

CAUSE AND EFFECT CHART

rev 4.2 7/21/06

- Questionable
- Modified
- Local Control

Process Component		Device ID					Out	PLC	Function Performed																
		ID	Service	ID	#	SAC#				In	PLC														
SSSV		Hydraulic System Well Room 3 & 4	PAH			X310	5		5	CBA-414 - Vapor Comp - S/D															
			PAL			X311	5			5	CBA-416 - GC2 S/D														
ABJ	810	Waste Oil Tank	LSH	810		X67	5	X	X		3	CBA-420 - Chiller Comp #1 S/D													
			LAH	810		X70	5					5	CBA-421 - Chiller Comp #2 S/D												
			Start	810		X71	5						2	CBA-434 - Vapor Recovery Comp S/D											
			Stop	810			loc						3	CBA-435/436 - Start Lead Air Comp											
			LSL	810		X72	5						3	CBA-435/436 - Start Lag Air Comp											
			LAHH	810		v1402	2			X			5	CBA-439 - GC3 S/D											
			LAH	810		v1402	2						3	CBA-449 - Acid Gas Comp S/D											
			LAL	810		v1402	2						3	CBA-449 - Acid Gas Pump/Fan Motor S/D?											
			Start	810		v1402	2						7	CMB-406 - Vacuum Pump S/D											
			Stop	810		v1402	2						5	HAL-301/302 - Gas Fin Fan S/D											
ABJ	811	Waste Water Tank	PAH	811		v1410	2						5	HAL-303 - Chiller Fin Fan S/D											
			LAH	811		X73	5							5	HAL-304 - GC2 Fin Fan S/D										
			LAL	811		X74	5								5	HAL-305 - GC3 Fin Fan S/D									
ABJ	812	Belly Tank	LSH	812		X75	5								loc	HAL-309 - Amine Fin Fan S/D									
CBA	414	Vapor Compressor	SD			X77	5										loc	HAL-320 - Acid Gas Exchanger S/D							
			ALM			X100	5											5	PAX-423 - Ship Pump #1 S/D						
			PSH				loc		X										5	PAX-440 - Ship Pump #2 S/D					
			PSL			X101	5		X										5	PAX-441 - Ship Pump #3 S/D					
CBA	416	Gas Compressor	SD			X103	5												7	PBE-412 - Seawater Lift Pump S/D					
			ALM			X104	5													7	PBE-413 - Stop Backwash				
			Aux			X323	5														5	PBE-415 - Well Clean Pump S/D			
			PSH	612A			loc			L												5	PBE-415 - Start Well Clean Pump in Auto		
			PSL	612A			loc				L												5	PBE-415 - Stop Well Clean Pump in Auto	
			TSH	612			loc				L												5	PBE-422 - Glycol Pump S/D	
CBA	420	Chiller Compressor	SD			X105	5															5	PBE-423 - Glycol Pump S/D		
			FAL			X106	5																5	PBE-424 - Relief Scrub Pump S/D	
							loc																	5	PBE-424 - Start Relief Scrub Pump in Auto
CBA	421	Chiller Compressor	SD			X107	5																5	PBE-424 - Stop Relief Scrub Pump in Auto	
			FAL			X106	5																	3	PBE-427 - HTM Pump S/D
							loc																		5
																							5	PBE-431 - Start Waste Oil Pump in Auto	
																								5	PBE-432 - Waste Water Pump S/D
																								3	PBE-444 - HTM Pump S/D
																								5	PBE-447 - SO2 Pump S/D
																								7	PBE-452 - Water Inj Charge Pump S/D
																								7	PBE-453 - Water Injection Pump S/D
																								7	LCV-801 - Close Vacuum Degasser Dump
																								7	ZZZ-901 - Air Scour Blower S/D
																								4A	LCV-602 - Open Main Scrubber Dump
																								4A	LCV-602 - Close Main Scrubber Dump
																								2	LCV-611 - VR Comp Suct Scrub Dump
																								7	LCV-802 - Close Backwash Tank Inlet
																								1	Shutdown VSDs

