

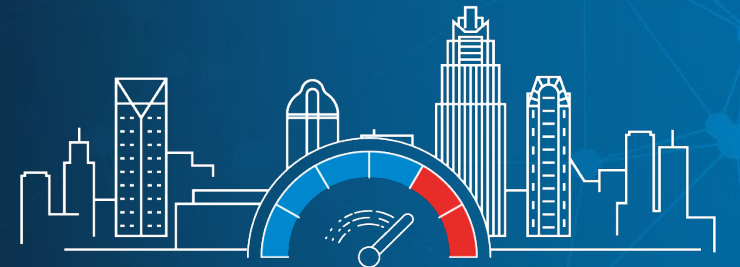


NS2022

ACCELERATING INNOVATION

Tridium Industrial

KraftHeinz



NS2022
ACCELERATING INNOVATION

Client's Goal

- Reduce Energy Consumption
- 15% Over 3 Years
- During Non-Production
- Zero Impact to Quality

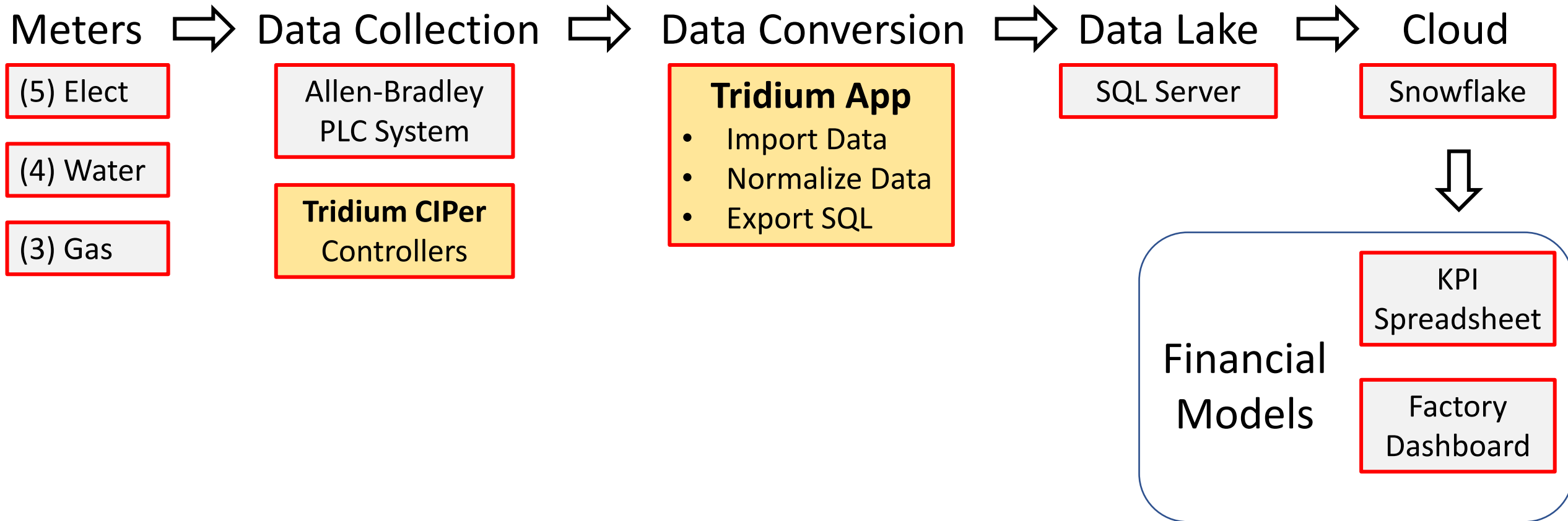
Challenges

- Utility Data Collection
- Normalize Energy Units
- Real-Time Information

Opportunity (Tridium Solution)

- Lower Cost vs PLC
- Quicker Implementation Time
- Utility Metering Library (we've done this)
- Integration with Allen-Bradley
- Export Feature (SQL and CSV)

System Overview



Outcome

- Awarded Top-10 Energy Consuming Factories
55 CIPer Controllers
10 Supervisors w/ SQL and A-B Drivers
- 13 Additional Factories in Design
- 90+ Factories Remaining
- Travel Rewards (Hilton Honors)

Takeaways

- Understand the Culture (PLC Environment)
- Cooperation (Integration Capability)
- Speed (Propose Faster Implementation)
- Experience (Decades of it)



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Utah's Olympic Park (UOP) Slide Track Renovations

- Originally built in 2002 for the Winter Olympic games
- Used for the bobsled, skeleton and luge events
- Potential bid for 2030 Olympic games
- Required various renovations and critical upgrades
- Chance to showcase the latest advancements in control technology



Utah's Olympic Park Slide Track



Agenda/Objectives

1. The capabilities of industrial grade hardware within Building Automation.
2. The versatility of Niagara in industrial applications.
3. A successful installation of industrial hardware utilizing the Niagara Framework.



