

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – 2 Reformer			By	Xenon OptumPCP	
					Rev	0	
	Num	747002-LAR1C-AUT-FDS-0101	Project	747002	Date	03-Jan-23	
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AUTOMATION MODERNIZATION PROGRAM

LOS ANGELES CARSON REFINERY

LAR1C AMP BPCS CONFIGURATION PROJECT EQUIPMENT FUNCTIONAL DESIGN SPECIFICATION - 2 REFORMER

Revisions and Approvals					
Rev	Date	Reason for Issue	Originated By:	Reviewed By:	Approved By:
A	07-Sep-22	Issued for Review	AP	NF	HR
B	02-Nov-22	Issued for Approval	NF	RP	HR
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Revision History

Rev	Description	Section
A	Issued for Review	All
B	IFR comments incorporated and document Issued for Approval	1.3, 3.2, 5.1, 6.1, 6.2, 6.4, Appendix A, C, E, F
0	Global comments are incorporated and document Issued for Design HOLDs 2 and 3 are cleared.	1.1, 5.1, 6.1, 6.2, 6.4, 6.5, 7.1, Appendix A, C, E, F 7.1, Appendix A

Assumptions,

No.	Description	Section
-	-	-

Holds

No	Description	Section
1	Confirm with LAR the points currently connected to the Environmental Monitoring System	5.3
2	Obsolete tag list is to be confirmed from EP Contractor— CLEARED based on Carson I/O List “747002-LAR1C-AUT-IOA-0100”	7.1
3	P&IDs for the tags to be confirmed with EP Contractor— CLEARED based on P&ID information available in document “747002-LAR1C-AUT-IOA-0100”	Appendix A

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1. General

1.1 Introduction

The Los Angeles Refinery Carson (LARC) facility is completing an Automation Modernization Program (AMP) to replace obsolete automation equipment and to migrate the existing functionality and operability to the Honeywell Experion Process Knowledge System (EPKS) platform.

The LAR1 project scope is to migrate and/or upgrade the existing functionality and operability of identified Basic Process Control System (BPCS) consoles and controllers as well as operator and engineering stations to comply with current industry standards and practices. The migration will be from the existing Honeywell High Performance Process Manager (HPM)¹, Application Module (AM) controllers, Process Manager Input/Output (PMIO) and Basic Controllers to new Honeywell Experion C300 controllers and Series C and Universal Input/Output (UIO) and (UIO-2). The migration of the existing 3rd-party device serial interfaces to the C300 controllers shall be via either Modbus TCP/IP using Peer Communication Data Interfaces (PCDI), Ethernet Interface Module (EIM) or EPKS Server Supervisory Control and Data Acquisition (SCADA) points and Human Machine Interface (HMI) screens migrated using HMI WebBuilder.

1.2 Purpose of this Document

The purpose of the Equipment Functional Design Specification is as follows:

- Describe the existing equipment configuration implemented in the BPCS at a functional level, including hardwired and soft I/O, location of the equipment on the local control network (LCN), I/O distribution, assigned console, regulatory control functions, control calculations, operator interfaces, and 3rd-party connections.
- Record any deviations from the current design (e.g., value engineering, regulatory compliance).
- Describe the high-level implementation of the migrated complex controls at the system level, the point details are recorded in the software migration specifications.
- Serve as the basis to support the detailed design, implementation, and testing activities.

1.3 Scope

The scope of the Equipment Functional Design Specification is to describe the functions and associated interfaces gathered from the information available in the BPCS backup files and site surveys associated with the 2 Reformer “alphabet” unit that are not covered by the equipment

¹ The scope of the HPM migration is limited to specific functions if it is determined to provide a more robust solution of the other control loops migrating to the C300 controllers.

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specific heater and compressor specifications. Once approved, the document is maintained as a live document throughout the project until the complete project handover to LAR.

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2. Acronyms and Definitions

2.1 Acronyms

Table 2.1 defines the acronyms used within this document.

Table 2.1. Acronyms

Acronym	Description
AM	Application Module
AMP	Automation Modernization Program
APP	Application Processing Platform
BPCS	Basic Process Control System
CB	Control Box (Basic Controller)
CDA	Control Data Access
DHP	Data Hiway Port
DMC	Dynamic Matrix Control
EIM	Ethernet Interface Module
EPKS	Experion® Process Knowledge System
HLPIU	High-Level Process Interface Unit
HMI	Human Machine Interface
HPM	High Performance Process Manager
I/O	Input/Output
LAR	Los Angeles Refinery
LARC	Los Angeles Refinery Carson
LCN	Local Control Network
LEPIU	Low-Energy Process Interface Unit
LLMUX	Low Level Multiplexer
LLPIU	Low Level Process Interface Unit
MPC	Marathon Petroleum Corporation
PCDI	Peer Communication Data Interface
PMIO	Process Manager Input/Output

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Acronym	Description
RSP	Refinery Standard Practice
SCADA	Supervisory Control and Data Acquisition
TPS	Total Plant Solution
UCN	Universal Control Network
UIO	Universal Input/Output

2.2 Project Definitions

Table 2.2 describes terms used in this document.

Table 2.2. Project Definitions

Definition	Description
3 rd -Party Interface	Systems that connect to the BPCS via serial data links or software applications that send and receive data to the BPCS, residing above level 2 in the BPCS architecture.
Automation Contractor	Marathon appointed Automation Contractor or their authorized representative(s).
Complex Loop	A loop whose functionality has deviated from the standard configuration template or where control calculations are performed. Else, the loop is considered a “standard” loop.
Demo	Refers to scope to be “demobilized,” i.e., removed from service, all hardware and software and documentation updated accordingly.
LAR Team	Los Angeles Refinery Site and Project Team or their authorized representative(s).
Standard Loop	A loop whose functionality is fully provided by the standard configuration template with no custom configuration. Else, the loop is considered a “complex” loop.

