

						Failure				
sset Code	Name	Asset Description	Component	Failure Mode	Criticality	Pattern	Task	Frequency	Done by	Comments
		Horizontal pump							Maintenance	Avoid overgreasing. Use correct grease as stipulated by bearing
/SO-PAGPS-0022	Storage Pump 1	between bearings	Bearings	Loss of lubrication	High	Age-related	Scheduled greasing	Weekly	contractor	manufacturer.
						-		1		Refer to pump specifications on minimum NPSH requirements. Follow
		Horizontal pump					Monitor suction pressure not to go	,		company policy in dealing with cavitation issues (e.g. call MCC to increa
SO-PAGPS-0022	Storage Pump 1	between bearings	Bearings	High vibration due to cavitation	High	Random	below xx head.	Every hour	Operator	suction pressure and/or shutdown pumps)
30 1 Adi 3 0022	Storage rump 1	Horizontal pump	bearings	High vibration due to bearing failure	iligii	Random	below Ax field.	Every flour	Maintenance	Use trained contractor for the appropriate vibration monitoring device
SO-PAGPS-0022	Storago Dumo 1	between bearings	Bearings	(e.g. foreign materials in lubrication)	High	Random	Vibration monitoring	2-weekly (every 2 weeks)	contractor	Report findings every month.
30*FAGF3*0022	Storage Fullip 1	Horizontal pump	bearings	(e.g. foreign materials in lubrication)	riigii	Kalluulli	Vibration monitoring	2-weekly (every 2 weeks)	Maintenance	Report findings every month.
/SO-PAGPS-0022	Charana Duman 1	between bearings	Packing	Excessive leaks	Medium	Age-related	Tighten packing bolts	2-weekly (every 2 weeks)	contractor	Avoid overtightening of packing bolts.
3U-PAGP3-0022	Storage Pump 1		Packing	EXCESSIVE IEAKS	ivieulum	Age-related		2-weekly (every 2 weeks)	CONTRACTOR	Avoid overlightening of packing boils.
		Horizontal pump					Motor (skin) temperature			
SO-PAGPS-0022	Storage Pump 1	between bearings	Motor	Motor trip due to overloading	High	Random	measurement	Every hour	Operator	Refer to motor specifications on maximum allowable surface temperat
		Horizontal pump		Motor burns due to failure of winding			Test/measure motor winding		Maintenance	
SO-PAGPS-0022	Storage Pump 1	between bearings	Motor	insulation	Low	Age-related	insulation	Annually	contractor	Use qualified maintenance contractor.
		Horizontal pump							Maintenance	Use qualified maintenance contractor. Failure of this valve may cause
SO-PAGPS-0022	Storage Pump 1	between bearings	Suction isolating valve	Valve passing (leaks)	Medium	Age-related	Test valve integrity	Annually	contractor	problems during maintenance of pump/motor.
		Horizontal pump							Maintenance	Use qualified maintenance contractor. Failure of this valve is not critic
SO-PAGPS-0022	Storage Pump 1	between bearings	Discharge isolating valve	Valve passing (leaks)	Low	Age-related	Test valve integrity	Annually	contractor	long as the check valve is working.
										Replace with calibrated pressure gauge. Mark with acceptable operati
		Horizontal pump		Pressure gauge reading is wrong due to					Maintenance	range. Criticality is low if the online pressure sensors are still functioni
SO-PAGPS-0022	Storage Pump 1	between bearings	Pressure gauge (suction & discharge)		Low	Age-related	Replace pressure gauge	Annually	contractor	properly.
		Horizontal pump	Pressure sensors (suction &					Semi-annually (every 6	Maintenance	Property.
SO-PAGPS-0022	Storago Dumo 1	between bearings	discharge)	Pressure reading is erroneous	High	Random	Calibrate pressure sensors	months)	contractor	Use qualified maintenance contractor.
30-FAGF 3-0022	Storage Fullip 1	Horizontal pump	uiscriarge)	Leaks due to loose bolts and/or gasket	riigii	Kalluulli	Re-tighten bolts using specified	monuis)	Maintenance	Use proper bolt tightening methods (e.g. manual, hydraulic, pneumati
CO DA CDC 0033	C1 1		Flores		N. A. a. d. P					
SO-PAGPS-0022	Storage Pump 1	between bearings	Flange	failure	Medium	Age-related	torque values	Annually	contractor	tensioning, etc.) Apply required bolt torque values.
										Refer to recommended life of dampers by manufacturer. Otherwise,
		Horizontal pump		Leaks due to deteriorated materials			Replace vibration dampers based		Maintenance	purchase spare damper before its recommended life to ensure available
SO-PAGPS-0022	Storage Pump 1	between bearings	Vibration dampers	caused by fatigue	Medium	Age-related	on recommended life	Every 10 years	contractor	when needed.