The World of Industrial Automation

- **Industrial** – an economic activity involving a process; typically, of either production or reduction (but not always)
- **UL-508**
- More rigorous testing
- Critical applications
- Hazardous locations / explosion proof
- Conformal coatings
- Built-in surge protection
- Shock & vibration resistant
- EMC protection (noise filtering)
- UPS/Battery backup
- Redundancy

Solar Power



Wind Power



Automotive



Factory



Transportation Infrastructure



Water/Wastewater



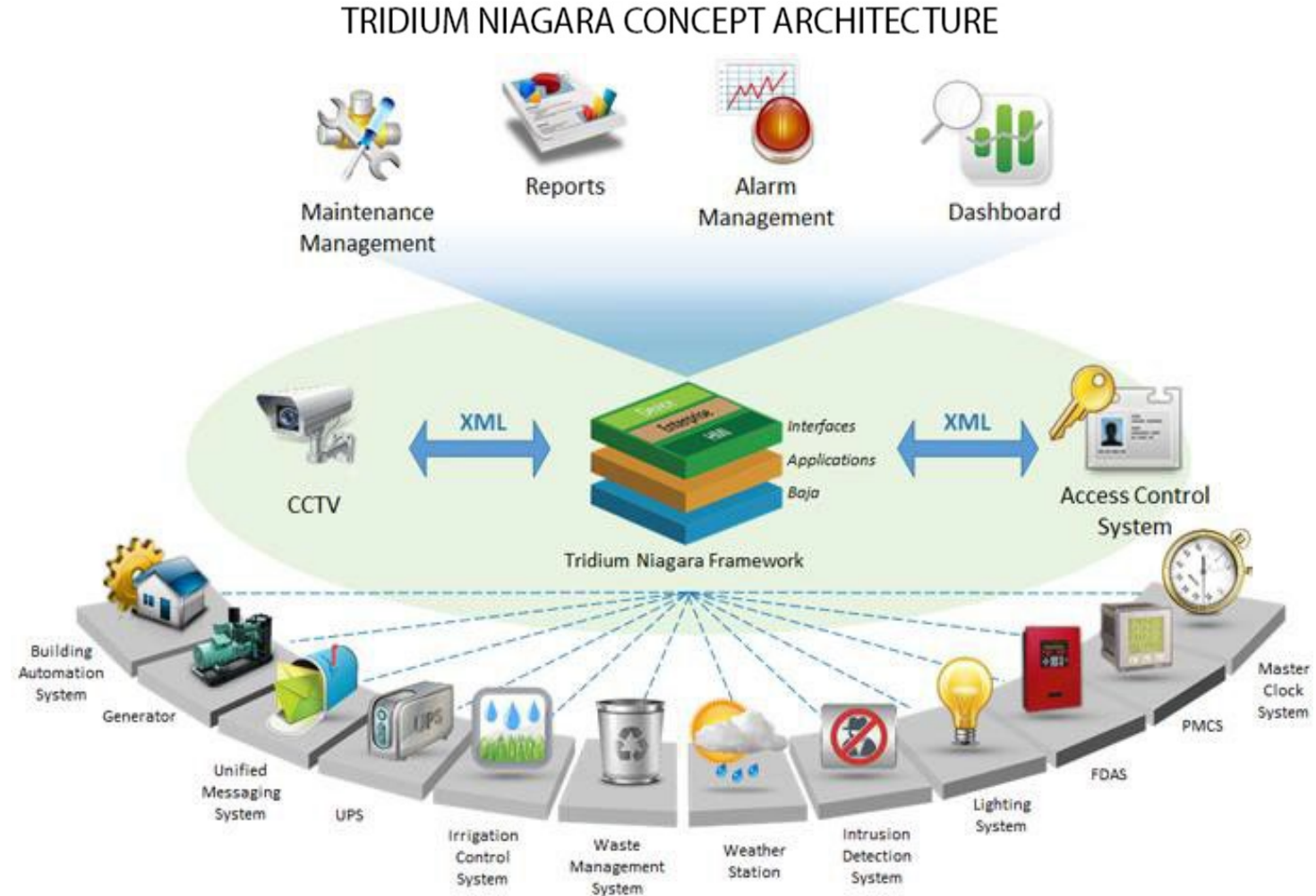
Oil & Gas



E-Mobility

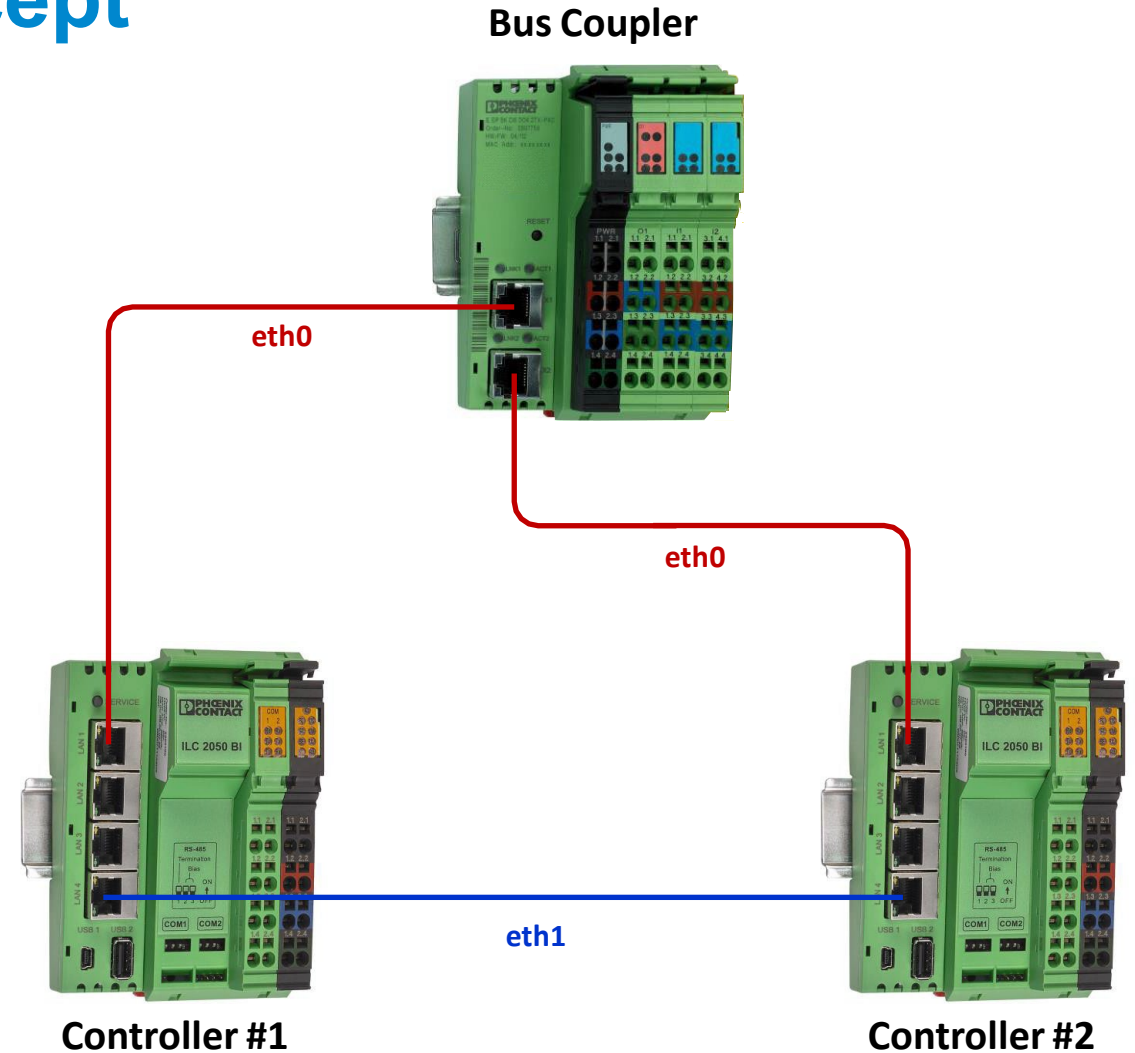
Limitless Possibilities – Bridging the Gap with Niagara