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3. References

3.1 MPC and LAR Standards

Table 3.1 records the specifications that shall be referenced in developing this functional design specification. Any deviations from the specifications are recorded in an addendum to the specification and will be referenced in the table below.

Table 3.1. Codes and Standards

Document Number	Rev	Document Title
AMP Central Global Specifications		
AMP-GBL-PM-SPC-0002	A1	Automation Specification
AMP-GBL-PM-SPC-0004	5	HMI Specification
AMP-GBL-PM-SPC-0009	A3	Third-Party Integration Specification
AMP-GBL-PM-SPC-0012	A0	Experion C300 Configuration Specification
AMP-GBL-PM-SPC-0020	3	Process Automation System Naming Specification
AMP-GBL-PM-SPC-0022	2	Automation System Testing Specification
Refining Standards and Specifications		
-	-	-

3.2 Project Reference Drawings, Documents, and Software Backups

Table 3.2 records the project documentation referenced in developing this functional design specification.

Table 3.2. Project Reference Drawings/Documents/Software Backup

Reference Number	Rev	Reference Title
Software Backups		
LCN1 EBs Mar2022	1	AMP LAR1C EB Database (Received from LAR AMP in March 2022)
EP Documentation		
BOD MPLA20002-LAR1-PM-RPT-0002	6	Paton LAR1 Definition BOD 2022-2024 TAR Equipment
P&IDs		

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Reference Number	Rev	Reference Title
BF-2202-37953-S1	C	NO. 2 DESULFURIZER AUXILIARY P&ID
BF-2201-59673-S1	C	2 REFORMER AUXILIARY P&ID
BF-2202-37953-S2	C	2 REFORMER DESULF PROCESS P&ID
BF-2201-20252-S1	C	2 REFORMER PROCESS P&ID
BF-2902-59669-S1	C	3 REFORMER TANK STORAGE AREA PROCESS P&ID
BF-8904-20735-S1	C	NO. 14 COOLING TOWER PROCESS/AUXILIARY PROCESS P&ID
BF-8903-41112-S1	C	NO. 13 COOLING TOWER PROCESS/AUXILIARY PROCESS P&ID
BF-0103-64750-S1	C	FCCU-TDC RCK RM-HVAC/FIRE B-1067 AUXILIARY P&ID
BF-0121-37714-S1	C	OFFPLOT AREA 21 PROCESS P&ID
8628-11101006	C	NITROGEN SYSTEM NORTH AREA 1 UTILITY SYSTEM P&ID
8615-11100941	C	COOLING WTR/CT BLOWDOWN SYSTEM NORTH AREA 1 UTILITY SYSTEM P&ID
8608-11100916	C	INSTRUMENT AIR SYSTEM NORTH AREA 1 UTILITY SYSTEM P&ID
8603-11100901	C	STEAM (150#, 175#) SYSTEM NORTH AREA 1 UTILITY SYSTEM P&ID
LAR AMP BPCS Documentation		
747002-LAR1C-AUT-IOA-0100	1	LAR1 AMP BPCS Configuration Project I/O List- Carson
747002-LAR1C-AUT-SPC-0101	B	LAR1C AMP BPCS Configuration Project HMI Migration Specification – 1 Reformer
747002-LAR1C-AUT-SPC-0102	B	LAR1C AMP BPCS Configuration Project HMI Migration Specification – 2 Reformer

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4. Process System Overview

The scope covered by this “2 Reformer” Equipment Functional Design Specification is not related to a specific equipment item; therefore, a process system overview is not applicable.

4.1 List of Major Equipment

Table 4.1 lists the major equipment.

Table 4.1. List of Major Equipment

Equipment No	Description
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4.2 Refinery Standard Practice (RSP) Compliance

The migration scope for the 2 Reformer is not impacted by the RSP compliance requirements.

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5. Process Control System

5.1 Existing & Migrated Control Architecture

The controls for the 2 Reformer are currently implemented across several nodes connected to redundant Hiway Gateway nodes 43/44 that connect to the Data Hiway 07 on the LCN 1 Carson. Table 5.1 shows how the existing hardware shall be migrated to the new hardware.

Table 5.1. Existing & Migration Control Hardware for 2 Reformer

Existing		Migrated	
Device	Ref #	Device	Ref #
Redundant Hiway Gateway	43/44	Series C IO	REF2-C300-21
Data Hiway	07	C300 Controller	
Basic controllers (11 from 22)	20, 22, 23, 24, 27, 28, 29, 31, 34, 35, 44		
Data Hiway - HLPIU (1 from 2)	07 Box 07, 26	Series C IO C300 Controller	REF2-C300-21
Data Hiway - LLPIU (1 from 2)	07 Box 08	LLMUX C300 Controller	REF2-C300-23
AM – LCN 1	25	No Change	-

5.2 Migration Impact on DMC

The Dynamic Matrix Control (DMC) interface shall be reviewed in detail as part of the cutover sequence and a plan developed to minimize the downtime post migration of the equipment. The detailed review of the migrated loops and their connection with the functions in the AM are described in Section 6.2. There are no direct connections with the HPM control logic.

During the detailed loop cutover planning, consideration shall be given the use of the migrated tags by the DMC application to ensure its operation is not compromised. As part of the initial functional design AM points have been identified which can be implemented in the C300 controller as part of the LAR1 scope.

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The DMC application interface is from a flex station with KVM to the console. This interface shall be merged into the operator console interface, the scope of which shall be identified and detailed in specific engineering workshops prior to the start of the detailed cutover planning.

