

CONTROL PHILOSOPHY

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CONTROL PHILOSOPHY

1. PROCESS DESCRIPTION AND OPERATIONAL OVERVIEW

It is the intent of the design team that the Booster Pumphouse will be controlled utilizing a Programmable Logic Controller (PLC). The overall booster station process is depicted on the Process and Instrumentation Diagrams, I3 and I4. Generally, the process will consist of:

- Utilizing variable speed pump(s) to raise the available water pressure to satisfy the Plateau Subdivision demands,
- Utilizing a large capacity diesel driven pump to provide design fire flows at hydrants within the Plateau Subdivision,
- Utilizing small constant speed circulation pump(s) to ensure constant circulation of water within the Plateau Subdivision as a freeze protection method, and
- Adding heat to the recirculated water as a freeze protection method.

It is intended that the Booster Pumphouse be capable of operating on a continuous automatic basis, under control of the PLC. Various conditions of alarms will be detected and reported to the PLC, some will shut the pumps down and others will turn on back up equipment. This control philosophy outlines all alarms including set points, normal operation, abnormal operation and manual controls.

1.1 Future Additions

The City of Iqaluit intends to eventually abandon the Trigram Reheat facility and incorporate the reheat and recirculation functions necessary for Lower Base into the Plateau Booster Station. Consequently space has been provided, and this control philosophy reflects, the future addition of:

- Boiler,
- Heat exchanger,
- Recirculation pump(s), and
- Fire Pump.

2. STANDARD CONTROL LOGIC

Unless stated otherwise in this document the following general device control strategies shall apply.

2.1 Process Pumps

Pumps shall operate in the following manner:

Pumps are equipped with HAND-OFF-AUTO (HOA) switches located at the motor starters. When in HAND the Plant Operator can control the pumps manually regardless of the process conditions. In the OFF position the pump will not operate. In the Auto position the PLC controls when the pumps turn on and off.

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Pump Status signals:

- Run Enable (MN)
- Pump Status (YI)
- Auto Mode (YS).

Pump Alarm signals:

- Pump Fault (YA).

2.2 Duty / Standby systems

Duty status is assigned at the operator HMI. Where a pump is part of a Duty/Standby pair then the following shall apply:

Where a duty pump enters a fault condition the device shall be stopped and alarmed locally accordingly. The standby device shall then be called to run. There shall be no duty changeover initiated. When the duty device's fault is cleared and its status is available then the standby pump shall be stopped and the duty pump again called to run.

3. PLATEAU TREATED WATER PUMPING FOR DISTRIBUTION

3.1 Normal Operation

Water is supplied to the Booster Station by a 300 mm HDPE watermain originating in new AV 600 on Apex Road. This main is freeze protected by a normally closed valve in AV 600 which ensures constant flow in the 300 mm mains to and from the booster station.

Jockey Pumps 303 and 304 are identical variable speed pumps, which operate in a duty/standby mode to handle system demands under low flow conditions. The normal mode of operation is to maintain the pressure at PI-310 to a fixed set-point of 138 PSI. The Duty pump (either P-303 or P-304 as selected by the Operator) will run with the PLC modulating its output to the VFD control to maintain 138 PSI. When the PLC detects flow at FE-311 exceeding 456 lpm (7.6 lps) the Supply Pump will be started and the Jockey pump stopped.

Supply Pumps 301 and 302 are identical variable speed pumps, which operate in a duty/standby mode. The normal mode of operation is to maintain the pressure at PI-310 to a fixed set-point of 138 PSI. The Duty pump (either P-301 or P-302 as selected by the Operator) will run with the PLC modulating its output to the VFD control to maintain 138 PSI. When the PLC detects flow falling below 445 lpm (7.4 lps) the Jockey Pump will be started, provided the Supply Pump minimum run timer is satisfied (adjustable 10 to 20 minutes), and the Supply Pump stopped.

Should the pressure at PI-310 drop below 128 PSI for a fixed period (0 to 99 mins) the Fire Pump P-305 will start and the pump will run for a minimum period (0 to 99 mins). Pumps P-301 through P-304 will be shut down when P305 is in operation.

FE-311 will record the jockey and supply pump flows, FE-312 will record the fire pump flow.