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Process Component		Device ID					PLC	Function Performed
ID	Service	ID	#	SAC#	In	PLC	Out	
MBA	507	Amine Regenerator	PSH	507			loc	5 CBA-414 - Vapor Comp - S/D
			PSL	507			loc	5 CBA-416 - GC2 S/D
			LSH	507			loc	5 CBA-420 - Chiller Comp #1 S/D
			LAH	507			loc	5 CBA-421 - Chiller Comp #2 S/D
MBA	508	Regenerator Reflux Drum	PSH	508			loc	2 CBA-434 - Vapor Recovery Comp S/D
			PSL	508			loc	3 CBA-435/436 - Start Lead Air Comp
			LSH	508			loc	3 CBA-435/436 - Start Lag Air Comp
			LSL	508			loc	3 CBA-435/436 - Stop Air Comp
			LAH	508			loc	5 CBA-439 - GC3 S/D
			LAL	508			loc	3 CBA-449 - Acid Gas Comp S/D
MBA	801	Vacuum Degasifier	LSH	801A		X3	7	7 CMB-406 - Vacuum Pump S/D
			LSL	801A		v3000	7	5 HAL-301/302 - Gas Fin Fan S/D
			LAH	801		X1	7	5 HAL-303 - Chiller Fin Fan S/D
			LAL	801		X2	7	5 HAL-304 - GC2 Fin Fan S/D
MBD	201	Test Separator	PSH	201		X140	5	loc HAL-309 - Amine Fin Fan S/D
			PSL	201		X141	5	loc HAL-320 - Acid Gas Exchanger S/D
			LSH	201		X142	5	5 PAX-423 - Ship Pump #1 S/D
			LSL	201		X143	5	5 PAX-440 - Ship Pump #2 S/D
MBD	202	Test Separator	PSH	202		X144	5	5 PAX-441 - Ship Pump #3 S/D
			PSL	202		X145	5	7 PBE-412 - Seawater Lift Pump S/D
			LSH	202		X146	5	7 PBE-413 - Stop Backwash
			LSL	202		X147	5	5 PBE-415 - Well Clean Pump S/D
MBD	203	Test Separator	PSH	203		X150	5	5 PBE-415 - Start Well Clean Pump in Auto
			PSL	203		X151	5	5 PBE-415 - Stop Well Clean Pump in Auto
			LSH	203		X152	5	5 PBE-422 - Glycol Pump S/D
			LSL	203		X153	5	5 PBE-423 - Glycol Pump S/D
MBD	204	Test Separator	PSH	204		X154	5	5 PBE-424 - Relief Scrub Pump S/D
			PSL	204		X155	5	5 PBE-424 - Start Relief Scrub Pump in Auto
			LSH	204		X156	5	5 PBE-424 - Stop Relief Scrub Pump in Auto
			LSL	204		X157	5	3 PBE-427 - HTM Pump S/D
							5 PBE-431 - Waste Oil Pump S/D - PLC5	
							5 PBE-431 - Start Waste Oil Pump in Auto	
							5 PBE-432 - Waste Water Pump S/D	
							3 PBE-444 - HTM Pump S/D	
							5 PBE-447 - SO2 Pump S/D	
							7 PBE-452 - Water Inj Charge Pump S/D	
							7 PBE-453 - Water Injection Pump S/D	
							7 LCV-801 - Close Vacuum Degasifier Dump	
							7 ZZZ-901 - Air Scour Blower S/D	
							4A LCV-602 - Open Main Scrubber Dump	
							4A LCV-602 - Close Main Scrubber Dump	
							2 LCV-611 - VR Comp Suct Scrub Dump	
							7 LCV-802 - Close Backwash Tank Inlet	
							1 Shutdown VSDs	