		Horizontal pump								
VSO-PAGPS-0022 S	Storage Pump 1	between bearings	System	General system leaks	Low	Random	Inspect system for leaks	Shift	Operator	Report excessive leaks for scheduled repairs.
							-Replace impeller	-10 years		
		Horizontal pump					-Inspect and measure clearances	-Annually	Maintenance	
SO-PAGPS-0022	Storage Pump 1	between bearings	Impeller	Impeller wear	Low	Age-related	after every	,	contractor	Inspect during annual overhauls.
50 171015 0022	Storage rump 1	Horizontal pump	Imperer	Impener wear	2011	rige related	utter every		Maintenance	mspeec during annual overnous.
SO-PAGPS-0022	Storage Pump 1	between bearings	Suction strainer	Blockage	Medium	Age-related	Clean strainer	Annually	contractor	During annual overhauls.
30 1 AGI 3 0022	Storage rump 1	Horizontal pump	Suction strainer	Бюскавс	Wiculum	Age Telateu	Cicali strainer	Aillidally	Maintenance	
SO-PAGPS-0033	Charage Dump 2	between bearings	Bearings	Loss of lubrication	Hab	Age-related	Scheduled greasing	Weekly	contractor	Avoid overgreasing. Use correct grease as stipulated by bearing manufacturer.
3U-PAGP3-0033	Storage Pump 2	between bearings	Bearings	LOSS OF IUDITICATION	High	Age-related	Scrieduled greasing	weekiy	contractor	
										Refer to pump specifications on minimum NPSH requirements. Follow
		Horizontal pump					Monitor suction pressure not to go			company policy in dealing with cavitation issues (e.g. call MCC to increase
SO-PAGPS-0033	Storage Pump 2	between bearings	Bearings	High vibration due to cavitation	High	Random	below xx head.	Every hour	Operator	suction pressure and/or shutdown pumps)
		Horizontal pump		High vibration due to bearing failure					Maintenance	Use trained contractor for the appropriate vibration monitoring device
SO-PAGPS-0033	Storage Pump 2	between bearings	Bearings	(e.g. foreign materials in lubrication)	High	Random	Vibration monitoring	2-weekly (every 2 weeks)	contractor	Report findings every month.
		Horizontal pump							Maintenance	
SO-PAGPS-0033	Storage Pump 2	between bearings	Packing	Excessive leaks	Medium	Age-related	Tighten packing bolts	2-weekly (every 2 weeks)	contractor	Avoid overtightening of packing bolts.
		Horizontal pump					Motor (skin) temperature			
SO-PAGPS-0033	Storage Pump 2	between bearings	Motor	Motor trip due to overloading	High	Random	measurement	Every hour	Operator	Refer to motor specifications on maximum allowable surface tempera
	.0	Horizontal pump	+	Motor burns due to failure of winding	-	1			Maintenance	
SO-PAGPS-0033	Storage Pump ?	between bearings	Motor	insulation	Low	Age-related	Inspect motor winding insulation	Annually	contractor	Use qualified maintenance contractor.
30 - Adi 3-0033	ocorage rump z	Horizontal pump		modiacioni	2044	, Se related	speec motor winding insulation	, amounty	Maintenance	Use qualified maintenance contractor. Failure of this valve may cause
CO DACDE 0033	Charage Duma 2		Custian isolating uplus	Value massing (leaks)	N A co al locar	Ann valeto 1	Test velve intervity	Annually		
SO-PAGPS-0033	Storage Pump 2	between bearings	Suction isolating valve	Valve passing (leaks)	Medium	Age-related	Test valve integrity	Annually	contractor	problems during maintenance of pump/motor.
	C	Horizontal pump	Discharge indution of the	Makes assets a fleeter			T - 4 1 - 1 - 1 - 1 - 1 - 1	A	Maintenance	Use qualified maintenance contractor. Failure of this valve is not critic
SO-PAGPS-0033	Storage Pump 2	between bearings	Discharge isolating valve	Valve passing (leaks)	Low	Age-related	Test valve integrity	Annually	contractor	long as the check valve is working.
									1	Replace with calibrated pressure gauge. Mark with acceptable operati
ļ	1	Horizontal pump		Pressure gauge reading is wrong due to					Maintenance	range. Criticality is low if the online pressure sensors are still functioni
		between bearings	Pressure gauge (suction & discharge)	wear	Low	Age-related	Replace pressure gauge	Annually	contractor	properly.
SO-PAGPS-0033	Storage Pump 2	between bearings						Semi-annually (every 6	Maintenance	
SO-PAGPS-0033	Storage Pump 2	Horizontal pump	Pressure sensors (suction &							
/SO-PAGPS-0033			Pressure sensors (suction & discharge)	Pressure reading is erroneous	High	Random	Calibrate pressure sensors	months)	contractor	Use qualified maintenance contractor.