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1 Normal Equipment Status

Equipment Tag #	Description	Status
P-301	Supply Pump 1	Auto at HS-301
P-302	Supply Pump 2	Auto at HS-302
P-303	Jockey Pump 1	Auto at HS-303
P-304	Jockey Pump 2	Auto at HS-304

3.2 Abnormal Operation

Abnormal Condition	Action	Alarm	Annunciation	
			Local	Dial out
Pump P-301 fails	Enable P-302	Supply Pump 1 failed	Yes	No
Pump P-302 fails	Enable P-301	Supply Pump 2 failed	Yes	No
Pump P-303 fails	Enable P-304	Jockey Pump 1 failed	Yes	No
Pump P-304 fails	Enable P-303	Jockey Pump 2 failed	Yes	No
Pump P-301 and P-302 fail	Start Fire Pump P-303 when Supply Pump required	Supply Pumps 1 and 2 failed	Yes	Yes
Pump P-303 and P-304 fail	Do not stop Supply Pump below 7.4 lps	Jockey Pumps 3 and 4 failed	Yes	Yes
PAL-310	No Action	Low Supply Pressure	Yes	Yes
PAH-310	No Action	High Supply Pressure	Yes	Yes

4. PLATEAU FIRE PUMP OPERATION

4.1 Normal Operation

The supply pumps (P-301 and P-302) and Jockey Pumps (P-303 and P-304) will run on a Duty and Standby basis. The Operator will select the status of the pumps on a rotational basis. If the pump Duty fails the Standby will run. If a low pressure is recorded on PI-310 the Fire pump will operate for a fixed time (0 to 99mins) and the Duty pump will stop. When the fire pump stops the Duty pump will resume operation. If, after a fixed time (0 to 99mins), the outlet pressure remains low, the fire pump will restart.

Pump Control Valve 306 acts to ease the Fire Pump P-305 on and off line and to provide pressure relief on the Fire Pump discharge. After Fire Pump P-305 receives a start signal and has run for a set period (adjustable 0-60 seconds) the solenoid valve SV-306 on PCV-306 is energized and PCV-306 starts to close. PCV 306 will close to the point that the pump discharge pressure is 144 psi and it will then, under pilot valve control, modulate to maintain the 144 psi setpoint. Should pressure fall below 144 psi then PCV-306 will completely close.

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When the P-305 minimum run timer expires the solenoid valve SV- 303 will be de-energized, allowing the PCV-306 to slowly move to fully open. At the fully open position a shaft on the valve will trip microswitch ZS)-306 which signals P-305 to stop.

.1 Normal Equipment Status

Equipment Tag #	Description	Status
P-305	Fire Pump	Auto
PCV-306	Pump Control Valve	Auto
SV-306	Solenoid Valve	Auto

4.2 Abnormal Operation

Abnormal Condition	Action	Alarm	Annunciation	
			Local	Dial out
P-305 Fails	No Action	Fire Pump Failed	Yes	Yes

5. PLATEAU RETURN WATER PUMPING AND HEATING

5.1 Normal Operation

Circulation Pumps P-310 and P-311 are identical constraint speed pumps, which operate in a duty/standby mode. The Duty pump (either P-310 or P-311 as selected by the Operator) will run continuously.

FE-310 will record return flow.

Return water quality will be measured by AE 312, AE 313 and TE 314 for turbidity, chlorine and temperature respectively.

The output of either P-310 or P-311 is directed through Heat Exchanger HE-300. Temperature sensor TE-325 on the outgoing waterline controls the position of modulating control valve CV-325, regulating the amount of glycol getting to HE-300 and hence maintaining the outgoing water at the temperature setpoint.

.1 Normal Equipment Status

Equipment Tag #	Description	Status
P-310	Return Pump 1	Auto at HS-310
P-311	Return Pump 2	Auto at HS-311

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5.2 Abnormal Operation

Abnormal Condition	Action	Alarm	Annunciation	
			Local	Dial out
Pump P-310 fails	Start P-311	Return Pump 1 failed	Yes	No
Pump P-311 fails	Start P-310	Return Pump 2 failed	Yes	No
Pump P-311 and P-312 fail	No Action	Return Pumps 1 and 2 failed	Yes	Yes
FAL-310(<50L/min)	No Action	Low Return Flow	Yes	Yes
AAH-313	No Action	High Return Chlorine	Yes	Yes
AAL-313	No Action	Low Return Chlorine	Yes	Yes
AAH-312	No Action	High Return Turbidity	Yes	Yes
TAL-314	No Action	Low Return Temperature	Yes	Yes

6. LOWER BASE RECIRCULATION (FUTURE)

6.1 Normal Operation

The booster pumphouse is configured such that freeze protection circulation and water heating for the Lower Base Area can be added in the future.

Circulation Pumps P-410 and P-411 are identical constraint speed pumps, which operate in a duty/standby mode. The Duty pump (either P-410 or P-411 as selected by the Operator) will run continuously.

