

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	1 of 24	

AUTOMATION MODERNIZATION PROGRAM

LOS ANGELES CARSON REFINERY

LAR1C AMP BPCS CONFIGURATION PROJECT EQUIPMENT FUNCTIONAL DESIGN SPECIFICATION – CARSON GENERAL

Revisions and Approvals					
Rev	Date	Reason for Issue	Originated By:	Reviewed By:	Approved By:
1	14-Jul-23	Issued for Design	AP	NF	HR
0	03-Jan-23	Issued for Design	AP	NF	HR
B	02-Nov-22	Issued for Approval	NF	RP	HR
A	08-Sep-22	Issued for Review	AP	NF	HR

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	2 of 24	

Table of Contents

1. General	6
1.1 Introduction	6
1.2 Purpose of this Document	6
1.3 Scope.....	6
2. Acronyms and Definitions	7
2.1 Acronyms	7
2.2 Project Definitions	8
3. References.....	9
3.1 MPC and LAR Standards.....	9
3.2 Project Reference Drawings, Documents, and Software Backups.....	9
4. Process System Overview	11
4.1 List of Major Equipment	11
4.2 Refining Standard Practice (RSP) Compliance.....	11
5. Process Control System	12
5.1 Existing & Migrated Control System Hardware	12
5.2 Migration Impact on DMC	12
5.3 Environmental Monitoring.....	13
6. Detailed Migration Scope Description	14
6.1 Standard Loops	14
6.2 Complex Loops.....	14
6.3 3 rd -Party System Interfaces.....	14
6.4 HMI Graphics.....	14
6.5 General Controls Overview	15
7. Obsolete Control Functionality	16
7.1 Obsolete Tags.....	16
Appendix A. Standard Tag List for Migration.....	17
Appendix B. Serial Link Tag List.....	20
Appendix C. AM Point Analysis	21
Appendix D. BPCS and Triconex System Interface	22
Appendix E. Existing Control System Schematic	23

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	3 of 24	

Appendix F. Migrated Control System Schematic	24
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List of Tables

Table 2.1. Acronyms.....	7
Table 2.2. Project Definitions.....	8
Table 3.1. Codes and Standards.....	9
Table 3.2. Project Reference Drawings/Documents/Software Backup	9
Table 4.1. List of Major Equipment.....	11
Table 5.1. Existing & Migration Control Hardware	12
Table 6.1. HMI Summary.....	14
Table 7.1. Obsolete HG Tags	16
Table A.1. Standard Tag List for Migration	17

List of Figures

Figure E.1. Existing Control System Schematic	23
Figure F.1. Migrated Control System Schematic.....	24

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	4 of 24	

Revision History

Rev	Description	Section
A	Issued for Review	All
B	Issued for Approval IFR comments incorporated and document	1.3, 5.1, 6.4, Appendix E, F
0	Issued for Design IFA comments and Global comments are incorporated and document HOLD 2 is cleared.	1.1, 3.1, 3.2, 5.1, 5.2, 6.1, Appendix A, E, F 7.1
1	Issued for Design Document is updated based on modpack specification document and I/O list Rev. 2. HOLD 1,3 and 4 are cleared.	5.1, 6.1, 7.1, Appendix A, E, F 5.3, Appendix A

Assumptions

No.	Description	Section
-	-	-

Holds

No.	Description	Section
1	Confirm with LAR the points currently connected to the Environmental Monitoring System. — CLEARED based on confirmation from LAR as this activity will be covered as part of cutover planning	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	The tags are on Hold in the I/O list pending confirmation from EP Contractor— CLEARED based on Carson I/O List “747002-LAR1C-AUT-IOA-0100.”	Appendix A

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	5 of 24	

No.	Description	Section
4	P&ID number to be confirmed with EP Contractor. — CLEARED based on Carson I/O List “747002-LAR1C-AUT-IOA-0100.”	Appendix A

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	6 of 24	

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 (FDS) 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 “General” Equipment FDS captures all the tags and functions not already described in the Equipment Specific FDS and is based on the information available in the BPCS backup files and site surveys. Once approved, the document is maintained as a live document throughout the project until the complete project handover to LAR.

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.

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	7 of 24	

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
FDS	Functional Design Specification
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

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	8 of 24	

Acronym	Description
PMIO	Process Manager Input/Output
RSP	Refining 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	MPC 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.
LAR Team	Los Angeles Refinery Site and Project Team or their authorized representative(s).
Demo	Refers to scope to be “demobilized,” i.e., removed from service, all hardware and software and documentation updated accordingly.
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.