		Horizontal pump		Pressure reading is erroneous Leaks due to loose bolts and/or gasket	High	Random	Calibrate pressure sensors Re-tighten bolts using specified	months)	contractor Maintenance	Use qualified maintenance contractor. Use proper bolt tightening methods (e.g. manual, hydraulic, pneumati



						Failure				
Asset Code	Name	Asset Description	Component	Failure Mode	Criticality	Pattern	Task	Frequency	Done by	Comments
										Refer to recommended life of dampers by manufacturer. Otherwise,
		Horizontal pump		Leaks due to deteriorated materials			Replace vibration dampers based		Maintenance	purchase spare damper before its recommended life to ensure availability
VSO-PAGPS-0033	Storage Pump 2	between bearings	Vibration dampers	caused by fatigue	Medium	Age-related	on recommended life	Every 10 years	contractor	when needed.
		Horizontal pump								
VSO-PAGPS-0033	Storage Pump 2	between bearings	System	General system leaks	Low	Random	Inspect system for leaks	Shift	Operator	Report excessive leaks for scheduled repairs.
							-Replace impeller	-10 years		
		Horizontal pump					-Inspect and measure clearances	-Annually	Maintenance	
NSO-PAGPS-0033	Storage Pump 2	between bearings	Impeller	Impeller wear	Low	Age-related	after every		contractor	Inspect during annual overhauls.
		Horizontal pump							Maintenance	
WSO-PAGPS-0033	Storage Pump 2	between bearings	Suction strainer	Blockage	Medium	Age-related	Clean strainer	Annually	contractor	During annual overhauls.
		Horizontal pump							Maintenance	Avoid overgreasing. Use correct grease as stipulated by bearing
NSO-PAGPS-0052	Booster Pump 1	between bearings	Bearings	Loss of lubrication	High	Age-related	Scheduled greasing	Weekly	contractor	manufacturer.
										Refer to pump specifications on minimum NPSH requirements. Follow
		Horizontal pump					Monitor suction pressure not to go			company policy in dealing with cavitation issues (e.g. call MCC to increase
NSO-PAGPS-0052	Booster Pump 1	between bearings	Bearings	High vibration due to cavitation	High	Random	below xx head.	Every hour	Operator	suction pressure and/or shutdown pumps)
		Horizontal pump		High vibration due to bearing failure					Maintenance	Use trained contractor for the appropriate vibration monitoring device.
VSO-PAGPS-0052	Booster Pump 1	between bearings	Bearings	(e.g. foreign materials in lubrication)	High	Random	Vibration monitoring	2-weekly (every 2 weeks)	contractor	Report findings every month.
		Horizontal pump							Maintenance	
NSO-PAGPS-0052	Booster Pump 1	between bearings	Packing	Excessive leaks	Medium	Age-related	Tighten packing bolts	2-weekly (every 2 weeks)	contractor	Avoid overtightening of packing bolts.
		Horizontal pump					Motor (skin) temperature			
WSO-PAGPS-0052	Booster Pump 1	between bearings	Motor	Motor trip due to overloading	High	Random	measurement	Every hour	Operator	Refer to motor specifications on maximum allowable surface temperature
		Horizontal pump		Motor burns due to failure of winding					Maintenance	
WSO-PAGPS-0052	Booster Pump 1	between bearings	Motor	insulation	Low	Age-related	Inspect motor winding insulation	Annually	contractor	Use qualified maintenance contractor.
		Horizontal pump							Maintenance	Use qualified maintenance contractor. Failure of this valve may cause
WSO-PAGPS-0052	Booster Pump 1	between bearings	Suction isolating valve	Valve passing (leaks)	Medium	Age-related	Test valve integrity	Annually	contractor	problems during maintenance of pump/motor.
		Horizontal pump							Maintenance	Use qualified maintenance contractor. Failure of this valve is not critical as
NSO-PAGPS-0052	Booster Pump 1	between bearings	Discharge isolating valve	Valve passing (leaks)	Low	Age-related	Test valve integrity	Annually	contractor	long as the check valve is working.
										Replace with calibrated pressure gauge. Mark with acceptable operating
		Horizontal pump		Pressure gauge reading is wrong due to					Maintenance	range. Criticality is low if the online pressure sensors are still functioning
WSO-PAGPS-0052	Booster Pump 1	between bearings	Pressure gauge (suction & discharge)	wear	Low	Age-related	Replace pressure gauge	Annually	contractor	properly.
		Horizontal pump	Pressure sensors (suction &					Semi-annually (every 6	Maintenance	
WSO-PAGPS-0052	Booster Pump 1	between bearings	discharge)	Pressure reading is erroneous	High	Random	Calibrate pressure sensors	months)	contractor	Use qualified maintenance contractor.
		Horizontal pump		Leaks due to loose bolts and/or gasket			Re-tighten bolts using specified		Maintenance	Use proper bolt tightening methods (e.g. manual, hydraulic, pneumatic,
WSO-PAGPS-0052	Booster Pump 1	between bearings	Flange	failure	Medium	Age-related	torque values	Annually	contractor	tensioning, etc.) Apply required bolt torque values.