FE-410 will record the return flow.

Return water quality will be measured by AE 412, AE 413 and TE 414 for turbidity, chlorine and temperature respectively.

The output of either P-410 or P-411 is directed through Heat Exchanger HE-400. Temperature sensor TE-415 on the outgoing 300 mm waterline controls the position of modulating control valve CV-425, regulating the amount of glycol getting to HE-400 and hence maintaining the outgoing water at the temperature setpoint.

1 Normal Equipment Status

Equipment Tag #	Description	Status
P-410	Return Pump 1	Auto at HS-410
P-411	Return Pump 2	Auto at HS-411

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6.2 Abnormal Operation

Abnormal Condition	Action	Alarm	Annunciation	
			Local	Dial out
Pump P-410 fails	Start P-411	Return Pump 1 failed	Yes	No
Pump P-411 fails	Start P-410	Return Pump 2 failed	Yes	No
Pump P-411 and P-412 fail	No Action	Return Pumps 1 and 2 failed	Yes	Yes
FAL-410(<50L/min)	No Action	Low Return Flow	Yes	Yes
AAH-413	No Action	High Return Chlorine	Yes	Yes
AAL-413	No Action	Low Return Chlorine	Yes	Yes
AAH-412	No Action	High Return Turbidity	Yes	Yes
TAL-414	No Action	Low Return Temperature	Yes	Yes

7. WATER RECOVERY

7.1 Normal Operation

Water from analytical instruments (AIT 312 turbidity, AIT-313 Chlorine, AIT 412 turbidity and AIT 414 chlorine) is directed to a storage tank. A level switch in the tank starts and stops positive displacement pump P-300 which directs the recovered water into the Plateau distribution header. In the event of a failure of Pump P-300 the tank will overflow to the sanitary sewer.

.1 Normal Equipment Status

Equipment Tag #	Description	Status
P-300	Recovery Pump 1	Auto at HS-300

7.2 Abnormal Operation

Abnormal Condition	Action	Alarm	Annunciation	
			Local	Dial out
Pump P-300 fails	None	None	No	No

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8. LOWER BASE FIRE PUMP OPERATION (FUTURE)

8.1 Normal Operation

Normal supply to Lower Base is by gravity from the Water Storage Reservoir(s). If a low pressure is recorded on PIT-400 the Fire pump will operate for a fixed time (0 to 99mins). If, after a fixed time (0 to 99mins) with the fire pump off, the pressure remains low, the fire pump will restart.

Pump Control Valve 402 acts to ease the Fire Pump P- 401 on and off line and to provide pressure relief on the Fire Pump discharge. After Fire Pump P-401 receives a start signal and has run for a set period (0-60 seconds) a Solenoid Valve SV-402 on PCV 402 is energized and it starts to close. PCV 402 will close to the point that the pump discharge pressure is ??? psi and it will then, under pilot valve control, modulate to maintain the ??? psi setpoint. Should pressure fall below ??? psi then PCV 402 will completely close.

Motorized valve V-400 is normally closed to prevent water from flowing directly from the 300 mm Lower Base supply main to the 200 mm Lower Base return main. This valve is opened when Fire Pump P-401 is operating and closed when P-401 is not in use.

When the P-401 minimum run timer expires Solenoid Valve SV-402 will be de-energized, allowing the valve to slowly move to fully open. At the fully open position a shaft on the valve will trip microswitch ZSO-402 which signals P-401 to stop.

.1 Normal Equipment Status

Equipment Tag #	Description	Status
P-401	Fire Pump	Auto
PCV-402	Pump Control Valve	Auto
SV-402	Solenoid Valve	Auto

8.2 Abnormal Operation

Abnormal Condition	Action	Alarm	Annunciation	
			Local	Dial out
P-401 Fails	No Action	Fire Pump Failed	Yes	Yes

9. GENERAL ALARM HANDLING

The following table lists the facilities alarms, related set points, forms of annunciation, and subsequent interlocks or actions. All alarms will be stored in an alarm log file consisting of the 200 most recent alarms. The alarm log file will include the date, time, alarm descriptor info, and the acknowledgement date and time.

