Using Technology to Perform SCADA Point to Point Validations

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SCADA Project Commissioning – Why?

(c) ***Provide adequate information.*** Each operator must provide its controllers with the information, tools, processes and procedures necessary for the controllers to carry out the roles and responsibilities the operator has defined by performing each of the following:

(1) Implement sections 1, 4, 8, 9, 11.1, and 11.3 of API RP 1165 (incorporated by reference, see § 192.7) whenever a SCADA system is added, expanded or replaced, unless the operator demonstrates that certain provisions of sections 1, 4, 8, 9, 11.1, and 11.3 of API RP 1165 are not practical for the SCADA system used;

(2) Conduct a point-to-point verification between SCADA displays and related field equipment when field equipment is added or moved and when other changes that affect pipeline safety are made to field equipment or SCADA displays;

(3) Test and verify an internal communication plan to provide adequate means for manual operation of the pipeline safely, at least once each calendar year, but at intervals not to exceed 15 months;

(4) Test any backup SCADA systems at least once each calendar year, but at intervals not to exceed 15 months; and

(5) Establish and implement procedures for when a different controller assumes responsibility, including the content of information to be exchanged.

Implementation deadline for this paragraph is amended to August 1, 2012, for sections (c)(1)–(4).

SCADA Project Commissioning – When?

- Any time new telemetered or calculated information is added to the SCADA system, as well as when existing information is modified
- Changes that affect pipeline safety are made to field equipment or SCADA displays, including calibration or replacement of a **safety device**
- When console directly requests database or display changes that affect s **safety-related points,** as defined during an Alarm Objective Analysis (AOA)

CPL's Definition of 'Safety-Related'

Safety Related Devices (analog or discrete)	Safety Related Alarms
	PLM Threshold / Leak Detection Alarm
Relief Valve	Relief Alarm / Flow to Flare
Over Pressure Device	Shutdown / Lockout (top level)
Tank Level Device	Tank / Sump Level Alarms
Hazardous Gas Detector	Hazardous Gas Alarms
	Safety/Environmental Alarms identified in AOA as major or severe consequence

Alarm Severity Determination – Impact Matrix

MTR Class	No Consequence	Minor / Moderate	Major	Severe
Personnel (Safety)	No Injury	First aid or slight health effect. No disability or lost time recordable.	Lost time recordable or reversible health effect. No disability.	Lost time, permanent disability, severe injury, or loss of life.
Public or Environmental	No Effect	Minimal exposure. Release does not cross fence line. Source eliminated. Negligible financial consequences.	Visible/indicated flaring event. Public exposed to hazards. Medical aid or damage claims. Environmental contamination causing non-permanent damage.	Uncontained release of materials with major environmental and 3rd party impact. Public exposed to life threatening hazards, disruption of services, property damage. Extensive clean up.
Repair Cost and/or Downtime	No Loss	< $10k or ~1 hour lost production	$10k-$100k or ~½ day lost production	Cost > $100k or ~1 day lost production

SCADA Project Commissioning – How?

- Project opportunity identified and Management of Change (MOC) generated
- Commissioning request sent to Field Control Systems & SCADA via Sharepoint site (~2 weeks in advance)
- Remote Information Form (RIF) and Functional Specification (FS) completed and attached to Sharepoint list entry
- RIF review meeting with Field I&E Technicians, Field Control Systems, Operations Representative, and SCADA to review project scope, drawings, SCADA tags, setpoints, alarm limits, leak detection, project timelines, etc.
- Begin project implementation & SCADA preparation
- Schedule point-to-point verification in Sharepoint list/calendar
- Conduct point-to-point verification (commissioning) and preliminary Alarm Objective Analysis (AOA)

Commissioning List

Project Name	Commission Date	Project Scope	Resources
Project Status : Assigned (57)			
Project Status : Completed (406)			
Category : Add/Modify Points (116)			
Corinne Pump Station NWCP AOA	9/27/2011	NWCP AOA	
Banta OMNI Upgrade	3/17/2011	Upgrade Banta OMNI Rev 22.71	

Commission List - Banta OMNI Upgrade

View

Edit Item | Version History | Manage Permissions | Delete Item | Alert Me | Workflows

Manage | Actions

Project Name	Banta OMNI Upgrade
Requestor	Asendorf, Charles (ASEC) (CAsendorf)
Category	Add/Modify Points
Project Scope	Upgrade Banta OMNI from a OMNI 3000 REV 20.71 to a OMNI 6000 Rev 22.71
Charge Code	PWREM 02197-100
MOC #	M2010369-001
Field Start Date	3/17/2011
Target Date	3/9/2011
Commission Date	3/17/2011
Calc End Date	3/18/2011 12:00 AM
Project Status	Completed
AOR	WCCP
Asset	CA
Field Team	CA - Los Medanos
P/L System	WCCP - BAPL
RTU	BA1 - BANTA TERMINAL OMNI
Resources	FCST; Op Rep; Field I&E Tech; Elec Engr; SCADA

SCADA Project Commissioning – What?