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Process Component		Device ID					PLC	Function Performed				
ID	Service	ID	#	SAC#	In	PLC	Out					
PBE	427	HTM Pump	PSH	427		X123	3	5	CBA-414 - Vapor Comp - S/D			
			PSL	427		X124	3	5	CBA-416 - GC2 S/D			
PBE	428	Sour Water Pump	PSH	428			loc	5	CBA-420 - Chiller Comp #1 S/D			
			PSL	428			loc	5	CBA-421 - Chiller Comp #2 S/D			
PBE	430	Fire Pump	PAHL	430		X274	5	2	CBA-434 - Vapor Recovery Comp S/D			
			UL/OL	430		X275	5	3	CBA-435/436 - Start Lead Air Comp			
PBE	431	Waste Oil Pump	PSH	431		X277	5	3	CBA-435/436 - Start Lag Air Comp			
			PSL	431		X300	5	3	CBA-435/436 - Stop Air Comp			
PBE	432	Waste Water Pump	PSH	432		X302	5	5	CBA-439 - GC3 S/D			
			PSL	432		X303	5	3	CBA-449 - Acid Gas Comp S/D			
PBE	437	Potable Water Pump	Aux	437		X320	5	3	CBA-449 - Acid Gas Pump/Fan Motor S/D?			
PBE	442	Lean Amine Pump	PSH	442			loc	7	CMB-406 - Vacuum Pump S/D			
			PSL	442			loc	5	HAL-301/302 - Gas Fin Fan S/D			
PBE	443	Regenerator Reflux Pump	PSH	443			loc	5	HAL-303 - Chiller Fin Fan S/D			
			PSL	443			loc	5	HAL-304 - GC2 Fin Fan S/D			
PBE	444	HTM Pump	PSH	444		X125	3	5	HAL-305 - GC3 Fin Fan S/D			
			PSL	444		X126	3	3	HAL-309 - Amine Fin Fan S/D			
PBE	445	Fire Pump	PAHL	445		X274	5	loc	HAL-320 - Acid Gas Exchanger S/D			
			UL/OL	445		X275	5	5	PAX-423 - Ship Pump #1 S/D			
PBE	446	Potable Water Pump	Aux	446		X321	5	5	PAX-440 - Ship Pump #2 S/D			
PBE	452	Water Injection Charge Pump	FSH	452		v3004	7		7	PAX-441 - Ship Pump #3 S/D		
			FSL	452		v3004	7			7	PBE-412 - Seawater Lift Pump S/D	
			PAH	452		v3003	7				7	PBE-413 - Stop Backwash
			PAL	452		v3003	7				5	PBE-415 - Well Clean Pump S/D
			FAH	452		v3004	7				5	PBE-415 - Start Well Clean Pump in Auto
			FAL	452		v3004	7				5	PBE-415 - Stop Well Clean Pump in Auto
			Aux	452		X26	7				5	PBE-422 - Glycol Pump S/D
									5	PBE-423 - Glycol Pump S/D		
									5	PBE-424 - Relief Scrub Pump S/D		
									5	PBE-424 - Start Relief Scrub Pump in Auto		
									5	PBE-424 - Stop Relief Scrub Pump in Auto		
									3	PBE-427 - HTM Pump S/D		
									5	PBE-431 - Waste Oil Pump S/D - PLC5		
									5	PBE-431 - Start Waste Oil Pump in Auto		
									5	PBE-432 - Waste Water Pump S/D		
									3	PBE-444 - HTM Pump S/D		
									5	PBE-447 - SO2 Pump S/D		
									7	PBE-452 - Water Inj Charge Pump S/D		
									7	PBE-453 - Water Injection Pump S/D		
									7	LCV-801 - Close Vacuum Degasser Dump		
									7	ZZZ-901 - Air Scour Blower S/D		
									4A	LCV-602 - Open Main Scrubber Dump		
									4A	LCV-602 - Close Main Scrubber Dump		
									2	LCV-611 - VR Comp Suct Scrub Dump		
									7	LCV-802 - Close Backwash Tank Inlet		
									1	Shutdown VSDs		

