Design Requirements for the LCLS Injector PPS Safety System

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Brief Summary: This specification describes the Personnel Protection System requirements to support the LCLS Injector Vault at Sector 20.

Keywords: Injector, Sector 20, S20, Injector Vault, Protection

Key WBS#’s: 1.2.16.1
Personnel Protection System general criteria:
The Personnel Protection System (PPS) will comply with the SLAC Radiation Safety Systems Technical Basis Document (SLAC-I-720-0A05Z-002) and should meet the standard for a SIL-2 safety system as described in IEC 61511. A detailed system description will be prepared by the LCLS Personnel Protection System engineer.

Personnel Protection System protection:
The PPS must be protected against tampering. All logic will be enclosed in locked racks. Lockable Hoffman boxes (or comparable) will be used where locked racks are not practicable. Cable will run in either cable tray or conduit. Cable is allowed to drop unprotected from cable tray to a locked rack if the rack height exceeds six feet. All system connections will be enclosed such that access may only be obtained by key or by tool.

Personnel Protection System hardware:
PPS hardware will be selected, by the PPS engineer, to be robust and suitable for industrial conditions. Materials and components will be of high quality for dependability and long life. Components that resist radiation will be used in locations where radiation levels are high enough to cause radiation damage.

The PPS logic will be implemented using a programmable logic controller (PLC). The preferred PLC manufacturer is Allen Bradley. PLC hardware should be selected using the Allen Bradley publication Using ControlLogix in SIL2 Applications (publication 1756-RM001B-EN-P October 2003).

Personnel Protection System review and acceptance:
The PPS must undergo a series of system reviews prior to operation. A conceptual design review will be coordinated by the Radiation Safety Officer. The conceptual design review will verify that the conceptual design meets or exceeds the guidance provided by the SLAC Radiation Safety Systems Technical Basis Document. A design review will be coordinated by the ESD department Safety System Review Officer. The design review will verify that the design meets or exceeds the specification in the detailed system description. A series of test cases will be generated and performed to verify the correct wiring and proper operation of the PPS prior to final system acceptance.