- The power of “**OPEN**”
 - Third party development
 - Communication– large variety of drivers and protocols
 - OPC UA, DALI, etc.
 - Integration of existing SCADA systems and PLCs
- Niagara Analytics
 - Real-time data collection, interpretation, diagnostics & alarming
- Security
 - Built-in, enterprise-grade cyber security
 - Video surveillance live streaming/recording
- Result → More compatibility!



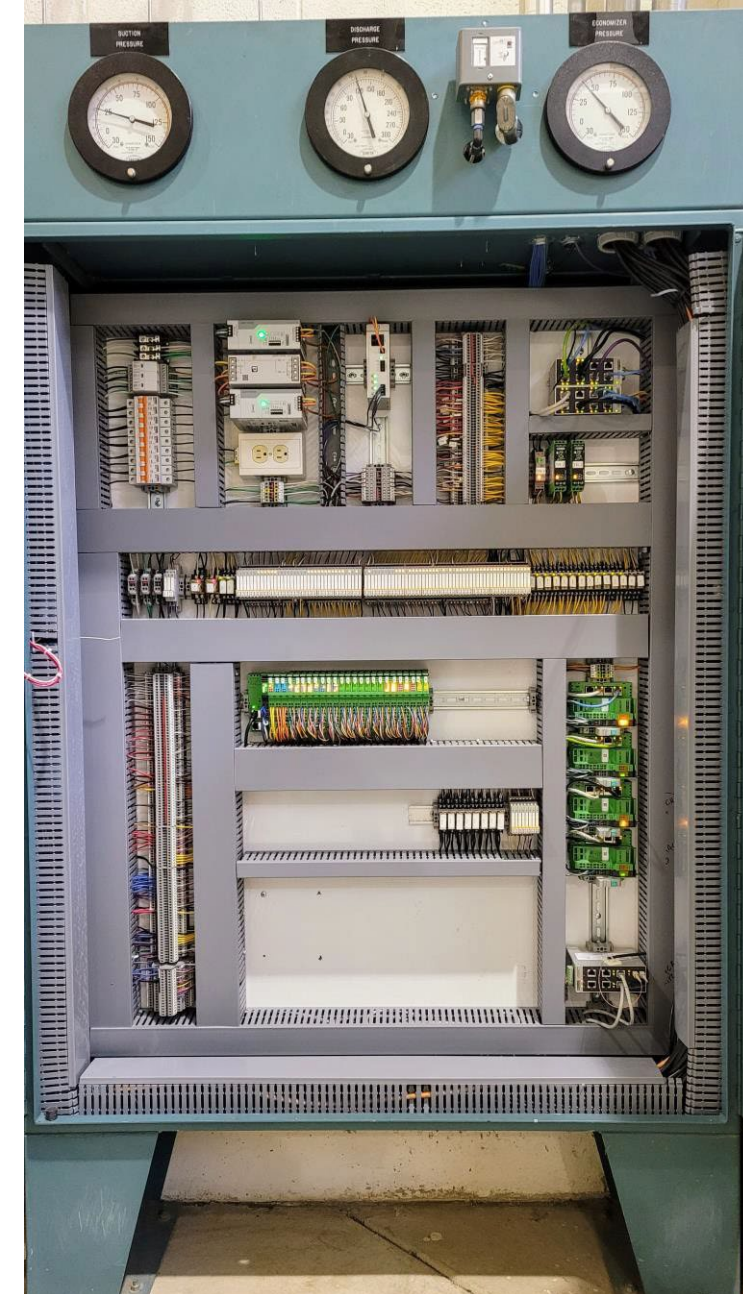
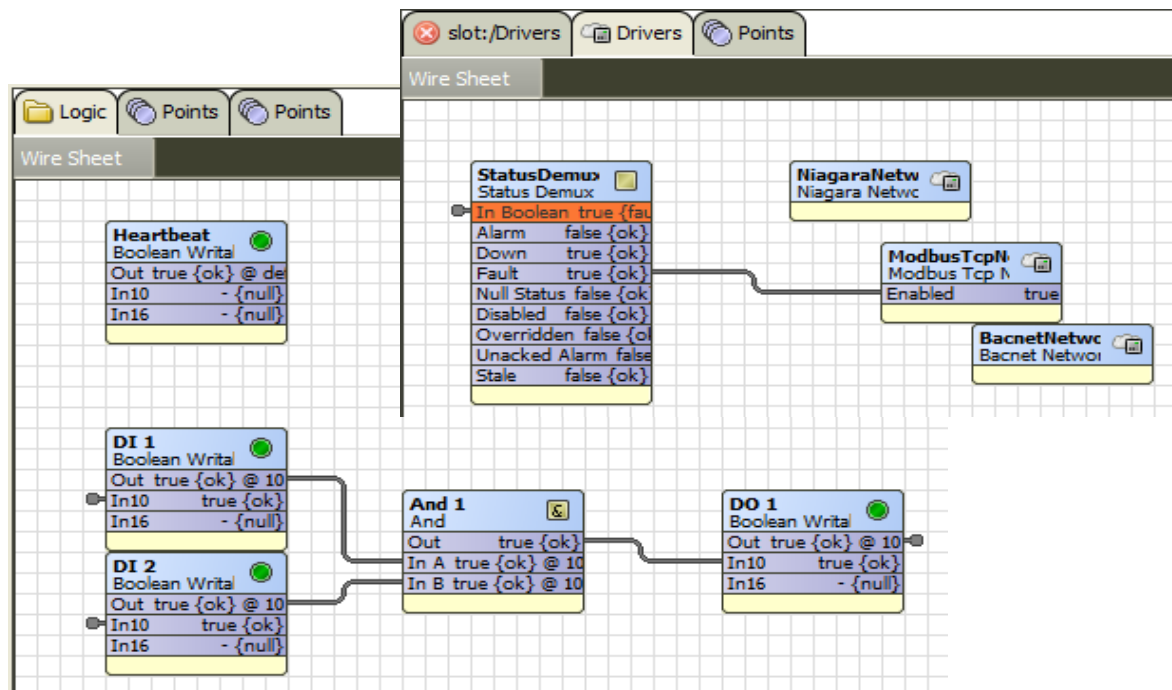
Backup Standby Station Concept