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9.1 Plateau Booster Facility Alarms

Alarm No.	Description	Tripped By	Set Point	Annunciation	
				Local	Dial Out
	Building Intrusion				Dial Out
	Building Low Temperature				Dial Out
	Fire Alarm Trouble				Dial Out
	Fire Alarm Sounded				Dial Out
	FUEL SYSTEM				
	Exterior Tank Warning Low Level	LSL 101		Local	
	Exterior Tank Low Level	LSLL 101			Dial Out
	Day Tank High Level	LSHH 102			Dial Out
	Day Tank Low Level	LSLL 102			Dial Out
	PLATEAU DIESEL				
	Plateau Diesel Pump Fault				Dial Out
	Plateau Diesel Pump Not In Auto			Local	
	Plateau Diesel Pump Battery Charger Fault				Dial Out
	DUTY PUMPS P-301, P-302, P-303 and P-304				
	Pump Not In Auto			Local	
	Pump Fault			Local	
	Pump Alarm (PLC Generated)			Local	
	RECIRCULATION PUMPS				
	Recirculation Pump P-310 Not in Auto			Local	
	Recirculation Pump P-310 Fault			Local	
	Recirculation Pump P-311 Not in Auto			Local	
	Recirculation Pump P-311 Fault			Local	
	ANYLITICAL ALARMS				
	Inflow Low Pressure	PIT-400			Dial Out
	Outflow High Flow	FE-311			Dial Out
	Outflow Low Flow	FE-311			Dial Out
	Outflow High Pressure	PIT-310			Dial Out

CONTROL PHILOSOPHY

Alarm No.	Description	Tripped By	Set Point	Annunciation	
				Local	Dial Out
	Outflow Low Pressure	PIT-310			Dial Out
	Return Low Flow	FE-310			Dial Out
	Return High Turbidity	AIT-312		Local	
	Return High Chlorine	AIT-313		Local	
	Return Low Chlorine	AIT-313		Local	
	Return Low Temperature	TIT-314			Dial Out
	STANDBY GENERATOR				
	Transfer Switch Not In Auto			Local	
	Generator Not In Auto			Local	
	Generator Battery Charger Fault			Local	
	Generator Fault				Dial Out
	Power Fail			Local	
	PLC				
	PLC Fault				Dial Out
	UPS Fault			Local	
	BOILER SYSTEM				
	Glycol Low Temperature				Dial Out
	Glycol Low Flow				Dial Out

9.2 Lower Base Recirculation Alarms (Future)

Alarm No.	Description	Tripped By	Set Point	Annunciation	
				Local	Dial Out
	LOWER BASE DIESEL				
	Lower Base Diesel Fault				Dial Out
	Lower Base Diesel Not In Auto			Local	
	Lower Base Diesel Battery Charger Fault				Dial Out
	LOWER BASE RECIRCULATION				
	Recirculation Pump P-410 Not In Auto			Local	
	Recirculation Pump P-410 Fault			Local	

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Alarm No.	Description	Tripped By	Set Point	Annunciation	
				Local	Dial Out
	Recirculation Pump P-411 Not In Auto			Local	
	Recirculation Pump P-411 Fault			Local	
	LOWER BASE ANYLITICAL ALARMS				
	Return Low Flow	FE-410			Dial Out
	Return High Turbidity	AIT-412		Local	
	Return High Chlorine	AIT-413		Local	
	Return Low Chlorine	AIT-413		Local	
	Return Low Temperature	TIT-414			Dial Out

10. UTILITY POWER FAILURE

The PLC will continue to operate during a power failure, drawing it's power from the UPS system.

The control system will ensure that, in the event of a utility power failure, the generator will be monitored. Once the generator is available each motor load will be re-started in a sequential fashion and motor load shall be assigned to the stand-by source in order of priority.

PLC I/O INDEX

1. GENERAL

1.1 References - General

- .1 Refer to Section 17010.

1.2 PLC I/O Index

- .1 The following spreadsheet gives an itemized list of the input and output between the PLC and the field devices. It is intended to serve as an aid for determining the cabling requirements for the work specified in this Division.