										Refer to recommended life of dampers by manufacturer. Otherwise,
		Horizontal pump		Leaks due to deteriorated materials			Replace vibration dampers based		Maintenance	purchase spare damper before its recommended life to ensure availability
WSO-PAGPS-0052	Booster Pump 1	between bearings	Vibration dampers	caused by fatigue	Medium	Age-related	on recommended life	Every 10 years	contractor	when needed.
		Horizontal pump								
WSO-PAGPS-0052	Booster Pump 1	between bearings	System	General system leaks	Low	Random	Inspect system for leaks	Shift	Operator	Report excessive leaks for scheduled repairs.
							-Replace impeller	-10 years		
		Horizontal pump					-Inspect and measure clearances	-Annually	Maintenance	
WSO-PAGPS-0052	Booster Pump 1	between bearings	Impeller	Impeller wear	Low	Age-related	after every		contractor	Inspect during annual overhauls.
		Horizontal pump							Maintenance	
WSO-PAGPS-0052	Booster Pump 1	between bearings	Suction strainer	Blockage	Medium	Age-related	Clean strainer	Annually	contractor	During annual overhauls.
		Horizontal pump							Maintenance	Avoid overgreasing. Use correct grease as stipulated by bearing
WSO-PAGPS-0062	Booster Pump 2	between bearings	Bearings	Loss of lubrication	High	Age-related	Scheduled greasing	Weekly	contractor	manufacturer.
										Refer to pump specifications on minimum NPSH requirements. Follow
		Horizontal pump	_				Monitor suction pressure not to go			company policy in dealing with cavitation issues (e.g. call MCC to increase
WSO-PAGPS-0063	Booster Pump 2	between bearings	Bearings	High vibration due to cavitation	High	Random	below xx head.	Every hour	Operator	suction pressure and/or shutdown pumps)
		Horizontal pump		High vibration due to bearing failure	L	L .			Maintenance	Use trained contractor for the appropriate vibration monitoring device.
NSO-PAGPS-0064	Booster Pump 2	between bearings	Bearings	(e.g. foreign materials in lubrication)	High	Random	Vibration monitoring	2-weekly (every 2 weeks)	contractor	Report findings every month.
D. CDC C	D	Horizontal pump	Partition.	etll.			Talana a salda a halka	2	Maintenance	A control and a state of the angle of the state of the st
WSO-PAGPS-0065	Booster Pump 2	between bearings	Packing	Excessive leaks	Medium	Age-related	Tighten packing bolts	2-weekly (every 2 weeks)	contractor	Avoid overtightening of packing bolts.
		Horizontal pump		L	L	L .	Motor (skin) temperature	L .		
WSO-PAGPS-0066	Booster Pump 2	between bearings	Motor	Motor trip due to overloading	High	Random	measurement	Every hour	Operator	Refer to motor specifications on maximum allowable surface temperature
		Horizontal pump		Motor burns due to failure of winding	1				Maintenance	
WSO-PAGPS-0067	Booster Pump 2	between bearings	Motor	insulation	Low	Age-related	Inspect motor winding insulation	Annually	contractor	Use qualified maintenance contractor.
		Horizontal pump	1	1	1	1		1	Maintenance	Use qualified maintenance contractor. Failure of this valve may cause
WSO-PAGPS-0068		between bearings	Suction isolating valve	Valve passing (leaks)	Medium	Age-related	Test valve integrity	Annually	contractor	problems during maintenance of pump/motor.



					Failure				
Asset Code Name	Asset Description	Component	Failure Mode	Criticality	Pattern	Task	Frequency	Done by	Comments
	Horizontal pump						,	Maintenance	Use qualified maintenance contractor. Failure of this valve is not critical
WSO-PAGPS-0069 Booster Pump 2	between bearings	Discharge isolating valve	Valve passing (leaks)	Low	Age-related	Test valve integrity	Annually	contractor	long as the check valve is working.
			Tarra Passang (rasna)						Replace with calibrated pressure gauge. Mark with acceptable operating
	Horizontal pump		Pressure gauge reading is wrong due to					Maintenance	range. Criticality is low if the online pressure sensors are still functioning
WSO-PAGPS-0070 Booster Pump 2	between bearings	Pressure gauge (suction & discharge)		Low	Age-related	Replace pressure gauge	Annually	contractor	properly.
W30-FAGF3-0070 Booster Fullip 2	Horizontal pump	Pressure sensors (suction & discharge)	wear	LOW	Agericiateu	Replace pressure gauge	Semi-annually (every 6	Maintenance	properly.
WSO-PAGPS-0071 Booster Pump 2	between bearings	discharge)	Pressure reading is erroneous	Ulak	Random	Calibrate pressure sensors	months)	contractor	Use qualified maintenance contractor.