- Components:
 - **2 Niagara controllers**
 - Identical stations on each
 - One controller is active while other is on standby
 - Communicate with each other via BACnet
 - **1 Modbus bus coupler**
 - Functions as a Modbus device, but contains all I/O
 - Connected to each controller on an eth0 port



Backup Standby Station Concept

- Switchover Function:
 - Each controller has a BooleanWritable point referred to as its “heartbeat”
 - The “StatusDemux” function block is used to periodically check for the “heartbeat”
 - If active controller goes down, “heartbeat” will change to false and standby controller will take over





Outside Air Temp:	-4.8 °C
Engine Room Temp:	8.8 °C
System Enable	
Disabled	

E-Stop	
Status	Normal
Latched	Off
Reset	false

Ammonia 20K PPM Alarm	
Status	Off
Latched	Off
Reset	false

Upper Track Average Temperature:	-8.5 °C
MidTrack Average Temperature:	-8.1 °C
Lower Track Average Temperature:	-6.0 °C
All Tracks Average Temperature:	-7.8 °C

Econo Suction:	35.6 psi
LPR Suction:	34.2 psi
Discharge:	45.6 psi

Calculated Setpoint	Red
Setpoint	Green
Overridden	Blue

- CUP Overview
- Compressors
- Refrig Pumps
- System Safeties
- Track Overview
- Upper Track
- Upper Track Sum
- Mid Track
- Mid Track Sum
- Lower Track
- Lower Track Sum
- Plant Ammonia
- Upper Weather
- Mid Weather
- Lower Weather
- Alarms
- Users
- History
- Backups
- Logoff
- Save



Outside Air Temp:	-4.8 °C
Engine Room Temp:	8.8 °C
System Enable	
Disabled	

E-Stop	
Status	Normal
Latched	Off
Reset	false

Ammonia 20K PPM Alarm	
Status	Off
Latched	Off
Reset	false

Upper Track Average Temperature:	-8.5 °C
MidTrack Average Temperature:	-8.1 °C
Lower Track Average Temperature:	-6.1 °C
All Tracks Average Temperature:	-7.8 °C

Econo Suction:	35.5 psi
LPR Suction:	34.1 psi
Discharge:	45.4 psi

Calculated Setpoint
Setpoint
Override

- CUP Overview
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Upper Track Outside Air Temperature