2. PRODUCTS – (NOT USED)

3. EXECUTION – (NOT USED)

END OF SECTION



EarthTech

A Tyco International Ltd. Company

City of Iqaluit
Nunavut
Booster Station No. 2

BOOSTER STATION No. 2 PLC I/O INDEX
Project Number: 83700
Date: May 05

PLC POINT NAME	PLC ADDRESS			CARD TYPE	POINT DESCRIPTION	SIGNAL TYPE						SOURCE DEVICE	DATA FIELD 1 LOGIC 0 (SIGANL RANGE)	DATA FIELD 2 LOGIC 1 (E.U. RANGE)	P&ID	ALARM CATEGORY	REMARKS	REV STA
	RACK	SLOT	CHNL															
YA-301a	1			1746-B16	PLATEAU SUPPLY PUMP # 1	PUMP MOTOR STARTER FAULT ALARM	DI (24)	DI (120)	DO (24)	DO (120)	AI	AO	P-301	FAULT	NORMAL	13		
YA-301b	1			1746-B16	PLATEAU SUPPLY PUMP # 1	BYPASS MOTOR STARTER FAULT ALARM	1						P-301	FAULT	NORMAL	13		
YA-302a	1			1746-B16	PLATEAU SUPPLY PUMP # 2	PUMP MOTOR STARTER FAULT ALARM	1						P-302	FAULT	NORMAL	13		
YA-302b	1			1746-B16	PLATEAU SUPPLY PUMP # 2	BYPASS MOTOR STARTER FAULT ALARM	1						P-302	FAULT	NORMAL	13		
YA-303a	1			1746-B16	JOCKEY PUMP # 1	PUMP MOTOR STARTER FAULT ALARM	1						P-303	FAULT	NORMAL	13		
YA-303b	1			1746-B16	JOCKEY PUMP # 1	BYPASS MOTOR STARTER FAULT ALARM	1						P-303	FAULT	NORMAL	13		
YA-304a	1			1746-B16	JOCKEY PUMP # 2	PUMP MOTOR STARTER FAULT ALARM	1						P-304	FAULT	NORMAL	13		
YA-304b	1			1746-B16	JOCKEY PUMP # 2	BYPASS MOTOR STARTER FAULT ALARM	1						P-304	FAULT	NORMAL	13		
YA-305	1			1746-B16	PLATEAU FIRE PUMP	PUMP MOTOR STARTER FAULT ALARM	1						P-305	FAULT	NORMAL	13		
YA-310	1			1746-B16	PLATEAU RECIRC. PUMP # 1	PUMP MOTOR STARTER FAULT ALARM	1						P-310	FAULT	NORMAL	14		
YA-311	1			1746-B16	PLATEAU RECIRC. PUMP # 2	PUMP MOTOR STARTER FAULT ALARM	1						P-311	FAULT	NORMAL	14		
YA-401	1			1746-B16	LOWER BASE AREA FIRE PUMP	PUMP MOTOR STARTER FAULT ALARM	1						P-401	FAULT	NORMAL	13		FUTURE BY OTHERS
YA-410	1			1746-B16	LOWER BASE RECIRC. PUMP # 1	PUMP MOTOR STARTER FAULT ALARM	1						P-410	FAULT	NORMAL	14		FUTURE BY OTHERS
YA-411	1			1746-B16	LOWER BASE RECIRC. PUMP # 2	PUMP MOTOR STARTER FAULT ALARM	1						P-411	FAULT	NORMAL	14		FUTURE BY OTHERS
Y1-301	1			1746-B16	PLATEAU SUPPLY PUMP # 1	PUMP STATUS INDICATION	1						P-301	STOPPED	RUNNING	13		
Y1-302	1			1746-B16	PLATEAU SUPPLY PUMP # 2	PUMP STATUS INDICATION	1						P-302	STOPPED	RUNNING	13		