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	9 of 24	

3. References

3.1 MPC and LAR Standards

Table 3.1 records the specifications that shall be referenced in developing this FDS. 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-0001	A3	T/A Integration and Cutover Specification
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 FDS.

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 MAR-2022)
LCN1 EBs May2023	1	AMP LAR1C EB Database (Received from LAR AMP in MAY-2023)
EP Documentation		

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	10 of 24	

Reference Number	Rev	Reference Title
BOD MPLA20002-LAR1-PM-RPT-0002	6	Paton LAR1 Definition BOD 2022-2024 TAR Equipment
P&IDs		
BF-2201-20252-S2	C	2 REFORMER PROCESS P&ID (5-49)
0104-10091548	C	OFFPLOT AREA 4 AUXILIARY P&ID
8605-11100871	C	FLARE SYSTEM NORTH AREA 1 UTILITY SYSTEM P&ID
BF-2700-20531-S1	C	LIGHT ENDS DEPROPANIZER PROCESS P&ID
0103-10260371	C	OFFPLOT AREA 03 NORTH AREA RIE AUXILIARY P&ID
LAR AMP BPCS Documentation		
747002-LAR1C-AUT-IOA-0100	2	LAR1 AMP BPCS Configuration Project I/O List-Carson
747002-LAR1C-AUT-SPC-0102	B	LAR1C AMP BPCS Configuration Project HMI Migration Specification – 2 Reformer
747002-LAR1C-AUT-SPC-0151	A	LAR1C AMP BPCS Configuration Project – Modpack #1 Specification

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	11 of 24	

4. Process System Overview

The scope covered by this “General” Equipment FDS 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
-	-

4.2 Refining Standard Practice (RSP) Compliance

Not Applicable.

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	12 of 24	

5. Process Control System

5.1 Existing & Migrated Control System Hardware

The controls are currently implemented across several nodes connected to redundant Hiway Gateway nodes 43/44 which 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

Existing		Migrated	
<i>Device</i>	<i>Ref #</i>	<i>Device</i>	<i>Ref #</i>
Redundant Hiway Gateway Data Hiway Basic controllers (7 from 22)	43/44 07 24, 26, 33, 35, 16, 18, 20	Series C IO C300 Controller	REF2-C300-21
Data Hiway - HLPIU (1 from 2)	07 Box 07	Series C IO C300 Controller	REF2-C300-21
Cabinet Alarms – New Tags	-	Series C IO C300 Controller	REF2-C300-21 REF2-C300-23 LEDDIB-C300-25
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 to 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 LAR #1 scope.

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	13 of 24	

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. No I/O has been identified by the scope of this compressor migration.

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	14 of 24	

6. Detailed Migration Scope Description

6.1 Standard Loops

There are 74 standard loops that are required to be migrated, which 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 is not traced (in the HPM and AM). Therefore, this section is not applicable.

6.3 3rd-Party System Interfaces

Not Applicable.

6.4 HMI Graphics

The graphics associated with Appendix A tags are listed in Table 6.1 and are part of the Reformer Console². Any changes to the scope and content of the graphics are described in the relevant HMI Migration Specification.

Table 6.1. HMI Summary

Item	Display	Title
Process Graphics		
1	2701.DS	2210 #2 Reformer Overview
2	2702.DS	2211 #2 Reformer Feed / Effl Exch & Sulfur Trap
3	Reformer_2219.htm	2219 #2 Ref - Flash Drum/K.O. Pot
4	Reformer_2235.htm	2220 #2 Ref - Surf Cond & Recy Gas Comp
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

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

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	15 of 24	

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 will follow the MPC standard being deployed across all MPC refineries as part of the wider RSP program.

6.5 General Controls Overview

Not Applicable.