- Use the Remote Information Form (RIF) to verify and document point configuration
  - The value and status of the data itself
  - The physical location of the instrument or device
  - Alarm set points and alarm descriptions
  - Control functionality or sequences with related devices or equipment
- Verify points on all associated graphics
  - Should test new points from both graphical and tabular displays to ensure correct attach points
  - For display only changes, can verify graphical change against known tabular values without full test to end device
- Preferable to actually operate the field device, but if doing so could potentially disrupt operations, then other industry-accepted techniques may be used
  - Simulation techniques include driving an input from the field, forcing an output from a transmitter, forcing a signal inside the cabinet, or writing manual values in the PLC or flow computer

Remote Information Form (RIF)

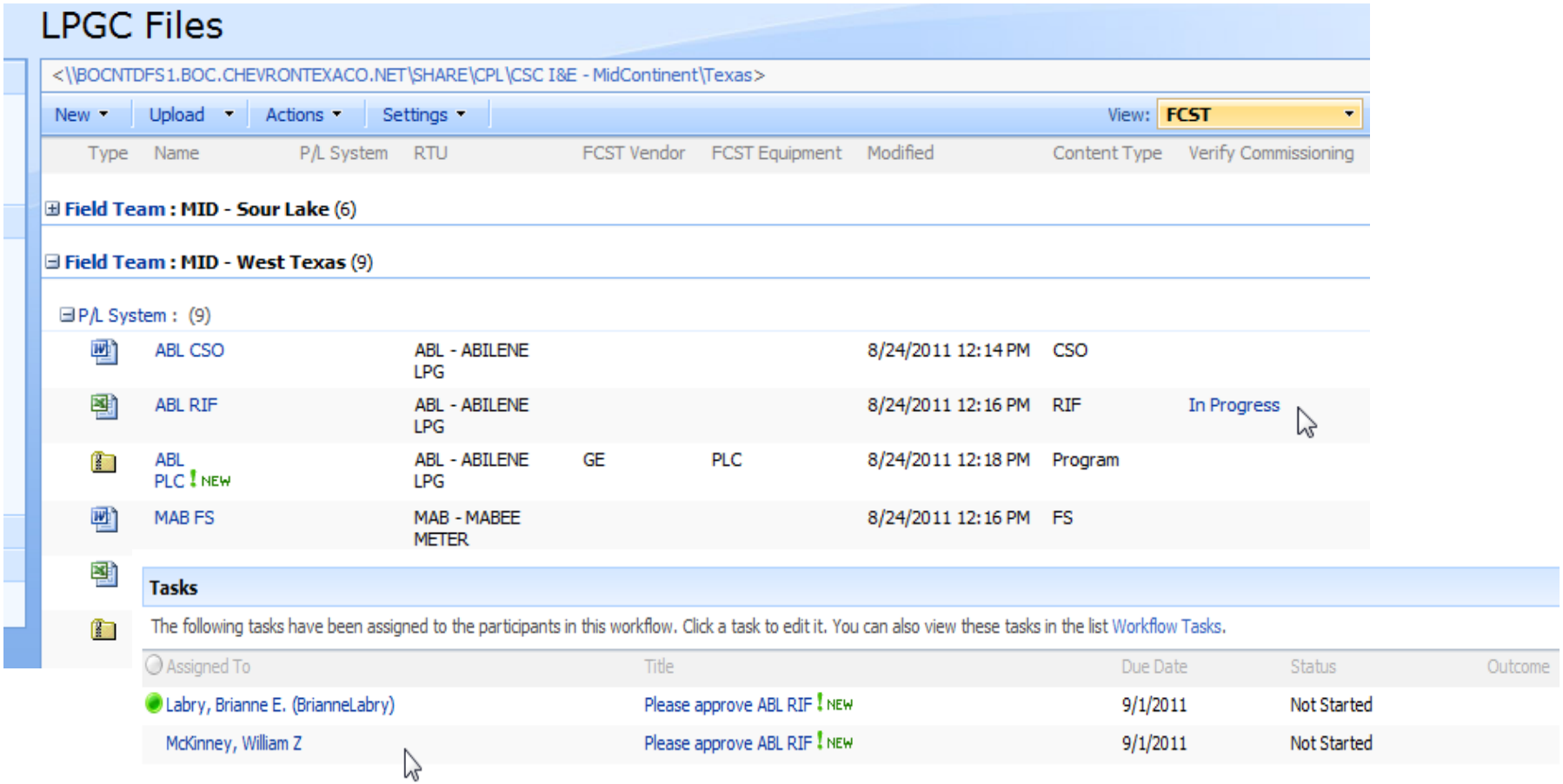
	ANALOG INPUTS										
	REGISTER % R	P&ID TAG	INSTRUMENT DESCRIPTION	ENG UNITS	# OF DECIMALS	TYPE I or F	Safety Related	CARD	CHANNEL	POINT #	OASYS NAME
	FCS	FCS	FCS	FCS	FCS	FCS	FCS	FCS	FCS	SCADA	SCADA
1		PT1900	DISCHARGE PRESSURE at SHIP SHOAL 208F	PSI	2	Float			1505		S8F_ST_PRS_DIS_
2		PIT1000	INSTRUMENT AIR PRESS at SHIP SHOAL 208F	PSI	2	Float			1507		S8F_ST_INSTAIR
3		PIT3000	SS266 Pipe Line Pressure at SHIP SHOAL 208F	PSI	2	Float	AOA Safety / Environmental Pressure Alarm		1509		S8F_ST_PRSSS266