WSO-PAGPS-0071 BOOSTEI PUITIP 2	Horizontal pump	uiscriarge)	Leaks due to loose bolts and/or gasket	High	Kanuom		monuis)	Maintenance	
WCO DA CDC 0073		51	failure	Medium		Re-tighten bolts using specified	Annually		Use proper bolt tightening methods (e.g. manual, hydraulic, pneumatic,
WSO-PAGPS-0072 Booster Pump 2	between bearings	Flange	failure	Medium	Age-related	torque values	Annually	contractor	tensioning, etc.) Apply required bolt torque values.
									Refer to recommended life of dampers by manufacturer. Otherwise,
	Horizontal pump		Leaks due to deteriorated materials			Replace vibration dampers based		Maintenance	purchase spare damper before its recommended life to ensure availabilit
WSO-PAGPS-0073 Booster Pump 2	between bearings	Vibration dampers	caused by fatigue	Medium	Age-related	on recommended life	Every 10 years	contractor	when needed.
	Horizontal pump								
WSO-PAGPS-0074 Booster Pump 2	between bearings	System	General system leaks	Low	Random	Inspect system for leaks	Shift	Operator	Report excessive leaks for scheduled repairs.
						-Replace impeller	-10 years		
	Horizontal pump					-Inspect and measure clearances	-Annually	Maintenance	
WSO-PAGPS-0075 Booster Pump 2	between bearings	Impeller	Impeller wear	Low	Age-related	after every		contractor	Inspect during annual overhauls.
	Horizontal pump							Maintenance	
WSO-PAGPS-0076 Booster Pump 2	between bearings	Suction strainer	Blockage	Medium	Age-related	Clean strainer	Annually	contractor	During annual overhauls.
·	Horizontal pump				-		· ·	Maintenance	Avoid overgreasing. Use correct grease as stipulated by bearing
WSO-PAGPS-0072 Booster Pump 3	between bearings	Bearings	Loss of lubrication	High	Age-related	Scheduled greasing	Weekly	contractor	manufacturer.
		8-				8	,		Refer to pump specifications on minimum NPSH requirements. Follow
	Horizontal pump					Monitor suction pressure not to go			company policy in dealing with cavitation issues (e.g. call MCC to increase
WSO-PAGPS-0072 Booster Pump 3	between bearings	Bearings	High vibration due to cavitation	High	Random	below xx head.	Every hour	Operator	suction pressure and/or shutdown pumps)
W3O-FAGE3-0072 BOOSTEI FUITIP 3	Horizontal pump	Bearings	High vibration due to bearing failure	nigii	Kalluulli	Delow XX Head.	Every flour	Maintenance	Use trained contractor for the appropriate vibration monitoring device.
WCO DA CDC 0073		Baranta and		111-1	Random	Vibration monitoring	2	contractor	
WSO-PAGPS-0072 Booster Pump 3	between bearings	Bearings	(e.g. foreign materials in lubrication)	High	Random	Vibration monitoring	2-weekly (every 2 weeks)		Report findings every month.
	Horizontal pump							Maintenance	
WSO-PAGPS-0072 Booster Pump 3	between bearings	Packing	Excessive leaks	Medium	Age-related	Tighten packing bolts	2-weekly (every 2 weeks)	contractor	Avoid overtightening of packing bolts.
	Horizontal pump					Motor (skin) temperature			
WSO-PAGPS-0072 Booster Pump 3	between bearings	Motor	Motor trip due to overloading	High	Random	measurement	Every hour	Operator	Refer to motor specifications on maximum allowable surface temperature
	Horizontal pump		Motor burns due to failure of winding					Maintenance	
WSO-PAGPS-0072 Booster Pump 3	between bearings	Motor	insulation	Low	Age-related	Inspect motor winding insulation	Annually	contractor	Use qualified maintenance contractor.
	Horizontal pump							Maintenance	Use qualified maintenance contractor. Failure of this valve may cause
WSO-PAGPS-0072 Booster Pump 3	between bearings	Suction isolating valve	Valve passing (leaks)	Medium	Age-related	Test valve integrity	Annually	contractor	problems during maintenance of pump/motor.
	Horizontal pump							Maintenance	Use qualified maintenance contractor. Failure of this valve is not critical
WSO-PAGPS-0072 Booster Pump 3	between bearings	Discharge isolating valve	Valve passing (leaks)	Low	Age-related	Test valve integrity	Annually	contractor	long as the check valve is working.
									Replace with calibrated pressure gauge. Mark with acceptable operating
	Horizontal pump		Pressure gauge reading is wrong due to					Maintenance	range. Criticality is low if the online pressure sensors are still functioning
WSO-PAGPS-0072 Booster Pump 3	between bearings	Pressure gauge (suction & discharge)	wear	Low	Age-related	Replace pressure gauge	Annually	contractor	properly.
	Horizontal pump	Pressure sensors (suction &				.,	Semi-annually (every 6	Maintenance	F - Y - Y
WSO-PAGPS-0072 Booster Pump 3	between bearings	discharge)	Pressure reading is erroneous	High	Random	Calibrate pressure sensors	months)	contractor	Use qualified maintenance contractor.