5.3 Environmental Monitoring

The existing Environmental Monitoring System shall remain in place, i.e., receiving the necessary signals directly from the field transmitters to the dedicated PLC.

HOLD 1. Confirm with LAR the list of points currently reporting to the Environmental Reporting System.

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6. Detailed Migration Scope Description

6.1 Standard Loops

There are 234 standard loops that are required to be migrated; these are either analog or digital input signals used for monitoring and alarming purposes. The signals are listed in Appendix A.

6.2 Complex Loops

The hardware I/O list has been checked and associated logic traced in AM to confirm the use of the migrated loops. The migrated loops interact with the AM, the summary outcome of the data tracing is in Table 6.1. The point specific migration status is listed in Appendix C.

Table 6.1. AM Point Summary

Group	No.
Total number of AM points	1251
Points associated with 2 Reformer	38
Points to migrate to CMs (C300)	23
- Points source is impacted due to the HG tags migration	15

6.3 3rd-Party System Interfaces

Not Applicable.

6.4 HMI Graphics

The graphics associated with Appendix A tags are listed in Table 6.2 and are part of the Reformer and 5 Trap Console². Any changes to the scope and content of the graphics are described in the relevant HMI Migration Specification.

Table 6.2. 2 Reformer HMI Summary

Item	Display	Title
Process Graphics		
1	8708.DS ³	WELL WATER OVERVIEW

² The graphics (EPKS type) are located in #1 Reformer Console as per the existing hardware at site. There are no EPKS consoles available for #2 Reformer.

³ This graphic belongs to the 5 Trap Console and has a point from the Reformer I/O, 89FI100.

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Item	Display	Title
2	c22.DS	#2 REF SUPERVISORY CONTROLS
3	dehex.DS	DEHEX FEED FROM ALL STABILIZERS
4	i22a.DS	INSTRUMENT LIST - UNIT 22 #2 REF STABILIZER
5	i22b.DS	INSTRUMENT LIST - UNIT 22 #2 REF DESULF
6	naccral.DS	NACCR ALARMS
7	naccral1.DS	NACCR ALARMS
8	8406.DS	RO WATER SYSTEM
9	2730.DS	TREATING OVERVIEW
10	E2131.htm	2131 735# / 650# H2 HEADERS
11	L2_23_H2System.htm	H2 SYSTEM
12	Reformer_2103.htm	2103 DES STRIP / ACCUM / AMINE CONTACTOR & KO POT
13	Reformer_2112.htm	2112 #1 REFORMER BUFFER H2
14	Reformer_2117.htm	2117 #1 REFORMER REGENERATION
15	Reformer_2131.htm	2131 735# / 650# H2 HEADERS
16	Reformer_2200.htm	2200 Desulf Process Overview
17	Reformer_2201.htm	2201 Desulf Feed System/Eff Exch
18	Reformer_2202.htm	2202 #2 Desulfurizer 2A Heater
19	Reformer_2203.htm	2203 Desulf Reactor
20	Reformer_2204.htm	2204 Desulf Strip/Accum/Amine Cont/KO Drum
21	Reformer_2207.htm	2207 #2 Desulfurizer 2B Heater
22	Reformer_2210.htm	2210 #2 Reformer Overview
23	Reformer_2211.htm	2211 #2 Reformer Feed / Effl Exch & Sulfur Trap
24	Reformer_2211H1.htm	2211H1 2 Ref Sulfur Trap Flow Lineups
25	Reformer_2212.htm	2212 #2 Ref Fuel Gas KO Drum
26	Reformer_2218.htm	2218 #2 Ref - 3A & 3B Reactors
27	Reformer_2219.htm	2219 #2 Ref - Flash Drum/K.O. Pot
28	Reformer_2221.htm	2221 #2 Ref - Steam Drum

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Item	Display	Title
29	Reformer_2222.htm	2222 #2 Ref - Stabilizer Section
30	Reformer_2222C1.htm	2222C1 No. 2 Stab Temps Supervisory Ctrl
31	Reformer_2222H1.htm	2222H1 2 Stab Reb Temp Supervisory Controls
32	Reformer_2223.htm	2223 #2 Ref - Regeneration
33	Reformer_2224.htm	2224 #2 Ref - Soda Ash System
34	Reformer_2227.htm	2227 #2 Ref - Reactor Temp Profiles
35	Reformer_2229.htm	2229 #2 REF - #14 Cooling Tower
36	Reformer_2229H1.htm	2229H1 #14 Cooling Tower RO Water Ratio Help
37	Reformer_2235.htm	2235 NACCR/2&3 Ref TDC Pwr & Building Alarm
38	Reformer_2240.htm	2240 2 Ref Emergency Screen
39	Reformer_2355.htm	2355 - H2 SYSTEM
40	Reformer_2132.htm	2132 200# H2 HEADER / KO DRUM
Shutdown Graphics		
-	-	-

The scope to migrate the graphics is achieved in two steps, the first step is to complete a one for one migration of the existing graphics to the EPKS environment using TPS shapes. This will allow operations to use the EPKS HMI interface and control the unit using the existing controller hardware. The second step is to migrate the EPKS TPS HMI screens loop by loop to use the Control Data Access (CDA) EPKS shapes, in line with the cutover plan—i.e., all the graphics affected by the Hiway gateway points migrating to C300.

The HMI screens associated with the 2 Reformer will follow the MPC standard being deployed across all MPC refineries as part of the wider RSP program.

6.5 2 Reformer Controls Overview

The overview is provided to confirm the scope has not been overlooked as part of the LAR1 migration. All the controls remain in place as currently implemented unless otherwise stated.

The main control schemes such as calculations and custom functions are present in the application module.