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	16 of 24	

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	29XA908	TDC 24V FAIL 3REF RACKRM	HG43/44
2	22TI792	22-LCP-105/22SPLC-0027 CABINET TEMPERATURE	HG43/44

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	17 of 24	

Appendix A. Standard Tag List for Migration

Table A.1. Standard Tag List for Migration

Tag Name	Description
22TI782	NORTH AREA RIE SIS 22LCP-0106 CABINET TEMPERATURE
22XA651	NARIE-C300-21/22 F BAT CHRG
22XA652	NARIE-C300-21/22 F P/S TOP ALM
22XA653	NARIE-C300-21/22 F P/S BTM ALM
22UA654	NARIE-C300-21/22 F FAN FAIL
22TA662	NARIE-C300-21/22 F HIGH TEMP
22UA641	UPS COMMON TROUBLE
22XA641	BYPASS LOAD
22XA642	LOSS OF COMMUNICATION
22XA643	CHARGER FAILURE
22XA644	BATTERY DISCHARGING
22XA645	LOW DC VOLTAGE
22XA646	INVERTER FAILURE
22XA647	STATIC SWITCH SCR FAILURE
22XA648	BYPASS FAILURE
22XA649	HEAT SINK TEMPERATURE
22XA650	FAN FAILURE
22XA655	NARIE-C300-23/24 F BAT CHRG
22XA656	NARIE-C300-23/24 F P/S TOP ALM
22XA657	NARIE-C300-23/24 F P/S BTM ALM
22UA658	NARIE-C300-23/24 F FAN FAIL
22TA783	NARIE-C300-23/24 F HIGH TEMP
29PA458	COOL WTR SUPPLY PRESS
29XA989	SUB 1J HYDROCARBON GAS
29XA990	SUB 1J SMOKE/FIRE DET
29XA906	TDC BBU TRBL 3REF RACKRM

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	18 of 24	

Tag Name	Description
29PA467	3 REF RACKROOM LOW PRESS
29XA901	EMERGENCY ALARM
29XA907	TDC FAN FAIL 3REF RACKRM
29XA991	SUB 1J LOSS OF BLDG PRES
28LA314	#2 REF FLARE LIQ BOOT S.
28LA315	#2 REF FLARE LIQ BOOT N.
27FI191	LED FEED PMP DISCHARGE
27LI334	FD FLASH DRUM WATER LEVL
27LC333	REBOILER COND LEVEL
27FI192	DEPROP REFLUX PUMP
27PI451	EAST FEED PUMP SEAL POT
27PI452	WEST FEED PUMP SEAL POT
27PI453	EAST REFLUXPMP SEAL POT
27PI454	WEST REFLUXPMP SEAL POT
27XA903	HCU-C300-25/26 F BAT CHRG
27XA904	HCU-C300-25/26 F P/S TOP ALM
27XA915	HCU-C300-25/26 F P/S BTM ALM
27UA918	HCU-C300-25/26 F FAN FAIL
27TA733	HCU-C300-25/26 F HIGH TEMP
22TI870	NORTH AREA RIE BUILDING TEMPERATURE
22XA659	22-LCP-105/22SPLC-0027 POWER SUPPLY FAILURE
22XA919	22-LCP-106/22SPLC-0026 POWER SUPPLY FAILURE
22LA333	NORTH AREA WATER INGRESS LEVEL
22HA9034	NORTH AREA RIE COMMON MANUAL PULL STATION ACTIVATED
22UA674	NORTH AREA RIE COMMON SMOKE DETECTOR FAULT
22UA673A	NORTH AREA RIE COMMON SMOKE/FIRE DETECTED
22UA675	NORTH AREA RIE COMMON GAS DETECTOR FAULT (LEL/H2S/H2)

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	19 of 24	

Tag Name	Description
22AA868	NORTH AREA RIE HIGH LEL
22AA868A	NORTH AREA RIE HIGH-HIGH LEL
22AA867	NORTH AREA RIE HIGH H2S
22AA867A	NORTH AREA RIE HIGH-HIGH H2S
22AA869	NORTH AREA RIE H2 ALARM
22AA849	NORTH AREA RIE O2 ALARM
22UA677	NORTH AREA RIE HVAC COMMON TROUBLE
22PA499	NORTH AREA RIE BUILDING PRESSURE - LOW
22XA668	NORTH AREA RIE HVAC UNIT 1 STATUS
22XA669	NORTH AREA RIE HVAC UNIT 2 STATUS
22XA670	NORTH AREA RIE HVAC SWAP DUE TO TROUBLE
29PI430	13 COOLING TOWER SUPPLY
29PI431	13 COOLING TOWER RETURN
29PI435	150 STEAM
29LI306	SOUTH LIQUID N2 TANK
29LI307	NORTH LIQUID N2 TANK
29PD463	3REF FUEL GAS FILTR DIFF
29PI405	FUEL GAS SUPPLY PSIG
29PI432	VAPOR RECOVERY
29PI433	INSTRUMENT AIR
29HS993	3REF EMERGENCY ALARM

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	20 of 24	

Appendix B. Serial Link Tag List

Not Applicable.