Wise Trial 5 core Booster Famp 5	Horizontal pump	discharge)	Leaks due to loose bolts and/or gasket	6	nunuum	Re-tighten bolts using specified	monunsy	Maintenance	Use proper bolt tightening methods (e.g. manual, hydraulic, pneumatic,
WSO-PAGPS-0072 Booster Pump 3	between bearings	Flange	failure	Medium	Age-related	torque values	Annually	contractor	tensioning, etc.) Apply required bolt torque values.
	octween bearings	. wile		wiculaili	, ige i ciateu	torque values	rundany	Contractor	Refer to recommended life of dampers by manufacturer. Otherwise,
	Hariaantal aaa		Looks does to detectorated materials			Bankas vikustias damas su harad		Maintenance	
MICO DA CDC 0073 Danatas D 3	Horizontal pump	Vibratian damage	Leaks due to deteriorated materials	Madius	Ann valoto d	Replace vibration dampers based	F		purchase spare damper before its recommended life to ensure availability
WSO-PAGPS-0072 Booster Pump 3	between bearings	Vibration dampers	caused by fatigue	Medium	Age-related	on recommended life	Every 10 years	contractor	when needed.
	Horizontal pump			1.	L .	l	at 15:		
WSO-PAGPS-0072 Booster Pump 3	between bearings	System	General system leaks	Low	Random	Inspect system for leaks	Shift	Operator	Report excessive leaks for scheduled repairs.
					1	-Replace impeller	-10 years		
	Horizontal pump					-Inspect and measure clearances	-Annually	Maintenance	
WSO-PAGPS-0072 Booster Pump 3	between bearings	Impeller	Impeller wear	Low	Age-related	after every		contractor	Inspect during annual overhauls.
	Horizontal pump							Maintenance	
WSO-PAGPS-0072 Booster Pump 3	between bearings	Suction strainer	Blockage	Medium	Age-related	Clean strainer	Annually	contractor	During annual overhauls.
	Horizontal pump							Maintenance	Avoid overgreasing. Use correct grease as stipulated by bearing
	between bearings	Bearings	Loss of lubrication	High	Age-related	Scheduled greasing	Weekly	contractor	manufacturer.
WSO-PAGPS-0082 Booster Pump 4		<u> </u>			3		'		Refer to pump specifications on minimum NPSH requirements. Follow
WSO-PAGPS-0082 Booster Pump 4		1		1		Monitor suction pressure not to go			company policy in dealing with cavitation issues (e.g. call MCC to increase
WSO-PAGPS-0082 Booster Pump 4	Horizontal numn								
	Horizontal pump	Descines	High dibrotion due to contestion	Ulimb	Dandan			0	
WSO-PAGPS-0082 Booster Pump 4 WSO-PAGPS-0082 Booster Pump 4	between bearings	Bearings	High vibration due to cavitation	High	Random	below xx head.	Every hour	Operator	suction pressure and/or shutdown pumps)
		Bearings Bearings	High vibration due to cavitation High vibration due to bearing failure (e.g. foreign materials in lubrication)	High High	Random			Operator Maintenance contractor	



						Failure				
sset Code	Name	Asset Description	Component	Failure Mode	Criticality	Pattern	Task	Frequency	Done by	Comments
		Horizontal pump							Maintenance	
SO-PAGPS-0082	Booster Pump 4	between bearings	Packing	Excessive leaks	Medium	Age-related	Tighten packing bolts	2-weekly (every 2 weeks)	contractor	Avoid overtightening of packing bolts.
		Horizontal pump				- ge : e-e-e-e	Motor (skin) temperature	, (0.0.),		
SU-DVCDS-UU83	Booster Pump 4	between bearings	Motor	Motor trip due to overloading	High	Random	measurement	Every hour	Operator	Refer to motor specifications on maximum allowable surface temperat
30-1 AGI 3-0002	booster rump 4	Horizontal pump	Wilde	Motor burns due to delibering	iligii	Nandom	measurement	Every nour	Maintenance	nerer to motor specifications on maximum allowable surface temperat
co byche uuos	Booster Pump 4	between bearings	Motor	insulation	Low	Age-related	Inspect motor winding insulation	Annually	contractor	Use qualified maintenance contractor.
3U-PAGP3-0082	Booster Pump 4		MOTOL	insulation	LOW	Age-related	inspect motor winding insulation	Annually	Maintenance	
	D	Horizontal pump	Continuity lands to a continu	Makes as a standard of the Lea			Tark and a faka ander	A		Use qualified maintenance contractor. Failure of this valve may cause
SO-PAGPS-0082	Booster Pump 4	between bearings	Suction isolating valve	Valve passing (leaks)	Medium	Age-related	Test valve integrity	Annually	contractor	problems during maintenance of pump/motor.