Temp: -5.8 °C

Upper Track

Upper Track Average Temperature

Temp: -8.0 °C



Master Manual Evap Valve Setpoint 20.0

Master Manual Soleniod Override 0

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Refrigerant Pumps

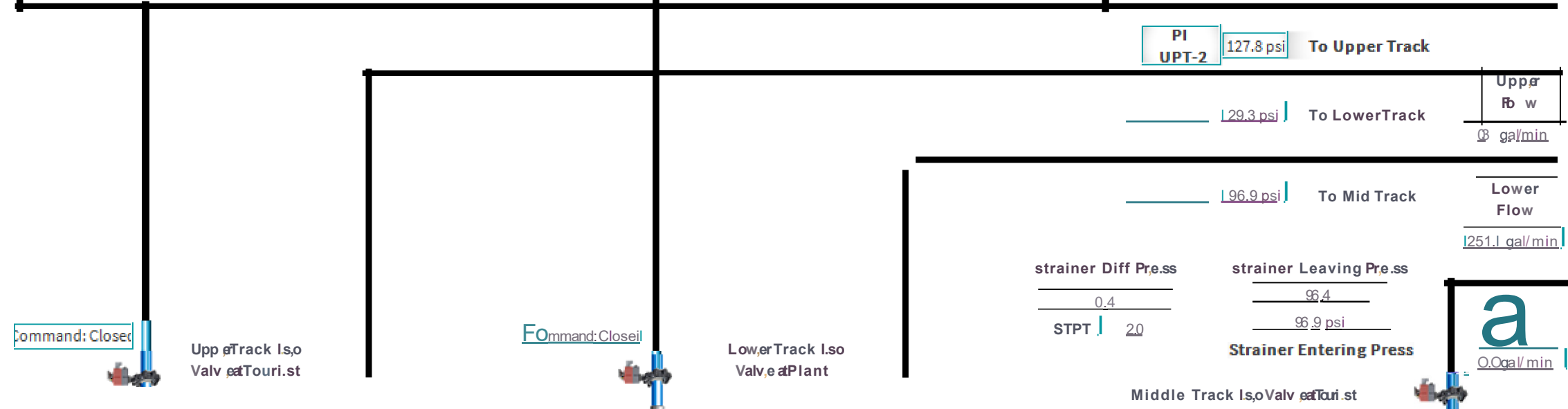
From LPRI Vessel

FCV
LPRI -1
status: Off
leommand: Closed

FCV
LPR2-1
status: On
leommand: Closed

From LPR2 vessel

Suction Valve at Tourist
Suction Open: On
Suction Closed: On



RTot: 3220.1 hr

PI RP6-2
31.5 psi

P6 Diff P
96.3 psi

Refrigerant Pump 6

status: On

Command: On

Speed: 0.0

Temp: -5.3 °C

Failure: false

Cmd Vs sts Alm: Off

Cavitation Alm: false

Maint Disable: Disable

Cavitation STPT: 52.0 psi

RTot: 3233.2 hr

PI RP5-2
31.5 psi

P5 Diff P
96.3 psi

Refrigerant Pump 5

status: On

Command: On

Speed: 0.0

Temp: -5.1 °C

Failure: false

Cmd Vs sts Alm: Off

Cavitation Alm: false

Maint Disable: Disable

Cavitation STPT: 52.0 psi

RTot: 3170.5 hr

PI RP2-2
31.6 psi

P2 Diff P
-2.2 psi

Refrigerant Pump 2

status: On

Command: Off

Speed: 0.0

Temp: -5.5 °C

Failure: false

Cmd Vs sts Alm: Off

Cavitation Alm: false

Maint Disable: Disable

Cavitation STPT: 30.0 psi

RTot: 3188.1 hr

PI RP1-2
31.5 psi

P1 Diff P
-2.2 psi

Refrigerant Pump 1

status: Off

Command: Off

Speed: 0.0

Temp: -4.5 °C

Failure: false

Cmd Vs sts Alm: Off

Cavitation Alm: false

Maint Disable: Disable

Cavitation STPT: 30.0 psi

RTot: 3375.6 hr

PI RP4-2
31.5 psi

P4 Diff P
65.3 psi

Refrigerant Pump 4

status: Off

Command: Off

Speed: 0.0

Temp: -4.7 °C

Failure: false

Cmd Vs sts Alm: Off

Cavitation Alm: false

Maint Disable: Disable

Cavitation STPT: 43.0 psi

RTot: 2570.4 hr

PI RP3-2
31.5 psi

P3 Diff P
65.3 psi

Refrigerant Pump 3

status: Off

Command: Off

Speed: 0.0

Temp: -5.2 °C

Failure: false

Cmd Vs sts Alm: Off

Cavitation Alm: false

Maint Disable: Disable

Cavitation STPT: 43.0 psi

strainer Diff Press: 0.4

STPT: 2.0

strainer Leaving Press: 96.4

strainer Entering Press: 96.9 psi

Flow: 251.1 gal/min

Upper Flow

Lower Flow

251.1 gal/min

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- Save
- Back

LPR Suction: **30.8 psi** | Actual | Suggested
 LPR Suction Setpoint: **38.8 psi** | **32.0 psi**

Compressor Summary

Disabled
 0.1psi
 High Pressure Cutout Alarm
 Latched | OU



Comp 1	
STS	Off
CAP	0.1 %
STPT	38.8 psig
Value	30.7 psig
Temp	52.5 °F
Super H	36.1 °F
Oil	48.9 °F
Oil Sep	65.3 °F

No Warning
No Shutdowns
C1 Status
 Limit Enabled
 Mode Remote Com
 SLIDE 0%

Comp 2	
STS	Off
CAP	0.1 %
STPT	38.8 psig
Value	31.2 psig
Temp	50.7 °F
Super H	32.9 °F
Oil	47.7 °F
Oil Sep	8.7 °F

No Warning
No Shutdowns
C2 Status
 Limit Enabled
 Mode Remote Com
 SLIDE 0%

Comp 3	
STS	Off
CAP	0.0 %
STPT	38.8 psig
Value	31.7 psig
Temp	47.3 °F
Super H	
Oil	
Oil Sep	

No Warning
No Shutdowns
C3 Status
 Limit Enabled
 Mode Remote Com
 SLIDE 0%

Comp 4	
STS	Off
CAP	0.3 %
STPT	38.8 psig
Value	31.1 psig
Temp	51 °F
Super H	33.7 °F
Oil	1 °F
Oil Sep	62.8 °F