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	21 of 24	

Appendix C. AM Point Analysis

Not Applicable.

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	22 of 24	

Appendix D. BPCS and Triconex System Interface

Not Applicable.

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon, OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	23 of 24	

Appendix E. Existing Control System Schematic

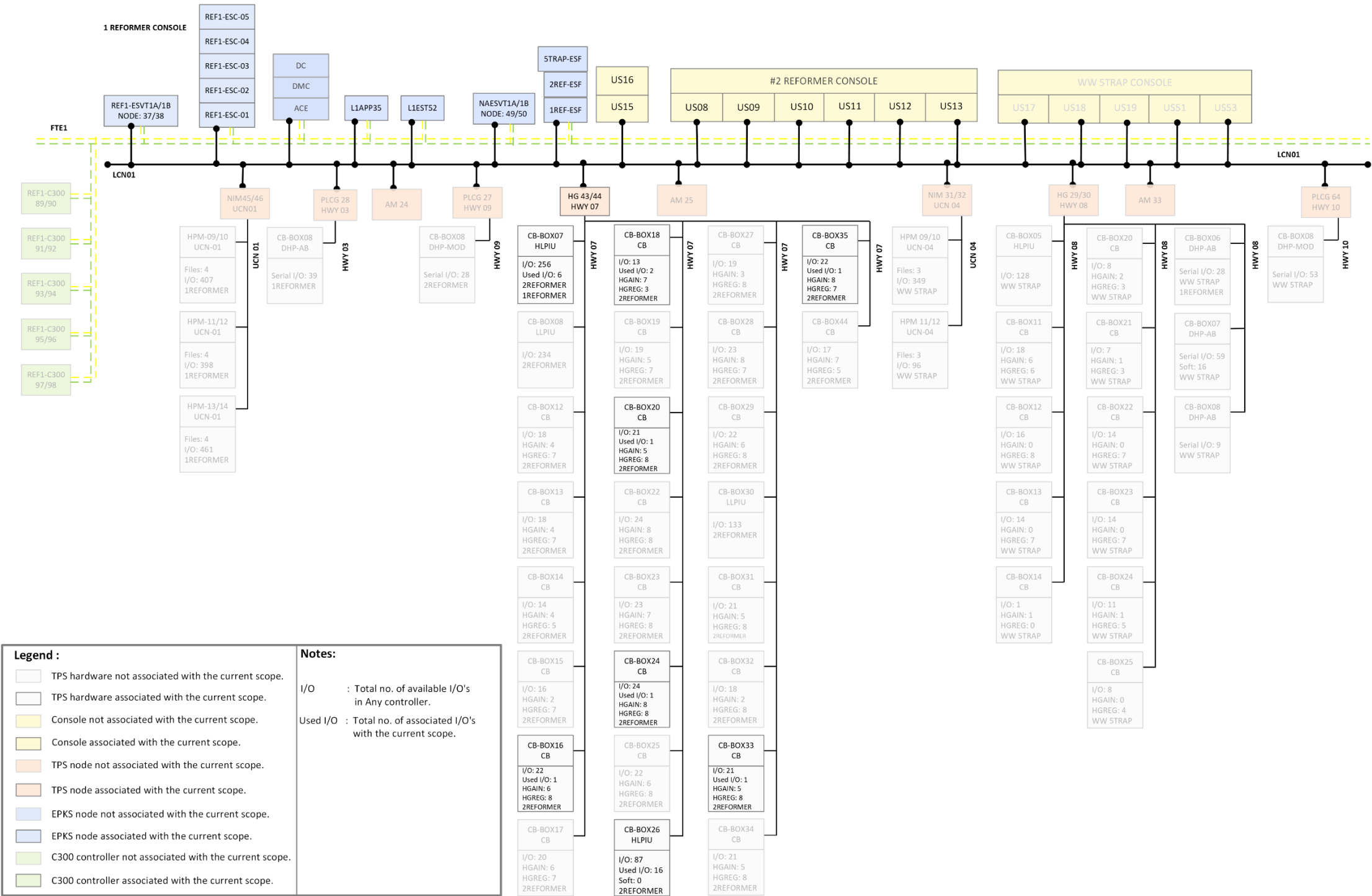


Figure E.1. Existing Control System Schematic

AMP	Title	LAR1C AMP BPCS Configuration Project Equipment Functional Design Specification – Carson General			By	Xenon, OptumPCP	
					Rev	1	
	Num	747002-LAR1C-AUT-FDS-0100	Project	747002	Date	14-Jul-23	
	Type	Functional Design Specification	Owner	Automation	Page	24 of 24	