		Horizontal pump							Maintenance	Use qualified maintenance contractor. Failure of this valve is not critic
SO-PAGPS-0082	Booster Pump 4	between bearings	Discharge isolating valve	Valve passing (leaks)	Low	Age-related	Test valve integrity	Annually	contractor	long as the check valve is working.
										Replace with calibrated pressure gauge. Mark with acceptable operati
		Horizontal pump		Pressure gauge reading is wrong due to					Maintenance	range. Criticality is low if the online pressure sensors are still functioni
SO-PAGPS-0082	Booster Pump 4	between bearings	Pressure gauge (suction & discharge)	wear	Low	Age-related	Replace pressure gauge	Annually	contractor	properly.
		Horizontal pump	Pressure sensors (suction &					Semi-annually (every 6	Maintenance	
SO-PAGPS-0082	Booster Pump 4	between bearings	discharge)	Pressure reading is erroneous	High	Random	Calibrate pressure sensors	months)	contractor	Use qualified maintenance contractor.
		Horizontal pump		Leaks due to loose bolts and/or gasket			Re-tighten bolts using specified		Maintenance	Use proper bolt tightening methods (e.g. manual, hydraulic, pneumati
O-PAGPS-0082	Booster Pump 4	between bearings	Flange	failure	Medium	Age-related	torque values	Annually	contractor	tensioning, etc.) Apply required bolt torque values.
			,					·		Refer to recommended life of dampers by manufacturer. Otherwise,
		Horizontal pump		Leaks due to deteriorated materials			Replace vibration dampers based		Maintenance	purchase spare damper before its recommended life to ensure availab
C-DVCD2-UU83	Booster Pump 4	between bearings	Vibration dampers	caused by fatigue	Medium	Age-related	on recommended life	Every 10 years	contractor	when needed.
30 1 AGI 3 0002	booster rump 4	Horizontal pump	Vibration dampers	caused by ratigue	Wicalam	Age Telateu	on recommended me	Every 10 years	contractor	when needed.
	D		ct	Consultanton India		Daniel and	I	Shift	0	Book and account of the last few colored and a country
SU-PAGPS-0082	Booster Pump 4	between bearings	System	General system leaks	Low	Random	Inspect system for leaks		Operator	Report excessive leaks for scheduled repairs.
							-Replace impeller	-10 years		
		Horizontal pump					-Inspect and measure clearances	-Annually	Maintenance	
SO-PAGPS-0082	Booster Pump 4	between bearings	Impeller	Impeller wear	Low	Age-related	after every		contractor	Inspect during annual overhauls.
		Horizontal pump							Maintenance	
O-PAGPS-0082	Booster Pump 4	between bearings	Suction strainer	Blockage	Medium	Age-related	Clean strainer	Annually	contractor	During annual overhauls.
		Horizontal pump							Maintenance	Avoid overgreasing. Use correct grease as stipulated by bearing
SO-PAGPS-0092	Booster Pump 5	between bearings	Bearings	Loss of lubrication	High	Age-related	Scheduled greasing	Weekly	contractor	manufacturer.
										Refer to pump specifications on minimum NPSH requirements. Follow
		Horizontal pump					Monitor suction pressure not to go			company policy in dealing with cavitation issues (e.g. call MCC to incre
SO-PAGPS-0092	Booster Pump 5	between bearings	Bearings	High vibration due to cavitation	High	Random	below xx head.	Every hour	Operator	suction pressure and/or shutdown pumps)
30 171013 0032	booster rump s	Horizontal pump	bearings	High vibration due to bearing failure		nanaom	Delow As riedu.	Every nour	Maintenance	Use trained contractor for the appropriate vibration monitoring devic
SU-DVCDS-UU03	Booster Pump 5	between bearings	Bearings	(e.g. foreign materials in lubrication)	High	Random	Vibration monitoring	2-weekly (every 2 weeks)	contractor	Report findings every month.
30 1 AGI 3 0032	booster rump 5	Horizontal pump	bearings	(c.g. foreign materials in labrication)	111811	Nandom	Vibration monitoring	2-Weekly (every 2 weeks)	Maintenance	nepore mangs every monen.
CO DACDE 0003	Danatas Duma F		Decking	Excessive leaks	Medium	A a a salata d	Tighton nogling holts	2aaliki (arraas 2aalia)	contractor	Avaid avastishtasing of position halts
SU-PAGPS-0092	Booster Pump 5	between bearings	Packing	Excessive leaks	ivieaium	Age-related	Tighten packing bolts	2-weekly (every 2 weeks)	contractor	Avoid overtightening of packing bolts.
		Horizontal pump					Motor (skin) temperature		_	
O-PAGPS-0092	Booster Pump 5	between bearings	Motor	Motor trip due to overloading	High	Random	measurement	Every hour	Operator	Refer to motor specifications on maximum allowable surface tempera
		Horizontal pump		Motor burns due to failure of winding					Maintenance	
SO-PAGPS-0092	Booster Pump 5	between bearings	Motor	insulation	Low	Age-related	Inspect motor winding insulation	Annually	contractor	Use qualified maintenance contractor.