Y1-303	1			1746-B16	JOCKEY PUMP # 1	PUMP STATUS INDICATION	1						P-303	STOPPED	RUNNING	13		
Y1-304	1			1746-B16	JOCKEY PUMP # 2	PUMP STATUS INDICATION	1						P-304	STOPPED	RUNNING	13		
Y1-305	1			1746-B16	PLATEAU FIRE PUMP	PUMP STATUS INDICATION	1						P-305	STOPPED	RUNNING	13		
Y1-306	1			1746-B16	PLATEAU FIRE PUMP PRESSURE CONTROL VALVE	VALVE OPEN INDICATION	1						ZSC-306	STOPPED	OPEN	13		
Y1-310	1			1746-B16	PLATEAU RECIRC. PUMP # 1	PUMP STATUS INDICATION	1						P-310	STOPPED	RUNNING	14		
Y1-311	1			1746-B16	PLATEAU RECIRC. PUMP # 2	PUMP STATUS INDICATION	1						P-311	STOPPED	RUNNING	14		FUTURE BY OTHERS
Y1-401	1			1746-B16	LOWER BASE AREA FIRE PUMP	PUMP STATUS INDICATION	1						P-401	STOPPED	RUNNING	13		FUTURE BY OTHERS
Y1-402	1			1746-B16	LOWER BASE FIRE PUMP PRESSURE CONTROL VALVE	VALVE OPEN INDICATION	1						ZSC-402	STOPPED	OPEN	13		
Y1-410	1			1746-B16	LOWER BASE RECIRC. PUMP # 1	PUMP STATUS INDICATION	1						P-410	STOPPED	RUNNING	14		FUTURE BY OTHERS
Y1-411	1			1746-B16	LOWER BASE RECIRC. PUMP # 2	PUMP STATUS INDICATION	1						P-411	STOPPED	RUNNING	14		FUTURE BY OTHERS
YS-301	1			1746-B16	PLATEAU SUPPLY PUMP # 1	PUMP IN AUTO INDICATION	1						P-301	HAND	AUTO	13		
YS-302	1			1746-B16	PLATEAU SUPPLY PUMP # 2	PUMP IN AUTO INDICATION	1						P-302	HAND	AUTO	13		
YS-303	1			1746-B16	JOCKEY PUMP # 1	PUMP IN AUTO INDICATION	1						P-303	HAND	AUTO	13		
YS-304	1			1746-B16	JOCKEY PUMP # 2	PUMP IN AUTO INDICATION	1						P-304	HAND	AUTO	13		
YS-305	1			1746-B16	PLATEAU FIRE PUMP	PUMP IN AUTO INDICATION	1						P-305	HAND	AUTO	13		
YS-310	1			1746-B16	PLATEAU RECIRC. PUMP # 1	PUMP IN AUTO INDICATION	1						P-310	HAND	AUTO	14		
YS-311	1			1746-B16	PLATEAU RECIRC. PUMP # 2	PUMP IN AUTO INDICATION	1						P-311	HAND	AUTO	14		
YS-401	1			1746-B16	LOWER BASE AREA FIRE PUMP	PUMP IN AUTO INDICATION	1						P-401	HAND	AUTO	13		FUTURE BY OTHERS
YS-410	1			1746-B16	LOWER BASE RECIRC. PUMP # 1	PUMP IN AUTO INDICATION	1						P-410	HAND	AUTO	13		FUTURE BY OTHERS
YS-411	1			1746-B16	LOWER BASE RECIRC. PUMP # 2	PUMP IN AUTO INDICATION	1						P-411	HAND	AUTO	14		FUTURE BY OTHERS
HS-306	1			1746-OX8	PLATEAU FIRE PUMP PRESSURE CONTROL VALVE	VALVE CONTROL SIGNAL			1				SV-306	CLOSE	OPEN	13		