Tested Values	Commissioning Status	Remote Data Source	Remote Data Source %M Bit	Remote Data Comm. Bit	LO SCADA ALARM	HI SCADA ALARM	ROC SCADA ALARM	Alarm Tested	ASSOCIATED DISPLAY NAME
SCADA		FCS	FCS	SCADA	OPREP	OPREP	OPREP	SCADA	SCADA
CHANGE NAME TO S8F_ST_PRS_S266									

SCADA Project Commissioning – Where?

- Collect CRMP evidence/documentation of point testing
  - SCADA marks RIF and/or SCADA graphic with test values , alarm limits, setpoints, etc.
  - Scan copy of final RIF and/or graphic and attach to Sharepoint list entry
  - Use Sharepoint workflow to send final document to those who participated in commissioning (I&E technician, Field Control Systems Rep, Operations Rep, etc.)
  - Participants use automated email to electronically approve final documentation
  - Documents with approval history and dates preserved electronically in Sharepoint for audit purposes
- For instrument calibrations, field personnel calls controller directly
  - Calibration is record in Controller Logbook
  - SCADA Event Summary is used as recorded value and evidence of test

Commissioning Evidence



Measurement and Verification

- Annual review of processes and procedures
- Periodically sampling the resulting documentation / evidence for completeness
- For display only changes, the revision history of recently modified graphics will be reviewed by using data in the ‘TortoiseCVS’ tool
- Evaluate leading/lagging measures:
  - # number of RIF review meetings held 2 weeks prior to commissioning (leading)
  - # of points added/modified (leading)
  - # of evidence packages verified for completeness (leading)
  - How long takes evidence to be approved (leading)
  - # of projects completed (lagging)
  - # of display only requests (lagging)
  - # of projects with attached CRMP evidence (lagging)

Q & A

Appendix

Alarm Objective Analysis (AOA)

- Methodically work through each individual SCADA point:
  - What could cause this condition?
  - What is the controller's corrective action(s)?
  - Will several alarms indicate the same condition?
  - Will this alarm make sense for all modes of operation (startup, shutdown, and normal)?
  - Should this alarm be suppressed when another alarm is annunciated?
  - Does this alarm match the criteria for a critical alarm?
- Use matrix to determine appropriate alarm severity
- Document all alarm parameters in the AOA database
- Configure custom 'safety' flag in SCADA database
- Review distribution of alarm severities

AOA Determination - Alarm Impact Matrix

MTR Class	No Consequence	Minor / Moderate	Major	Severe
Personnel (Safety)	No Injury	First aid or slight health effect. No disability or lost time recordable.	Lost time recordable or reversible health effect. No disability.	Lost time, permanent disability, severe injury, or loss of life.
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AOA Determination – Mean Time to Respond Matrix

	Responder Initial Location		
MTR	**Control Center**	**Field**	**Callout**
< 1 min	Class A	Redesign	Redesign
1 – 5 min	Class B	Redesign	Redesign
5 – 15 min	Class C	Class A	Redesign
15 – 30 min	Class C	Class B	Redesign
30 – 60 min	Class D	Class B	Class A
1 – 2 hours	No Alarm	Class C	Class B
2 – 4 hours	No Alarm	Class D	Class C
> 4 hours	No Alarm	No Alarm	Class D

AOA Determination – Severity = Consequence x Mean Time to Respond

MTR Class	No Consequence / Incidental	Minor / Moderate	Major	Severe
D	No Alarm	No Alarm	No Alarm	Low
C	No Alarm	Low	Low	Medium
B	No Alarm	Low	Medium	Medium
A	No Alarm	Medium	High	High