No Warning
No Shutdowns
C4 Status
 Limit Enabled
 Mode Remote Com
 SLIDE 0%

LPR Suction Safety Setpoint: **0.0 psi**
 Econ Low Suction Safety Setpoint: **20.0 psi**

Number Of Compressors Required		Max Comp Stages	
0		Stage Uptime	15.0 min
Stage 1 Slide Viv:	0%	Stage Own Time	15.0 min
Stage 2 Slide Viv:	0%		
Stage 3 Slide Viv:	0%		
Stage 4 Slide Viv:	0%		

Right Click on Value to challenge Compressor Rank if Oil Loss Desired Rank is Set

Select Lead Lag1 Ranking1: **C 4 3 1 2**

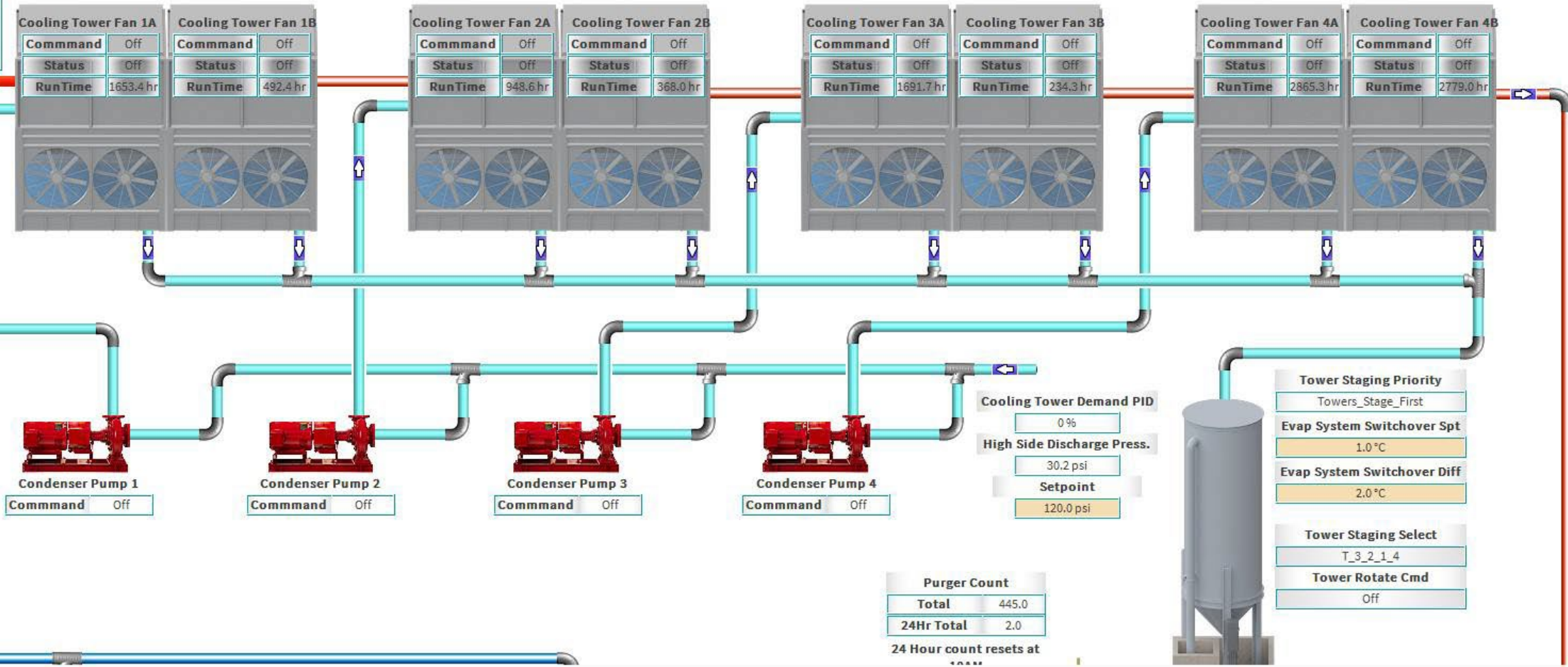
Right Click on Mode to change Compressor Rank. Right Click on Rotate Cmd Bottom Below

rotate Cmd: **false**

Outside Air Temp:	-10.0 °C	E-Stop		Ammonia 20K PPM Alarm		Upper Track Average Temperature:		-9.6 °C	Econo Suction:	31.3 psi	Color Key		
Engine Room Temp:	7.8 °C	Status	Normal	Status	Off	MidTrack Average Temperature:		-9.3 °C	LPR Suction:	30.8 psi	Calculated Setpoint	Alarm	Comm Loss
System Enable	Disabled	Latched	Off	Latched	Off	Lower Track Average Temperature:		-8.2 °C	Discharge:	30.2 psi	Setpoint	System Ok	Normal
		Reset	false	Reset	false	All Tracks Average Temperature:		-9.3 °C			Overridden	Point Fault	

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Cup Overview



Cooling Tower Fan 1A		Cooling Tower Fan 1B	
Command	Off	Command	Off
Status	Off	Status	Off
RunTime	1653.4 hr	RunTime	492.4 hr

Cooling Tower Fan 2A		Cooling Tower Fan 2B	
Command	Off	Command	Off
Status	Off	Status	Off
RunTime	948.6 hr	RunTime	368.0 hr

Cooling Tower Fan 3A		Cooling Tower Fan 3B	
Command	Off	Command	Off
Status	Off	Status	Off
RunTime	1691.7 hr	RunTime	234.3 hr

Cooling Tower Fan 4A		Cooling Tower Fan 4B	
Command	Off	Command	Off
Status	Off	Status	Off
RunTime	2865.3 hr	RunTime	2779.0 hr

Condenser Pump 1	
Command	Off

Condenser Pump 2	
Command	Off

Condenser Pump 3	
Command	Off

Condenser Pump 4	
Command	Off

Cooling Tower Demand PID

0%

High Side Discharge Press.