HS-400a	1			1746-OX8	LOWER BASE RETURN HEADER BLOCK VALVE	VALVE CLOSE SIGNAL			1				V-400	CLOSE	CLOSE	13		FUTURE BY OTHERS
HS-400b	1			1746-OX8	LOWER BASE RETURN HEADER BLOCK VALVE	VALVE OPEN SIGNAL			1				V-400	CLOSE	OPEN	13		FUTURE BY OTHERS
MN-301a	1			1746-OX8	PLATEAU SUPPLY PUMP # 1	PUMP RUN SIGNAL			1				P-301	CLOSE	OPEN	13		
MN-301b	1			1746-OX8	PLATEAU SUPPLY PUMP # 1	BYPASS RUN SIGNAL			1				P-301	STOP	RUN	13		
MN-302a	1			1746-OX8	PLATEAU SUPPLY PUMP # 2	PUMP RUN SIGNAL			1				P-302	STOP	RUN	13		
MN-302b	1			1746-OX8	PLATEAU SUPPLY PUMP # 2	BYPASS RUN SIGNAL			1				P-302	STOP	RUN	13		
MN-303a	1			1746-OX8	JOCKEY PUMP # 1	PUMP RUN SIGNAL			1				P-303	STOP	RUN	13		
MN-303b	1			1746-OX8	JOCKEY PUMP # 1	BYPASS RUN SIGNAL			1				P-303	STOP	RUN	13		
MN-304a	1			1746-OX8	JOCKEY PUMP # 2	PUMP RUN SIGNAL			1				P-304	STOP	RUN	13		
MN-304b	1			1746-OX8	JOCKEY PUMP # 2	BYPASS RUN SIGNAL			1				P-304	STOP	RUN	13		
MN-305	1			1746-OX8	PLATEAU FIRE PUMP	PUMP RUN SIGNAL			1				P-305	STOP	RUN	13		
MN-310	1			1746-OX8	PLATEAU RECIRC. PUMP # 1	PUMP RUN SIGNAL			1				P-310	STOP	RUN	14		
MN-311	1			1746-OX8	PLATEAU RECIRC. PUMP # 2	PUMP RUN SIGNAL			1				P-311	STOP	RUN	14		
MN-401	1			1746-OX8	LOWER BASE AREA FIRE PUMP	PUMP RUN SIGNAL			1				P-401	STOP	RUN	13		FUTURE BY OTHERS
MN-410	1			1746-OX8	LOWER BASE RECIRC. PUMP # 1	PUMP RUN SIGNAL			1				P-410	STOP	RUN	14		FUTURE BY OTHERS
MN-411	1			1746-OX8	LOWER BASE RECIRC. PUMP # 2	PUMP RUN SIGNAL			1				P-411	STOP	RUN	14		FUTURE BY OTHERS
AI-312	1			1746-N18	PLATEAU RETURN TURBIDITY ANALYZER	TURBIDITY INDICATION					1		AIT-312	0 - 100	NTU	14		
AI-313	1			1746-N18	PLATEAU RETURN CHLORINE ANALYZER	CHLORINE INDICATION					1		AIT-313	0 - 5.0	mg/L	14		
AI-412	1			1746-N18	LOWER BASE RECIRC. TURBIDITY ANALYZER	TURBIDITY INDICATION					1		AIT-412	0 - 100	NTU	14		FUTURE BY OTHERS
AI-413	1			1746-N18	LOWER BASE RECIRC. CHLORINE ANALYZER	CHLORINE INDICATION					1		AIT-413	0 - 5.0	mg/L	14		FUTURE BY OTHERS
FI-310	1			1746-N18	PLATEAU RETURN FLOWMETER	FLOW INDICATION					1		FTI-310	0 - 270	L/min	14		
FI-311	1			1746-N18	PLATEAU SUPPLY PUMPS FLOWMETER	FLOW INDICATION					1		FTI-311	0 - 1450	L/min	13		
FI-312	1			1746-N18	PLATEAU FIRE PUMP FLOWMETER	FLOW INDICATION					1		FTI-312	0 - 10,000	L/min	13		