There are calculations available for the following functions:

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- Reformer Flash Drum Level Deviation
- Reformer Stab Reboiler Level Deviation
- Cooling Tower 14 RO Water Ratio Calculation
- Reformer Stabilizer Tower Differential Pressure
- Desulfurizer Strip Tower Level Deviation
- Cooling Tower 13 RO Water Ratio Calculation
- North Area N2 Header Flow Compensation

The status of migration of these application module tags is listed in Appendix C. More details are available in the EB files and CL files. Table 6.3 lists the custom functions present in the AM related to 2 Reformer processes.

Table 6.3. AM Custom Functions

AM CL Name	Purpose
STABBTC	CL to prevent both the top and bottom of the no. 2 stabilizer to be in temperature control at the same time.
CDS3721	CL to create custom data segment which will allow operator to set constant delta temp between 22tc600 and 22tc601.
STOREOP	This program stores a snapshot of up-to-100 user-defined. OP parms to the bound_data_point.
PCDI0116	DMCplus Feed Forward Variable package
PCDF0114	DMCplus Manipulated Variable package
SL2	This program, along with YSL2.CL, sets up the custom parameters for the unit stream switch log schematics.
SPSELCDS	This custom data segment is intended for use with setpoint's custom selector CL block.
RF2_H2HC	This is a program to calculate the molar hydrogen to hydrocarbon ratio at --the no 2 Reformer
RF2COMP	This is a program to calculate the polytropic head at the discharge of the no 2 Ref recycle compressor, RW 7-087.06
UPSNACCR	This CL monitors the seven UPS's (22 points) in the NACCR and provides a common alarm for the Hydrocracker, FCCU and 4 steam consoles.

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7. Obsolete Control Functionality

7.1 Obsolete Tags

The tags listed below are assigned to the HG I/O and will be demolished. The timing of removing the I/O and associated logic shall be determined based on the cutover plan. The tags have been determined during the cutover reviews and status recorded in the master EP Contractor I/O list.

Table 7.1. Obsolete HG Tags

#	Tag	Service	Hardware detail
1	22HS964A	OLD TK-90 BOOSTER PUMP	HG43/44
2	22HS964B	OLD T-90 BOOSTER PMP B/U	HG43/44
3	22FA107	DESULFURIZER FEED FLOW	HG43/44
4	22LA313	DESULF STRIP HI LO LEVEL	HG43/44
5	22XA992	TDC 24V FAIL 2REF RACKRM	HG43/44
6	22XA989	TDC CABINET FAN RACKRM	HG43/44
7	22XA990	TDC BBU TRBL 2REF RACKRM	HG43/44
8	22PR458	#2REF DESULF HTR2A FG P	HG43/44

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Appendix A. Standard Tag List for Migration

Table A.1. Standard Tag List for Migration

Tag Name	Description
22XA985	NACCR UPS 5 INT BYP/TRBL
22XA986	NACCR UPS #5 LOW BATTERY
22XA987	NACCR UPS 5 ON BATTERY
22XA991	NACCR UPS#6 INTERNAL BYP
22XA908	NACCR UPS #6 AC IN FAIL
22XA907	NACCR UPS #6 LOW BATTERY
22XA909	NACCR UPS #7 ON BYPASS
22XA910	NACCR UPS #7 ON BATTERY
22XA911	NACCR UPS #7 FAULT
22XA984	NACCR UPS #4 FAULT
22XA983	NACCR UPS #4 ON BATTERY
22XA982	NACCR UPS #4 ON BYPASS
22XA981	NACCR UPS #3 FAULT
22XA980	NACCR UPS #3 ON BATTERY
89AA907B	CT 14 HI HI LEL
89AA907A	CT 14 HI LEL
89UA913	CT 14 LEL COMMON TROUBLE
89AA906B	CT 13 HI HI LEL
89AA906A	CT 13 HI LEL
89UA912	CT 13 LEL COMMON TROUBLE
22PA456	NACCR EMERG AIR SUPPLY
22FA161	S 969 PMP DISC FLOW ALM
22XA988	NACCR UPS5 ON EXT BYPASS
22XL898	NORTH 969 PUMP STATUS
22XL897	SOUTH 969 PUMP STATUS
22FA162	N 969 PMP DISC FLOW ALM

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Tag Name	Description
22PA441	SOUTH 969 PMP SUCT
22PA442	NORTH 969 PMP SUCT
22PA443	969 FEED LINE PRESS
22PA433	INST AIR RECEIVER BYPASS
89XA907	CT14 H2O PUMP 3 NO S/D
22XA966	DESULF FEED PUMP ELECT
22LA319	DESULF STRIP ACCUM LVL
22LA320	AMINE CONT BTMS LOW LVL
22LA316	STRIP ACCUM LOW H2O
22LA318	REF KO DRUM HI LEVEL
22LA317	DESULF RECY KO DRUM LVL
22PA408	SWITCH ROOM LO PRESS
22LA315	AMN CONTACTR TOP HI LVL
22LA314	SOUR H2O OIL HI LEVEL
22PA418	#2 RACK ROOM LO PRESS
22XA976	EMERGENCY GENERATOR
89XA906	CT14 H2O PUMP 1 SO S/D
89XA905	CT14 LVL HI-LO ALM
22XA955	#2 RACK RM H2S AIR WRNG
89XA904	COOLING WATER 6 7 FAN
89XA902	COOLING WATER 3 4 FAN
22LA330	CHLORIDE KO POT
22LA326	DES STR ACCUM HI H2O
22XA977	INSTRUMENT POWER FAIL
22XA957	#2 RACK RM LEL AIR WRNG
22XA956	#2 RACK RM H2S/LEL TRBLE
89XA903	COOLING WATER 5 FAN
89XA901	COOLING WATER 1 2 FAN