30.2 psi

Setpoint

120.0 psi

Purger Count	
Total	445.0
24Hr Total	2.0
24 Hour count resets at 00:00	

Tower Staging Priority

Towers_Stage_First

Evap System Switchover Spt

1.0 °C

Evap System Switchover Diff

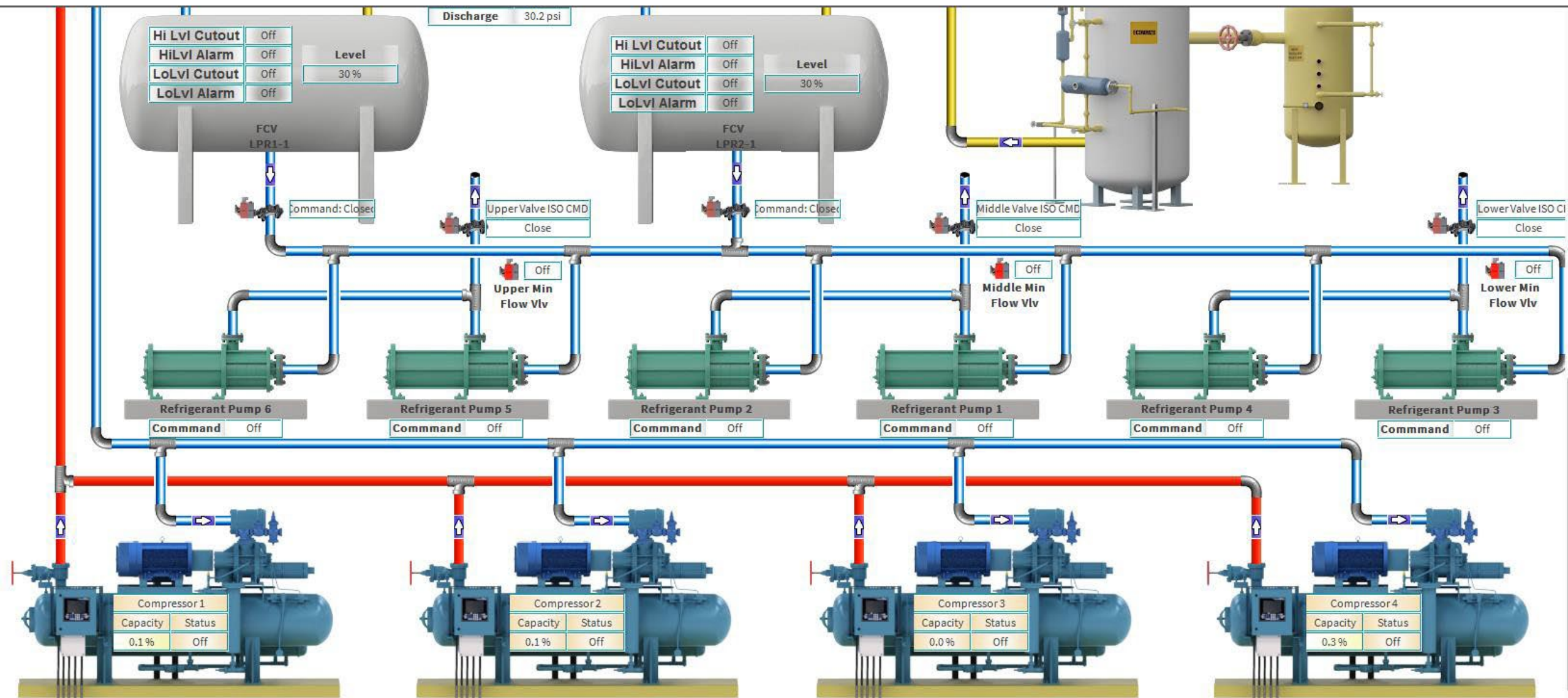
2.0 °C

Tower Staging Select

T_3_2_1_4

Tower Rotate Cmd

Off



Outside Air Temp: -4.8°C	E-stop	Am monia 20K PPM Alarm	UpperTrack Average Temperature - .asc
Engine Room Temp: 8.7°C	status Normal	status ON	MidTrack Average Temperature -a.1°C
System Enable	Latched Off	Latched Off	LowerTrack Average Temperature -6.0°C
Disabled	Reset fail	Reset full	All Tracks Average Temperature -7.8°C

Econ o Suction: 35.6 psi	ColorKey	Comm Loss
LPR Suction: 34.2 psi	Calculated Setpoint Alarm	Normal
Discharge: 45.4 psi	Setpoint System Ok	
	Overridden Point Fault	

CUP Overview	Master Manual Evap Valve Setpoint 20.0	Master Manual Solenoid Override 0	MidTrack Average Temperature Temp: -a.1°C	Supply Pressure 21	Command : Closed
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Mid Track Zone Valves

