# SECTION 405010 PROCESS CONTROL AND INSTRUMENTATION SYSTEM LOOP DESCRIPTIONS

## PART 1 - GENERAL

### A. Description

1. The descriptions, together with the detail drawings, instrumentation diagrams, comprise the functional design criteria of the Process Instrumentation and Control System (PCIS). The process and instrumentation diagrams (P&IDs) represent the basic concept of the PCIS requirements, whereas the descriptions supplement the instrumentation diagrams.

2. The PCIS Supplier shall utilize the descriptions and P&IDs as the basic criteria for the design of the instrumentation schematics, control software, preparation of data sheets, wiring diagrams, piping layouts, assembly drawings, and other requirements set forth in these specifications.

3. The PCIS will provide an integrated control and reporting system. The function of this system is to monitor, control, report, and safeguard the system. The PCIS system will be based on remote terminal units, linked to a SCADA computer and peripherals, with selected monitoring and alarm functions displayed in the control room.

4. Status-to-Command Disagreement (STCD): Provide a STCD alarm for all equipment controlled with the control system. The STCD alarm shall be initiated if a piece of equipment is commanded to start/stop or open/close by a PLC and the appropriate run or position status is not reported back within a time interval.

5. Provide high-high, high, low, low-low, rate of change and instrument fail alarms for all analog points in the system. If a particular alarm is used by ladder logic, or requires to be displayed at local Operator Interface, that alarm shall be implemented at the PLC.

6. All software switches shall be implemented with associated time delays. Time delay value shall be pre-programmed initially to 10 seconds, unless specified otherwise.

7. All flow values and motors elapsed running time shall be totalized and stored at the PLC. Resetting of those totals shall be coordinated with Owner's Representative during submittal stage.

8. If a field instrument with an analog output has additional alarm discrete (dry contact) outputs, at least one common alarm discrete output shall be interfaced with a PLC to send an advisory alarm to CCS.

9. All scaling of analog signals shall be implemented at the PLCs. Each PLC shall interface with an Operator Interface and with PLC network/SCADA System using data in engineering units.

10. At each PLC the processor shall monitor the internal operation of the PLC and communication system for failures. If a failure is detected, a dry contact closure shall close and illuminate the “PLC Fail Light” at an ICP.

11. SCADA System shall monitor communication with each PLC. If a communication failure with a PLC is detected, an alarm shall be generated and logged.

B. Related Work Specified Elsewhere

1. PCIS General Requirements: 405000.

2. Instrumentation Equipment: 405020.

3. Programmable Logic Controller and Operator Interface: 405040.

4. Instrument Control Panel: 405080.

## PART 2 - LOOP DESCRIPTIONS

A. Loop 101 Flow Monitoring

1. Flow shall be measured by a magnetic flow meter FE/FIT-101.

2. Provide I/I converters FY-101A and FY-101B at SMICP-100 to duplicate analog and pulse flow signals for PLC-31.

3. The PLCs shall monitor flow and transmit its value to Santa Maria and NCSD SCADA systems. Flow value shall be also displayed at the OI at each ICP.

4. Totalized flow pulses shall be accumulated to indicate total flow.

5. PLCs shall generate a “Flowmeter Failure” alarm when a flowmeter fail signal is detected.

B. Loops 103 and 117, Vaults Entry Monitoring

1. PLC shall monitor status of hatch switches ZS-103 and ZS-117.

C. Loops 105 and 121, Cabinets Entry Monitoring

1. PLC shall monitor status of SMICP-100 and ICP-31 doors switches ZS-105 and ZS-121.

D. Loops 107 and 119, Meter Vault and Valve Vault Flooding Monitoring

1. Flood alarms shall be generated and transmitted to the Santa Maria and NCSD SCS.

E. Loop 111, Inlet Pressure Monitoring

1. Provide a pressure transmitter PIT-111 to monitor the Flow Control Valve and Metering Station (FCVMS) inlet pressure.

2. Provide an I/I converter PY-111 at SMICP-100 to duplicate the pressure signal for PLC-31.

3. The PLCs shall monitor inlet pressure and transmit its value to Santa Maria and NCSD SCADA systems. Pressure value shall be also displayed at the OI at each ICP.

F. Loop 113, Cla-Val Operations

1. Cla-Val will be modulated by a controller to maintain desired flow at a set point remotely sent to the controller.

2. The PLC-100 shall monitor controller discrete output (dry contact) to indicate when the controller is switched to a manual mode.

G. Loop 115, Outlet Pressure Monitoring

1. Provide a pressure transmitter PIT-115 to monitor the Flow Control Valve and Metering Station (FCVMS) outlet pressure.

2. Provide an I/I converter PY-115 at SMICP-100 to duplicate the pressure signal for PLC-31.

3. The PLCs shall monitor outlet pressure and transmit its value to Santa Maria and NCSD SCADA systems. Pressure value shall be also displayed at the OI at each ICP.

H. Loops 123 and 125, UPS Monitoring

1. Status of a UPS at each ICP shall be monitored.

## PART 3 - EXECUTION

See Section 405000.

END OF SECTION