		Horizontal pump							Maintenance	Use qualified maintenance contractor. Failure of this valve may cause
SO-PAGPS-0092	Booster Pump 5	between bearings	Suction isolating valve	Valve passing (leaks)	Medium	Age-related	Test valve integrity	Annually	contractor	problems during maintenance of pump/motor.
		Horizontal pump							Maintenance	Use qualified maintenance contractor. Failure of this valve is not critic
SO-PAGPS-0092	Booster Pump 5	between bearings	Discharge isolating valve	Valve passing (leaks)	Low	Age-related	Test valve integrity	Annually	contractor	long as the check valve is working.
		-								Replace with calibrated pressure gauge. Mark with acceptable operati
		Horizontal pump		Pressure gauge reading is wrong due to					Maintenance	range. Criticality is low if the online pressure sensors are still functioning
SO-PAGPS-nno?	Booster Pump 5	between bearings	Pressure gauge (suction & discharge)		Low	Age-related	Replace pressure gauge	Annually	contractor	properly.
55 . AGI 5-0052	booster rump 3	Horizontal pump	Pressure sensors (suction & discharge)		2044	, se relateu	neplace pressure gauge	Semi-annually (every 6	Maintenance	property.
SO-PAGPS-0092	Poortor Rump C			Brossura roading is arrangous	High	Random	Calibrato proceura concore	months)		Use qualified maintenance contractor
JO-FAGES-0092	pouster runip 3	between bearings	discharge)	Pressure reading is erroneous	ı iigii	NatiuUIII	Calibrate pressure sensors	monuisj	contractor	Use qualified maintenance contractor.
	D	Horizontal pump	Flores	Leaks due to loose bolts and/or gasket			Re-tighten bolts using specified	A	Maintenance	Use proper bolt tightening methods (e.g. manual, hydraulic, pneumat
U-PAGPS-0092	Booster Pump 5	between bearings	Flange	failure	Medium	Age-related	torque values	Annually	contractor	tensioning, etc.) Apply required bolt torque values.
										Refer to recommended life of dampers by manufacturer. Otherwise,
		Horizontal pump		Leaks due to deteriorated materials			Replace vibration dampers based		Maintenance	purchase spare damper before its recommended life to ensure available
SO-PAGPS-0092	Booster Pump 5	between bearings	Vibration dampers	caused by fatigue	Medium	Age-related	on recommended life	Every 10 years	contractor	when needed.
		Horizontal pump								
SO-PAGPS-0092	Booster Pump 5	between bearings	System	General system leaks	Low	Random	Inspect system for leaks	Shift	Operator	Report excessive leaks for scheduled repairs.
			1			1	-Replace impeller	-10 years		
		Horizontal pump					-Inspect and measure clearances	-Annually	Maintenance	
	Booster Pump 5	between bearings	Impeller	Impeller wear	Low	Age-related	after every	,dully	contractor	Inspect during annual overhauls.
				IIIIDCIEL MEGI			Iditel EVELV	1		IIIISPECE GULIUS GIIIIUGI OVEITIGUIS.



						Failure				
Asset Code	Name	Asset Description	Component	Failure Mode	Criticality	Pattern	Task	Frequency	Done by	Comments
		Horizontal pump							Maintenance	
WSO-PAGPS-0092	Booster Pump 5	between bearings	Suction strainer	Blockage	Medium	Age-related	Clean strainer	Annually	contractor	During annual overhauls.
	Booster Pump 6 -	Horizontal pump								
WSO-PAGPS-0102	SPARE (dedicated)	between bearings	Bearings	bearing failure caused by false brinelling	High	Age-related	Rotate pump shaft 2-1/4 times	Every shift	Operator	Ensure that pump is isolated from power source
	Booster Pump 6 -	Horizontal pump		Bearing failure caused by contaminated			Inspect oil for water contamination	n	Maintenance	
WSO-PAGPS-0102	SPARE (dedicated)	between bearings	Bearings	oil	High	Random	Regrease as necessary	Weekly	contractor	
	Booster Pump 6 -	Horizontal pump					Start pump and run for at least 2			
WSO-PAGPS-0102	SPARE (dedicated)	between bearings	Starter; Auto start system	Fail to start	High	Random	hours. Check all functionalities.	Monthly	Operator	Do this during visit by maintenance contractor.

The list represents an initial recommended maintenance program for the mechanical (including motors and instruments) assets in Pagcor Pumping Facilities. The methodology used in its development is RCM (Reliability-Centered Maintenance). It is not intended to be the final list and should be treated as a "living" program. This simply means that it should always be reviewed and continuously improved over time. However, in doing this, the organization responsible for its sustainability should be aware of the methodologies and concepts used in RCM.

CRITICALITY MATRIX (Generic)