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Tag Name	Description
22PA416	STEAM DRUM CIRC WTR PRES
22PA415	INSTRUMENT AIR PRESSURE
22PA434	INSTRUMENT AIR DRYER
22XA900	COMP FIRE SPRINKLER ON
22PA430	DELUGE CV AIR LOW PRESS
22HS991	2 REF EMERGENCY ALARM
22TI722	DESULFURIZER STRIP FEED
22LI312	TK-930 SODA ASH STORAGE
22FI151	SODA ASH INJECTION
22FI146	TANK 969 MAKE UP
22PI419	BFW SUPPLY TO STEAM DRUM
22TI850	SODA ASH HEATER INLET
22FI101	ST RUN NAPHTHA - TK 90
22FI134	REF COND INJECT
22FI169	BUFFER H2 TO #2 REF
22FI165	RPV 3107 PSV PILOT PURGE
89FI100	14 WATER WELL
84TI702	NA NITROGEN HEADER TEMP
22LI305	STEAM DRUM TRUE LEVEL
84PI405	NA NITROGEN HEADER PRESS
22PI471	NO2 REF STM DRM PRESS
22LI310	STABILIZER ACCUM LEVEL
22PI405	600 STM PSIG
22PI403	INSTRUMENT AIR PSI
84FI101	NA NITROGEN HEADER FLOW
22PI401	14 COOLING TOWER RETURN
22PI400	14 COOLING TOWER SUPPLY
22PI406	150 STM PSIG

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Tag Name	Description
22PI404	PLANT AIR PSI
22LI321	REF FLASH DRUM - SRA
22PI475	DESULF REACTOR INLET
22PI559	2REF STABILIZER TOWER OH
22XA912	NACCR UPS#6 EXTERNAL BYP
22XA954	NACCR BATTERY CHARGER 2
22XA953	NACCR BATTERY CHARGER 1
22XA952	NACCR SBRD TIE-BRKR CLSD
22XA951	NACCR SWBD MN BKR 2 OPEN
22XA950	NACCR SWBD MN BKR 1 OPEN
22XA949	NACCR SWBD B BUS GROUND
22XA940	NACCR UPS #1 LOW BATTERY
22XA939	NACCR UPS #1 ON BATTERY
22XA938	NACCR UPS #1 ON BYPASS
22XA941	NACCR UPS #2 ON BYPASS
22XA943	NACCR UPS #2 FAULT
22XA979	NACCR UPS #3 ON BYPASS
22XA942	NACCR UPS #2 ON BATTERY
22XA948	NACCR SWBD A BUS GROUND
22XA947	NACCR 20% LEL AIR DUCT
22XA946	NACCR 15 PPM H2S IN AIR
22XA945	NACCR H2S LEL TROUBLE
22XA937	NACCR ZONE 11 SMOKE ALRM
22XA936	NACCR ZONE 10 SMOKE ALRM
22XA935	NACCR ZONE 9 SMOKE ALARM
22XA934	NACCR ZONE 8 SMOKE ALARM
22XA933	NACCR ZONE 7 SMOKE ALARM
22PA450	NACCR LOW PRESSURE

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Tag Name	Description
22PA451	NACCR DUCT PRESS HI LO
22XA932	NACCR ZONE 6 SMOKE ALARM
22XA931	NACCR ZONE 5 SMOKE ALARM
22XA930	NACCR ZONE 4 SMOKE ALARM
22XA929	NACCR ZONE 3 SMOKE ALARM
22XA928	NACCR ZONE 2 SMOKE ALARM
22XA927	NACCR ZONE 1 SMOKE ALARM
22XA926	NACCR FIRE DETECT SYSTEM
22XA920	NACCR HI/LO HUMIDITY
22XA925	NACCR HVAC CONTROL SYSTM
22XA924	NACCR HVAC SYSTEM 1 FAIL
22XA923	NACCR HVAC CLOG BAG FLTR
22XA922	NACCR HVAC CLOG PRE-FLTR
22XA921	NACCR HVAC 2 FAN FAILURE
22TA700	NACCR TDC ENG ROOM
22HS898	NORTH 969 TRANSFER PUMP
22HS897	SOUTH 969 TRANSFER PUMP
22TI727	TO WEST EFFLUENT EXCH
22TI721	DESULF REACTOR OUTLET
22TI726	DESULF CONTACTR BTM TEMP
22TI725	DESULF STRIP ACCUMULATOR
22TI724	DESULF STRIP OVERHEAD
22TI723	DESULF STRIP BOTTOMS
22TI731	FROM EAST EFFLUENT EXCH
22TI730	FROM WEST EFFLUENT EXCH
22TI781	EFFLUENT FROM EAST EXCH
22TI780	EFFLUENT FROM WEST EXCH
22TI790	REFORMATE TO STORAGE

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Tag Name	Description
22TI784	REF FLASH DRUM
22TI785	REF STABILIZER FEED
22TI786	STABILIZER REBOILER
22TI787	REF STAB TRAY 29 LIQUID
22TI789	STABILIZER ACCUM TEMP
22TI788	REF STABILIZER TOP
22TI793	150 STM FRM ATTEMPARATOR
22TI846	DESULF REACTOR INLET
22TI799	DESULF REACTOR MID NE
22TI798	DESULF REACTOR TOP NE
22TI797	DESULF REACTOR BTMS NW
22TI796	DESULF REACTOR MID NW
22TI795	DESULF REACTOR TOP NW
22TI803	DESULF REACTOR BTMS S
22TI802	DESULF REACTOR MID S
22TI801	DESULF REACTOR TOP S
22TI800	DESULF REACTOR BTMS NE
22PC460	DESULF FEED PMP SUCT
22FC108	HUX FEED DIRECT TO REF.
22LC303	REF FLASH DRUM LEVEL
22FC106	REFORMATE TO 3 REFORMER
89AI931	CT13 PH ANALYZR/CONTROLR
22FY106	3REF REFORMATE LO SELECT
22FC105	TOTAL DESULFURIZER FEED
22LC300	DESULF STRIP BTMS LEVEL
22FC111	REF FEED WEST MANIFOLD
22FI122	DESULF STRIP REFLUX
22FC112	REF FEED EAST MANIFOLD