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Process Component		Device ID					PLC	Function Performed	
ID	Service	ID	#	SAC#	In	PLC	Out		
PBE	453	Water Injection Pump	PSH	453		X20	7	5	CBA-414 - Vapor Comp - S/D
			PSL1	453		X25	7	5	CBA-416 - GC2 S/D
			PSL2	453		X21	7	5	CBA-420 - Chiller Comp #1 S/D
			VSH	453		X22	7	5	CBA-421 - Chiller Comp #2 S/D
			PAH	453		v3002	7	2	CBA-434 - Vapor Recovery Comp S/D
			PAL	453		v3002	7	3	CBA-435/436 - Start Lead Air Comp
ZBA	908	SO2 Chiller	PSH			X26	3	3	CBA-435/436 - Start Lag Air Comp
			PSL			X23	3	5	CBA-435/436 - Stop Air Comp
			TSH			X25	3	3	CBA-439 - GC3 S/D
ZBE	314	HTM Combustion Air Blower	PSL	314		X105	3	3	CBA-449 - Acid Gas Comp S/D
		Inj Well Alarms	FAL				1	7	CMB-406 - Vacuum Pump S/D
		SO2 Injection Alarms	FAL				1	5	HAL-301/302 - Gas Fin Fan S/D
		VSD Alarms	OL/UL				1	5	HAL-303 - Chiller Fin Fan S/D
			Status				1	5	HAL-304 - GC2 Fin Fan S/D
		Sump	LAH		X305	5		5	HAL-305 - GC3 Fin Fan S/D
								loc	HAL-309 - Amine Fin Fan S/D
								loc	HAL-320 - Acid Gas Exchanger S/D
								5	PAX-423 - Ship Pump #1 S/D
								5	PAX-440 - Ship Pump #2 S/D
								5	PAX-441 - Ship Pump #3 S/D
								7	PBE-412 - Seawater Lift Pump S/D
								7	PBE-413 - Stop Backwash
								5	PBE-415 - Well Clean Pump S/D
								5	PBE-415 - Start Well Clean Pump in Auto
								5	PBE-415 - Stop Well Clean Pump in Auto
								5	PBE-422 - Glycol Pump S/D
								5	PBE-423 - Glycol Pump S/D
								5	PBE-424 - Relief Scrub Pump S/D
								5	PBE-424 - Start Relief Scrub Pump in Auto
								5	PBE-424 - Stop Relief Scrub Pump in Auto
								3	PBE-427 - HTM Pump S/D
								5	PBE-431 - Waste Oil Pump S/D - PLC5
								5	PBE-431 - Start Waste Oil Pump in Auto
								5	PBE-432 - Waste Water Pump S/D
								3	PBE-444 - HTM Pump S/D
								5	PBE-447 - SO2 Pump S/D
								7	PBE-452 - Water Inj Charge Pump S/D
								7	PBE-453 - Water Injection Pump S/D
								7	LCV-801 - Close Vacuum Degasifier Dump
								7	ZZZ-901 - Air Scour Blower S/D
								4A	LCV-602 - Open Main Scrubber Dump
								4A	LCV-602 - Close Main Scrubber Dump
								2	LCV-611 - VR Comp Suct Scrub Dump
								7	LCV-802 - Close Backwash Tank Inlet
								1	Shutdown VSDs

Date	Rev	Edited By	Changes Made
5/20/06	1.0	Rick Hurdle	Added final sheet for revisions. Moved all C&E sheets onto the first sheet.
5/21/06		xxx	Removed "Close SSV/SSSV Affected Wells" from Function performed.
5/29/06	2.0	Rick Hurdle	Added missing process components and functions.
6/7/06	2.1	Rick Hurdle	Merge old SAFE chart with PLC5 I/O list to fill in gaps. Submitted to xxx for revisions.
6/23/06	2.2	Rick Hurdle	Update output coil addresses based on programming changes.
7/1/06	3.0	xxx, rmh	Update based on feedback from operations on xxx.
7/5/06	3.1	Rick Hurdle	Changes made by Rick Hurdle. These need to be reviewed and approved by xxx during next API RP 14C audit.
7/11/06	4.0	xxx	Changes made by Rick Hurdle as suggested by xxx.
7/21/06	4.1	Rick Hurdle	Changes made by Rick Hurdle as instructed xxx. Mostly alarms from the old Ronan panel that are being brought over into WW.