	Section 201	Section 201B	Section 7.1	Section 7.2	Section 7.3	Section 2.0	Section 9.1	Section 92	Section .301	Section .301B
Compressors	Temp: -a.c	Temp: 0.0°C	Temp: -11.c	Temp: -17.9°C	Temp: -7.6°C	Temp: -7.1°C	Temp: -7.6°C	Temp: -9.1°C	Temp: -7.4°C	status: 20%
Refrig Pumps	Pressure: 33.8psi	Lower status: 50%	Pressure: 33.8psi	Pressure: 33.8psi	Pressure: 34.0psi	Pressure: 33.8psi	Pressure: 33.9psi	Pressure: 33.8psi	Pressure: 33.9psi	Cmd: 20%
System Safeties	Lower status: 00%	Lower Cmd: 50%	Lower status: 40%	Lower status: 40%	Lower status: 40%	Lower status: 30%	Lower status: 35%	Lower status: 35%	Lower status: 2.5%	Low Sol Cmd: Closed
Track Overview	Lower Cmd: 00%	Low Sol Cmd: Clo=	Lower Cmd: 40%	Lower Cmd: 40%	Lower Cmd: 40%	Lower Cmd: 3-0%	Lower Cmd: 35%	Lower Cmd: 35%	Lower Cmd: 2.5%	
Upper Track	Low Sol Cmd: Closet		OW Sol Cmd: Closet	OW Sol Cmd: Closet	Low Sol Cmd: Closet	OW Sol Cmd: Closet	OW Sol Cmd: Closet	OW Sol Cmd: Closet		
Upper Track Sum			Upper status: i85%	Upper status: as%	Upper status: 45%	Upper status: 3-0%	Upper status: 35%	Upper status: 35%		
Mid Track			Upper Cmd: i85%	Upper Cmd: i85%	Upper Cmd: 45%	Upper Cmd: 3-0%	Upper Cmd: 35%	Upper Cmd: 35%		
Mid Track Sum			µ p Sol Cmd: Closed	µ p Sol Cmd: Closed	µ p Sol Cmd: Closed	µ p Sol Cmd: Closed	µ p Sol Cmd: Closed	µ p Sol Cmd: Closed		
Lower Track	Section 1:0.0	Section 11.1	Section 11.2	Section 11.3	Section 12.0	Section 13.1	Section 132	Section 14.0	Section 15.1	Section 15,2
Lower Track Sum	Temp: -8.2°C	Temp: -7.7°C	Temp: -a.4°C	Temp: -9.8°C	Temp: -6.1°C	Temp: -9.4°C	Temp: -9.2°C	Temp: -5.2°C	Temp: -5.0°C	Temp: -9.2°C
Plant Ammonia	Upper status: 20%	Pressure: 33.8psi	Pressure: 33.9psi	Pressure: 35.2psi	Pressure: 38.4psi	Pressure: 41.4psi	Pressure: 43.8psi	Pressure: 46.0psi	Pressure: 47.5psi	Pressure: 50.5psi
Upper Weather	Upper Cmd: 20%	Lower status: 22%	Lower status: 35%	Lower status: 35%	Lower status: 45%	Lower status: 35%	Lower status: 3a%	Lower sts: 35%	Lower status: 22%	Lower status: 33%
Mid Weather	µ p Sol Cmd: Closed	Lower Cmd: 22%	Lower Cmd: 35%	Lower Cmd: 35%	Lower Cmd: 45%	Lower Cmd: 35%	Lower Cmd: 3B%	Lower Cmd: 35%	Lower Cmd: 22%	Lower Cmd: 33%
Lower Weather		OW Sol Cmd: Closet	Low Sol Cmd: Closet	OW Sol Cmd: Closet	Low Sol Cmd: Closet	OW Sol Cmd: Closet	Low Sol Cmd: Closet	Low Sol Cmd: Closet	Low Sol Cmd: Closet	Upper status: 33%
Alarms		Upper status: 60%	Upper status: 70%	Upper status: 70%	Upper status: 25%	Upper status: 2,8%	Upper status: 43%	Up S status: 22%	Upper status: 22%	Upper Cmd: 33%
Users		Upper Cmd: 60%	Upper Cmd: 70%	Upper Cmd: 70%	Upper Cmd: 2.5%	Upper Cmd: 2,8%	Upper Cmd: 43%	Up S Cmd: 22%	Upper Cmd: 22%	OW Sol Cmd: Closet
History		µ p Sol Cmd: Closed	µ p Sol Cmd: Closed	µ p Sol Cmd: Closed	µ p Sol Cmd: Closed	µ p Sol Cmd: Closed	µ p Sol Cmd: Closed	pSSol Cmd: Closet	µ p Sol Cmd: Closed	µ p Sol Cmd: Closed
Backups								UpN status: 22%		
Logoff	Section 16.1	Section 16.2	Section 17.1	Section 17.2	Section LR.0			Up N Cmd: 22%		
Save	Temp: -7.1°C	Temp: -5.6°C	Temp: -6.1°C	Temp: -1.c	Temp: -6.8°C			pNSol Cmd: Close		
	Pressure: 51.9psi	Pressure: 53.4psi	Pressure: 53.7psi	Pressure: 54.1psi	Pressure: 56.4psi					
	Lower status: 23%	Lower status: 27%	Lower status: 23%	Lower status: 25%	Lower status: 2.5%					
	Lower Cmd: 23%	Lower Cmd: 27%	Lower Cmd: 23%	Lower Cmd: 25%	Lower Cmd: 25%					
	Low Sol Cmd: Closet	OW Sol Cmd: Closet	OW Sol Cmd: Closet	OW Sol Cmd: Closet	µ p Sol Cmd: Closed					
	Upper status: 2.3%	Upper status: 27%	Upper status: 2.5%	Upper status: 2.5%						
	Upper Cmd: 23%	Upper Cmd: 27%	Upper Cmd: 2.5%	Upper Cmd: 25%						

CURVE 8

VIRAGE 8

OLYMPIC PARK MID TRACK BOBSLED 75426

15.1





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CHARLOTTE, NC | APRIL 4-6

Thank you