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Tag Name	Description
89AI932	CT13 ORP ANALYZR/CONTRLR
22PC428	REF FLASH DRUM PSI
89AI933	CT14 PH ANALYZR/CONTROLR
22PC429	REF STABILIZER ACCUM
22HC999	DESULF STRIP REL FLARE
22FI123	DESULF H2 MAKE GAS
22HC998	REF FLASH DRUM REL FLARE
89AI934	CT14 ORP ANALYZR/CONTRLR
22PC420	DESULF AMN CONTACTR PSIG
22PC465	BUFFER H2 TO #2 REF
22LI331	2REF STAB RBLR LEVEL-SRA
22PI560	2REF STABILIZER OVERHEAD
22PI558	2REF STABILIZER BOTTOM
22LI332	DESULF STRIPPER TWR-SRA
22PI414	DESULF STRIPPER TOWER
22PD561	DESULF STRIPPER TWR D/P
22PC455	O2 REGEN GAS TO FIRE BOX
89PA411	CT13 PH/ORP/TRASAR PURGE
89PA413	CT14 PH/TRASAR PURGE
89LA301	HIGH BASIN WATER LEVEL
89LA300	LOW BASIN WATER LEVEL
89XA995	CT13 MAIN H2O PUMP S/D
89XA996	CT13 H2O PUMP AUTOSTART
89XA997	CELL 1 FAN MOTOR
89XA998	CELL 2 FAN MOTOR
89XA999	CELL 3 FAN MOTOR
89TI700	CT NO 13 CWS TEMP
22TC619	150 STEAM ATTEMPARATOR

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Tag Name	Description
22TC616	REF STABILIZER TRAY 28
22FI130	REF FLASH DRUM REL FUEL
22FC138	REF STABILIZER REFLUX
22FI136	REF STABILIZER FEED
22LC304	STEAM DRUM OPS LEVEL
22FI138	REF STABILIZER REFLUX
22FI139	#2 REF STAB BTMS PRODUCT
22FI140	REF STAB LIQ FEED LED
22FC121	LEAN AMN TO DES CONTACTR
22FI141	REF STABILIZER REL LED
22FI142	REF STABILIZER REL FUEL
22FC137	STEAM TO STAB REBOILER
22FC160	TOTAL 969 FEED FORWARD
22PC438	TK 969 MAKE-UP FEED/DES
22TC603	DESULF STRIP FEED TEMP
22FC100	CRACKED NAPTHA FEED TK91
22FI131	FLSH DRM REL 200 HEADER
89FC105	CT14 RO WATER
89FI104	CT14 WELL WATER
89LC304	CT14 BASIN LEVEL
22PD444	MOORLANE FEED FILTERS DP
84FI121	N2 SUPPLY TO SOUTH AREA
84FI122	N2 SUPPLY TO NORTH AREA
22FC150	SODA ASH HP BLR FEED H2O
22LC302	DESULF CONTACTR BTMS LVL
22PD432	DESULFERIZR AMN CONTACTR
22FI166	RICH AMN FM DESULF CONTR
22LC307	2REF STAB RBLR LVL CTRLR

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Tag Name	Description
22PI562	DESULF EXCHAGERS INLET
22LC301	DESULF STRIPR ACCUMULATR
89FC103	CT13 RO WATER
89FI102	CT13 WELL WATER
89LC303	CT13 BASIN LEVEL
22PD407	REF SULFUR TRAP DIFF
22PD413	DESULF REAC DIFFERENTIAL
22PD427	REF REAC 3B DIFFERENTIAL
22PD444	MOORLANE FEED FILTERS DP
22PD470	2 REF FUEL GAS FILTER
22HS895X	RW0033-214.09/RW0034-214.09 DESULF HATERS TRIP TO TRICON CX
22HS895Y	RW0033-214.09/RW0034-214.09 DESULF HATERS TRIP TO TRICON CX

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Appendix B. Serial Link Tag List

Not Applicable.

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Appendix C. AM Point Analysis for 2 Reformer

Table C.1. AM Point Analysis Summary

Point Type	Point (Tag)	PTDESC	CL Block	Migration Status
CUSTOMAM	22XX3700	NO. 2 REF SWITCH LOG	SL2, YSL2	The tag source will be modified due to the migration of the input tag to C300
CUSTOMAM	29XK3701	#3 REFMR/UDEX VALVE % OP	STOREOP	The tag source will be modified due to the migration of the input tag to C300
REGAM	22FK3160	TOT 969 FD > 1&2 DESULF		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	21LC3300	1 REF LVL TO 2 REF FEED		The tag source will be modified due to the migration of the input tag to C300
REGAM	22TC3611	STAB REBOIL TEMP CONTROL	STABBTTC	The tag source will be modified due to the migration of the input tag to C300
REGAM	22TK3620	#2 DESULF REAC DELTA T		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22PK3420	22PC420 OUTPUT HIGH ALRM		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22LY3303	REF FLASH DRUM LVL DEV		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	89FK3100	CT13/14 WATER WELL PUMP		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22FK3100	2REF TOTAL FEED		Tag will be deleted, and the functionality will be transferred to original signal in C300