Appendix F. Migrated Control System Schematic

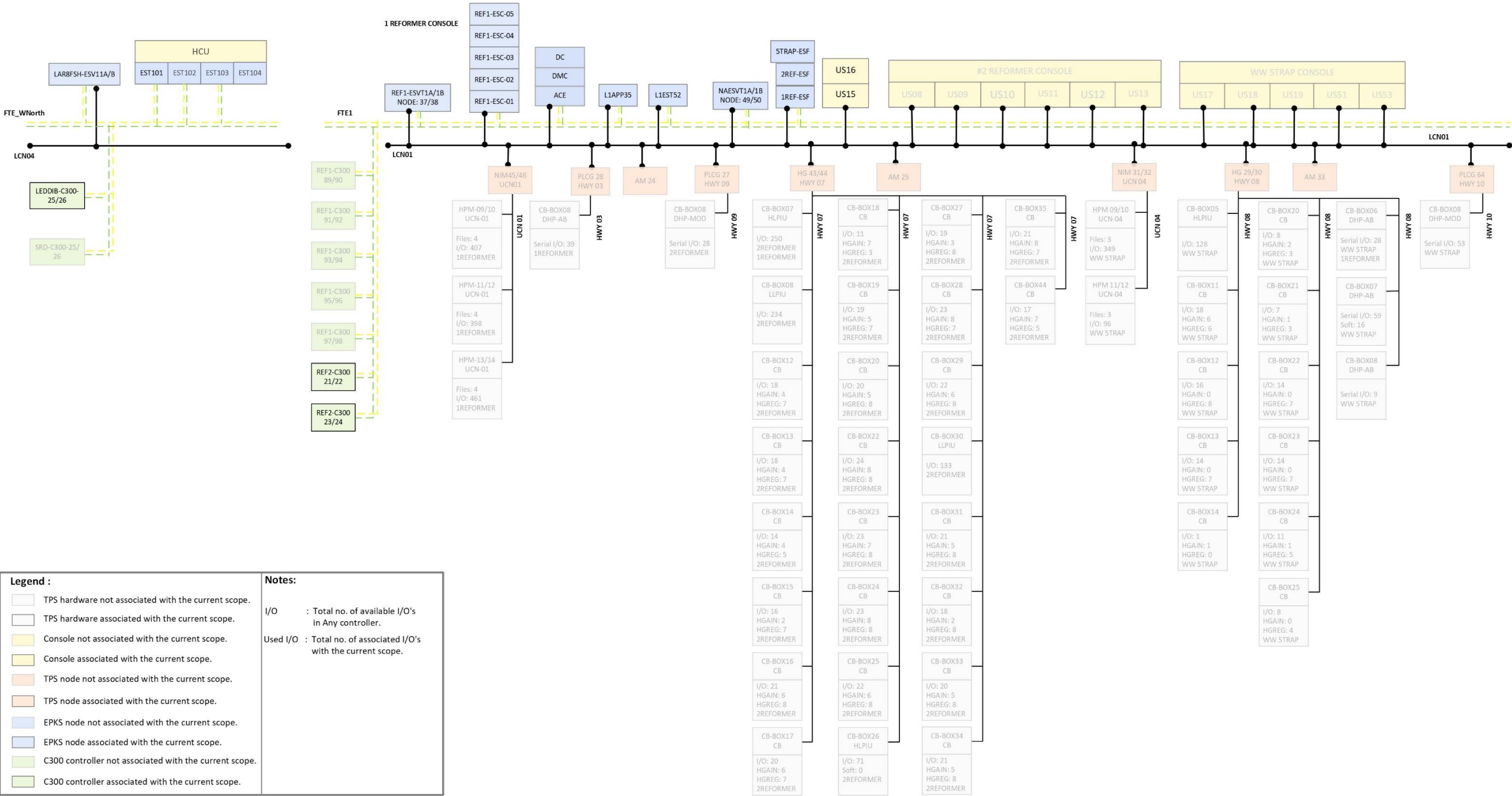


Figure F.1. Migrated Control System Schematic