Related Plant Equipment through Operational VDUs</p> <ul style="list-style-type: none"> • 	<p>1. An inspection of the as-built PCMS functional arrangement will be performed.</p>	<p>1. <u>The as-built PCMS conforms to the functional arrangement as described in the Design Description of Subsection 2.5.5.1 and in Table 2.5.5-2.</u></p> <p>The following systems are controlled and monitored by the as-built PCMS:</p> <ul style="list-style-type: none"> • Red Control • Pressurizer Pressure Control • Pressurizer Water Level Control • Steam Generator Water Level Control • Turbine Bypass Control • Balance of Plant Control • Turbine Electro-Hydraulic Governor Control • Turbine Protection Control • Electrical System Control • Auxiliary Equipment Control • Safety Related Plant Equipment through Operational VDUs

Table 2.5.5-1 Control Systems Not Required for Safety Inspections, Tests, Analyses, and Acceptance Criteria (Sheet 2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
<p>2. The following systems are monitored by the PCMS:</p> <ul style="list-style-type: none"> • Nuclear Instrumentation System • Red Position Indication System • Incore Instrumentation System • Turbine Supervisory Instrumentation System • Radiation Monitoring System • Safety Related Plant Instrumentation through Operational VDUs 	<p>2. An inspection of the as-built PCMS functional arrangement will be performed.</p>	<p>2. The following systems are monitored by the as-built PCMS:</p> <ul style="list-style-type: none"> • Nuclear Instrumentation System • Red Position Indication System • Incore Instrumentation System • Turbine Supervisory Instrumentation System • Radiation Monitoring System • Safety Related Plant Instrumentation through Operational VDUs
<p>3. The PCMS includes signal selection logic which ensures a single failed protection measurement channel does not cause erroneous control system actions, while another protection channel is continuously bypassed or out of service. Deleted.</p>	<p>3. An inspection of the as-built PCMS will be performed.</p>	<p>3. The as-built PCMS includes signal selection logic which ensures a single failed protection measurement channel does not cause erroneous control system actions, while another protection channel is continuously bypassed or out of service.</p>
<p>4. <u>For a control command to be generated from the PCMS Operational VDUs for safety-related components, two distinct operator actions, at a minimum, are required.</u></p>	<p>4. <u>A test of the as-built PCMS will be performed for each unique type of soft control command.</u></p>	<p>4. <u>A minimum of two distinct operator actions are required to generate safety-related component control commands from an as-built PCMS Operational VDU.</u></p>

**Table 2.5.5-2 Arrangement of Control Systems
Not Required for Safety**

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<u>PCMS (CONTROL) FUNCTION GROUP</u>	<u>DESCRIPTION</u>
<u>REACTOR CONTROL SYSTEM GROUP 1</u>	<u>A-SG FEEDWATER CONTROL</u>
	<u>A-MAIN STEAM RELIEF VALVE CONTROL</u>
<u>REACTOR CONTROL SYSTEM GROUP 2</u>	<u>B-SG FEEDWATER CONTROL</u>
	<u>B-MAIN STEAM RELIEF VALVE CONTROL</u>
	<u>PRESSURIZER PRESSURE CONTROL</u>
<u>REACTOR CONTROL SYSTEM GROUP 3</u>	<u>C-SG FEEDWATER CONTROL</u>
	<u>C-MAIN STEAM RELIEF VALVE CONTROL</u>
	<u>PRESSURIZER WATER LEVEL CONTROL</u>
<u>REACTOR CONTROL SYSTEM GROUP 4</u>	<u>D-SG FEEDWATER CONTROL</u>
	<u>D-MAIN STEAM RELIEF VALVE CONTROL</u>
	<u>CONTROL ROD INSERTION MONITORING</u>
<u>REACTOR CONTROL SYSTEM GROUP 5</u>	<u>TURBINE BYPASS CONTROL</u>
	<u>REACTOR MAKEUP CONTROL</u>
<u>REACTOR CONTROL SYSTEM GROUP 6</u>	<u>CONTROL ROD CONTROL</u>
<u>TURBINE PROTECTION SYSTEM</u>	<u>TURBINE PROTECTION CONTROL</u>
<u>BOP CONTROL SYSTEM</u>	<u>BALANCE OF PLANT CONTROL</u>
	<u>AUXILIARY EQUIPMENT CONTROL</u>
<u>TURBINE EHG CONTROL SYSTEM</u>	<u>TURBINE ELECTRICAL-HYDRAULIC GOVERNOR CONTROL</u>
<u>ELECTRICAL CONTROL SYSTEM</u>	<u>ELECTRICAL SYSTEM CONTROL</u>