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Point Type	Point (Tag)	PTDESC	CL Block	Migration Status
REGAM	22KK3800	2REF DESULF FUEL COST		The tag source will be modified due to the migration of the input tag to C300
REGAM	22TC3721	2 DESULF REACT OUT T AM	CDS3721	The tag source will be modified due to the migration of the input tag to C300
REGAM	22TK3846	2REF DES WABT		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22FC3138	REF STAB REFLUX (AM)		The tag source will be modified due to the migration of the input tag to C300
REGAM	22TC3616	REF STAB TRAY 28 (AM)		The tag source will be modified due to the migration of the input tag to C300
REGAM	22LY3307	2REF STAB RBLR LVL DEVTN		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22TK9001	LN AMNE/DES STR ACCM DT		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	89FK105	CT14 RO WATER RATIO		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	84FK101	NA N2 HDR FLOW COMPENSAT		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22PY3558	2REF STABILIZER TWR DP		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22LY3300	DESULF STRIP TWR LVL DEV		Tag will be deleted, and the functionality will be transferred to original signal in C300

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Point Type	Point (Tag)	PTDESC	CL Block	Migration Status
REGAM	22FC105M	TOTAL DESULF FEED	PCDI0116, DMCMVCL	The tag source will be modified due to the migration of the input tag to C300
REGAM	22TC603M	DESULF STRIPPER FD TEMP	PCDI0116, DMCMVCL	The tag source will be modified due to the migration of the input tag to C300
REGAM	22TA3731	2REF E EFFL EXCH OUT-SDL		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22TA3730	2REF W EFFL EXCH OUT-SDL		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22TA3722	2REF DSLF STRPR FEED-SDL		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22TA3721	2REF DSLF RX OULET-SDL		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22PA3562	DESULF EXCH INLET-SDL		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22PA3475	2REF DSLF RX INLET-SDL		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22PA3414	2REF DSLF STRPR TOWR-SDL		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22PA3429	2REF STBLZR OH ACCUM-SDL		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	22PA3428	2REF FLASH DRUM-SDL		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	Z89FK105	zCT14 RO WATER RATIO		Duplicate as (89FK105)

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Point Type	Point (Tag)	PTDESC	CL Block	Migration Status
REGAM	89FK103	CT13 RO WATER RATIO		Tag will be deleted, and the functionality will be transferred to original signal in C300
REGAM	87FK3100	TOTAL WELL WATER FLOW		The tag source will be modified due to the migration of the input tag to C300
REGAM	LOSEL	SIMULATED LO SELECTOR	SPSELCD5	The tag source will be modified due to the migration of the input tag to C300
SWITCHAM	REF2S1	2REF DMCPlus	PCDS0114, PCDS0211, PCDS0311, PCDS0412, PCDS0512, PCDS0611, PCDS0713, PCDS0813, PCDS0914, PCLS0123	The tag source will be modified due to the migration of the input tag to C300
CUSTOMAM	22XK3701	#2 REFORMER VALVE % OP	STOREOP	The tag source will be modified due to the migration of the input tag to C300

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Appendix D. Typical BPCS and Safety System Interface for Reformer

Not Applicable.

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Appendix E. Existing Control System Schematic for 2 Reformer