BOOSTER STATION No. 2 PLC I/O INDEX
Project Number: 83700
Date: May 05

PLC POINT NAME	PLC ADDRESS		CARD TYPE	POINT DESCRIPTION		SIGNAL TYPE						SOURCE DEVICE	DATA FIELD 1 LOGIC 0 (SIGANL RANGE)	DATA FIELD 2 LOGIC 1 (E.U. RANGE)	P&ID	ALARM CATEGORY	REMARKS	REV STA	
	RACK	SLOT		CHNL	ASSOCIATED EQUIPMENT	FUNCTION / TYPE	DI (24)	DI (120)	DO (24)	DO (120)	AI								AO
FL401	1		1746-N18	LOWER BASE AREA FIRE PUMP	FLOW INDICATION					1			FTT-401	0 - 10,000	U/min	13		FUTURE BY OTHERS	
FL410	1		1746-N18	LOWER BASE AREA RETURN FLOWMETER	FLOW INDICATION					1			FTT-410	0 - 270	U/min	14		FUTURE BY OTHERS	
PL310	1		1746-N18	SUPPLY PUMPS OUTLET PRESSURE TRANSMITTER	PRESSURE INDICATION					1			PIT-310	0 - 100	PSIG	13		FUTURE BY OTHERS	
PL400	1		1746-N18	LOWER BASE DISTRIBUTION HEADER	PRESSURE INDICATION					1			PIT-400	0 - 100	PSIG	13		FUTURE BY OTHERS	
PL401	1		1746-N18	LOWER BASE AREA PRESSURE TRANSMITTER	PRESSURE INDICATION					1			PIT-401	0 - 100	PSIG	13		FUTURE BY OTHERS	
SI-301	1		1746-N18	PLATEAU SUPPLY PUMP # 1	PUMP VFD SPEED INDICATION					1			P-301	0 - 100	PERCENT (%)	13			
SI-302	1		1746-N18	PLATEAU SUPPLY PUMP # 2	PUMP VFD SPEED INDICATION					1			P-302	0 - 100	PERCENT (%)	13			
SI-303	1		1746-N18	LOCKEY PUMP # 1	PUMP VFD SPEED INDICATION					1			P-303	0 - 100	PERCENT (%)	13			
SI-304	1		1746-N18	LOCKEY PUMP # 2	PUMP VFD SPEED INDICATION					1			P-304	0 - 100	PERCENT (%)	13			
TI-310	1		1746-N18	SUPPLY PUMPS OUTLET TEMPERATURE TRANSMITTER	TEMPERATURE INDICATION					1			TTT-310	-10 - 40	°C	13			
TI-314	1		1746-N18	PLATEAU RETURN TEMPERATURE TRANSMITTER	TEMPERATURE INDICATION					1			TTT-314	-10 - 40	°C	13			
TI-414	1		1746-N18	LOWER BASE RECIRC. TEMPERATURE TRANSMITTER	TEMPERATURE INDICATION					1			TTT-414	-10 - 40	°C	13		FUTURE BY OTHERS	
SC-301	1		1746-N04	PLATEAU SUPPLY PUMP # 1	PUMP VFD SPEED SETPOINT						1		P-301	0 - 100	PERCENT (%)	13			
SC-302	1		1746-N04	PLATEAU SUPPLY PUMP # 2	PUMP VFD SPEED SETPOINT						1		P-302	0 - 100	PERCENT (%)	13			
SC-303	1		1746-N04	LOCKEY PUMP # 1	PUMP VFD SPEED SETPOINT						1		P-303	0 - 100	PERCENT (%)	13			
SC-304	1		1746-N04	LOCKEY PUMP # 2	PUMP VFD SPEED SETPOINT						1		P-304	0 - 100	PERCENT (%)	13			
FL-200	1		1746-B16	GLYCOL SUPPLY	LOW FLOW ALARM														
LAH-102	1		1746-B16	DIESEL FUEL DAY TANK	TRANSFER PUMP STOP SIGNAL (80%)	1													
LAHH-102	1		1746-B16	DIESEL FUEL DAY TANK	HIGH HIGH LEVEL ALARM (90%)	1													
LAL-101	1		1746-B16	FUEL STORAGE TANK LEVEL SWITCH (50%)	LOW LEVEL ALARM		1						LSL-101	LOW FUEL ALARM	NORMAL				
LAL-102	1		1746-B16	DIESEL FUEL DAY TANK	TRANSFER PUMP START SIGNAL (50%)		1						LSLL-101	LOW LOW FUEL ALARM	NORMAL				
LALL-101	1		1746-B16	FUEL STORAGE TANK LEVEL SWITCH (25%)	LOW LOW LEVEL ALARM		1						TSLL-101	LOW PROCESS ROOM TEMP	NORMAL				
LALL-102	1		1746-B16	DIESEL FUEL DAY TANK	LOW LOW LEVEL ALARM (25%)		1												
TAL-101	1		1746-B16	PROCESS ROOM TEMPERATURE SWITCH	LOW TEMPERATURE ALARM		1												
TAL-200	1		1746-B16	GLYCOL SUPPLY	LOW TEMPERATURE ALARM		1												
YA-200	1		1746-B16	MECHANICAL SYSTEMS CONTROL PANEL	MECH. SYSTEM COMMON ALARM		1												
YA-201	1		1746-B16	GENERATOR CONTROL PANEL	GENERATOR COMMON ALARM		1												
YA-203	1		1746-B16	TRANSFER SWITCH	UTILITY FAIL ALARM		1												
ZSC-200	1		1746-B16	SECURITY ALARM	DOOR ALARM		1												
ZSC-201	1		1746-B16	SECURITY ALARM	DOOR ALARM		1												
CA-200	1		1746-OX8	AUTODIALER	COMMON ALARM TO AUTODIALER			1					ZSC-200	ALARM	NORMAL				
MN-102	1		1746-OX8	DAY TANK TRANSFER PUMP	PUMP RUN SIGNAL			1					PLC OUTPUT	DIAL OUT	NORMAL				
***** SHADED CELLS DENOTE NON-PROCESS I/O *****																			
***** THE ABOVE LIST INDICATES ONLY THE I/O TO BE CONNECTED. REFER TO PROJECT DRAWINGS FOR THE NUMBER OF SPARE I/O TO BE INCLUDED *****																			

INSTRUMENT INDEX

1. GENERAL

1.1 References - General

- .1 Refer to Section 17010.

1.2 Instrument Index

- .1 The following spreadsheet gives an itemized list of the instrumentation included as part of this work.

2. PRODUCTS – (NOT USED)

3. EXECUTION – (NOT USED)

END OF SECTION



Booster Station No. 2



Date : June 05

[illegible]

INSTRUMENT SPECIFICATION SHEETS

1. GENERAL

1.1 References - General

- .1 Refer To Section 17010.

1.2 Instrument Specification Sheets

- .1 The following data sheets provide information for instruments included as part of this work.
- .2 All instruments described in the instrument specification sheets are to be from a single source. Design has been based on the first named supplier.

2. PRODUCTS – (NOT USED)

3. EXECUTION – (NOT USED)

END OF SECTION