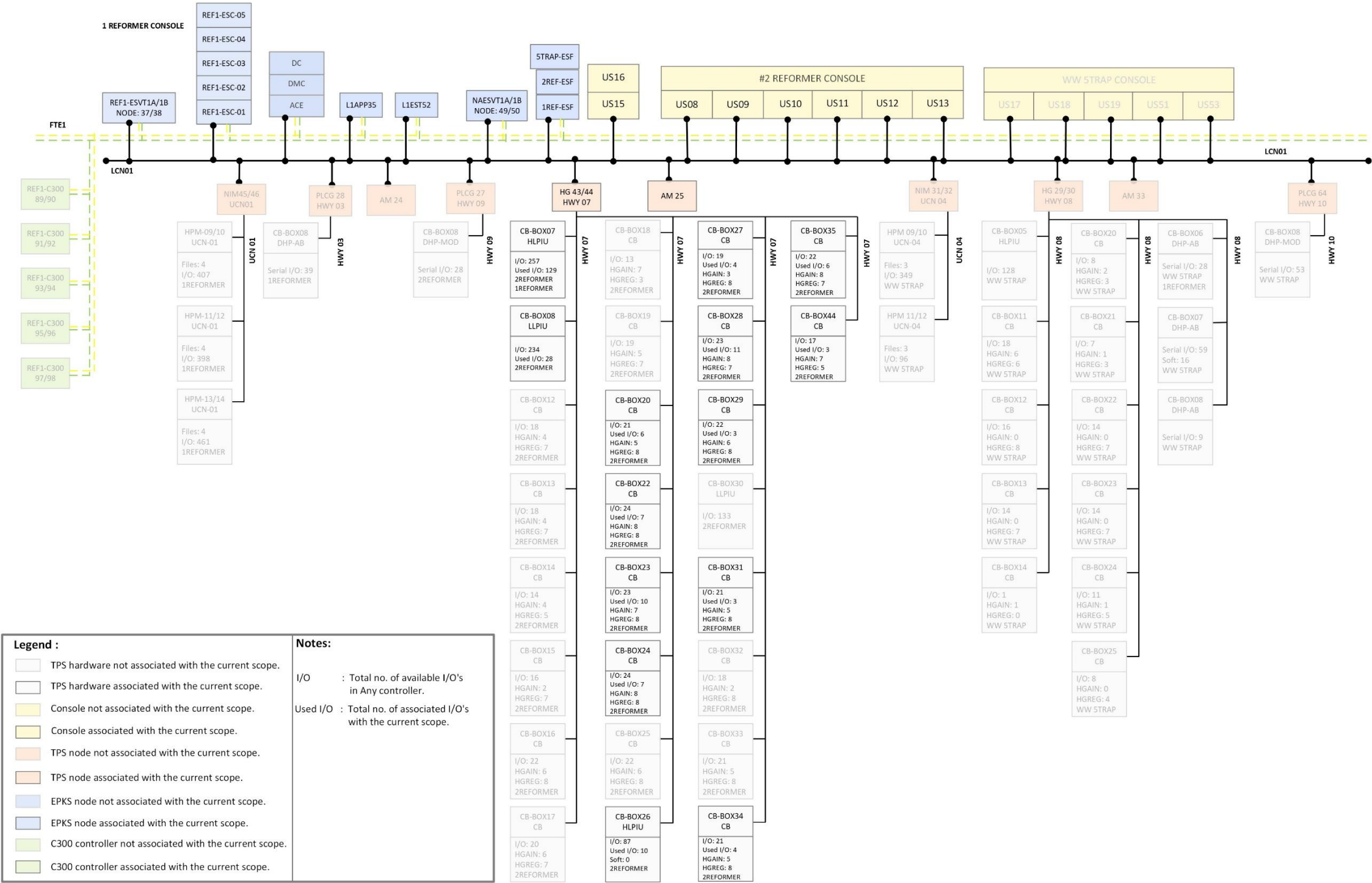


Figure E.1. Existing Control System Schematic for 2 Reformer

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification - 2 Reformer			By	Xenon, OptumPCP	
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Appendix F. Migrated Control System Schematic for 2 Reformer

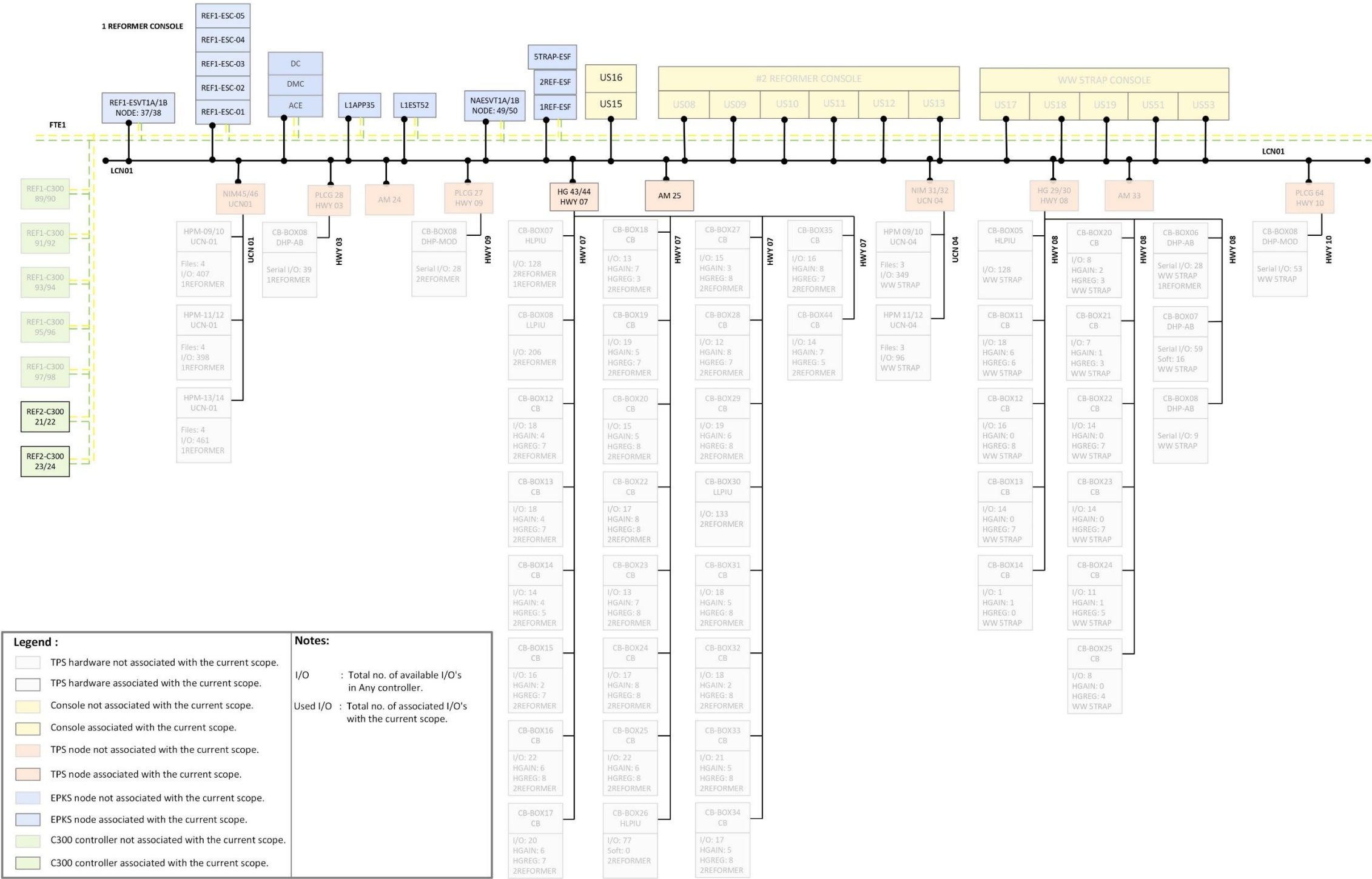


Figure F.1. Migrated Control System Schematic for 2 Reformer