FMEA INFORMATION WORKSHEET	ELEMENT	FUNC. LOC.	PM CODE
	Pan Conveyor	PN	PM114007
	COMPONENT	MADE BY	DATE
		Eagle Team	6/20/2001
		REVIEWED BY	DATE

	Function		Functional Failure		Failure Mode (Failure Cause)	Effects of Failure (What happens when it fails)
1	To transfer material from one location to another at a specific rate.	A	Does not transfer material from one location to another at a specific rate.	1	Normal wear of chain	Chain stops. Alarm sounds in control room. Replace chain. Downtime 8 to 36 hours.
				2	Improper adjustment of chain tension at installation	Chain stops. Alarm sounds in control room. Properly adjust chain tension. Downtime 0.5 to 1 hours.
				3	Normal wear of mechanical chain tensioner	Chain stops. Alarm sounds in control room. Replace or repair chain tensioner. Downtime 2 to 8 hours.
				4	Normal wear of adjustment screws	Chain stops. Alarm sounds in control room. Replace or repair chain tensioner. Downtime 2 to 8 hours.
				5	corrosion of adjustment screws	Chain stops. Alarm sounds in control room. Replace or repair chain tensioner. Downtime 2 to 8 hours.
				6	Excessively hot clinker	Chain stops. Alarm sounds in control room. Replace chain. Downtime 8 to 36 hours.
				7	chain sprockets out of alignment	Chain stops. Alarm sounds in control room. Proper alignment of chain sprocket. Downtime 2 to 8 hours.
				8	Rollers out of alignment	Chain stops. Alarm sounds in control room. Proper alignment of chain rollers. Downtime 1 to 2 hours.
				9	Improper application of chain	Chain stops. Alarm sounds in control room. Replace chain. Downtime 8 to 36 hours.
				10	Foreign object jamming chain	Chain stops. Alarm sounds in control room. Remove foreign object from chain . Downtime 2 to 8 hours.
				11	Excessive material on chain	Chain stops. Alarm sounds in control room. Remove excessive material on chain. Downtime 2 to 8 hours.
				12	Normal wear of bindicator	chain stops. Alarm sounds in control room. Replace bindicator device in hopper. Down time: 1 to 2 hours.
				13	Improper adjustment of bindicator	chain stops. Alarm sounds in control room. Re-adjust bindicator device in hopper. Down time: 1 to 2 hours.
				14	Loss of signal to bindicator	Loss of electrical interlock. chain stops. Alarm sounds in control room. Restore bindicator device signal. Down time: 1 to 2 hours.
				15	Normal wear of zero speed switch	Loss of electrical interlock. chain stops. Alarm sounds in control room. Replace zero speed switch. Down time: 1 to 2 hours.
				16	Loss of signal to zero speed switch	Loss of electrical interlock. chain stops. Alarm sounds in control room. Restore signal to zero speed switch. Down time: 1 to 2 hours.
				17	Improper adjustment of zero speed switch	Loss of electrical interlock. chain stops. Alarm sounds in control room. Adjust zero speed switch. Down time: 1 to 2 hours.
				18	Normal wear of torque limit switch	Loss of electrical interlock. chain stops. Alarm sounds in control room. Replace torque limit switch. Down time: 1 to 2 hours.
				19	Improper adjustment of torque limit switch	Loss of electrical interlock. chain stops. Alarm sounds in control room. Adjust torque limit switch. Down time: 1 to 2 hours.
				20	Loss of signal to proximity switch	Loss of electrical interlock. chain stops. Alarm sounds in control room. Restore signal to proximity switch. Down time: 1 to 2 hours.

				21	**Reference Process Station / PLC FMEA**	
				22	**Reference Bearing FMEA**	
				23	Normal wear of head / tail sprocket rim	Chain stops. Alarm sounds in control room. Replace head / tail sprocket rim. Downtime 8 to 36 hours.
				24	Improper installation of head / tail sprocket rim	Chain stops. Alarm sounds in control room. Reinstall head / tail sprocket rim. Downtime 8 to 36 hours.
				25	Normal wear of head / tail shaft	Chain stops. Alarm sounds in control room. Replace head / tail shaft. Downtime 8 to 36 hours.
				26	Foreign object rubbing on head / tail shaft	Chain stops. Alarm sounds in control room. Replace head / tail shaft. Downtime 8 to 36 hours.
				27	Heavy impact on head / tail shaft	Chain stops. Alarm sounds in control room. Replace head / tail shaft. Downtime 8 to 36 hours.
				28	Normal wear of rail	Chain stops. Alarm sounds in control room. Replace rail section Downtime 8 to 12 hours.
				29	Improper installation of rail	Chain stops. Alarm sounds in control room. Reinstall rail section Downtime 8 to 12 hours.
				30	**Reference Low Voltage motor FMEA**	
				31	**Reference gear box FMEA**	
				32	**Reference coupling FMEA**	
				33	**Reference chain or chain drive FMEA**	
				34	**Reference hydraulic drive FM**	
				35	**Reference hydraulic system FM**	
				36	Normal wear of pan	Chain stops. Alarm sounds in control room. Replace pan. Downtime 8 to 12 hours.
				37	Foreign object in pan	Chain stops. Alarm sounds in control room. Replace pan. Downtime 8 to 12 hours.
				38	Improper installation of pan	Chain stops. Alarm sounds in control room. Reinstall pan. Downtime 8 to 12 hours.
				39	Normal wear of trip cord switch	Belt stops. Alarm sounds in control room. Replace trip cord switch. Downtime 1 to 2 hours
				40	Improper adjustment of trip cord switch	Belt stops. Alarm sounds in control room. Readjust trip cord switch. Downtime .3 to 1 hours
				41	Loss of signal to proximity switch	Belt stops. Alarm sounds in control room. Restore signal to trip cord switch. Downtime .3 to 1 hours
2	Does not collect fugitive emissions	A	Dust Collector failed	1	**Reference dust collector FMEA**	

FAILURE MODE CAUSE ANALYSIS WORKSHEET					ELEMENT Pan Conveyor		FUNC. LOC. PN	Made by Eagle Team	Date 6/20/2001	
					COMPONENT 0		PM CODE PM114007	Reviewed by 0	Date 12/30/1899	
F	**FF**	**FM**	**Functional Failure**	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**	**Level 7**
1	A	1	Does not transfer material from one location to another at a specific rate.	Chain failed	Normal wear of chain					
		2			Improper tension of chain	Improper adjustment of chain tension at installation				
		3				Mechanical chain tensioner failed	Normal wear of mechanical chain tensioner			
		4					Adjustment screws failed	Normal wear of adjustment screws		
		5						corrosion of adjustment screws		
		6			Excessive heat on chain	Excessively hot clinker				
		7			chain out of alignment	chain sprockets out of alignment				
		8				Rollers out of alignment				
		9			Improper application of chain					
		10			Overloaded conditions on chain	Foreign object jamming chain				
		11				Excessive material on chain				
		12				Electrical interlocks failed	Bindicator failed	Normal wear of bindicator		
		13						Improper adjustment of bindicator		
		14						Loss of signal to bindicator		
		15					Zero speed switch failed	Normal wear of zero speed switch		
		16						Loss of signal to zero speed switch		
		17						Improper adjustment of zero speed switch		
		18					Torque limit switch failed	Normal wear of torque limit switch		
		19						Improper adjustment of torque limit switch		
		20						Loss of signal to proximity switch		
		21					Process Station / PLC failed	**Reference Process Station / PLC FM**		
		22			Bearing failed	**Reference Bearing FM**				
		23			Head / tail sprocket failed	Normal wear of head / tail sprocket rim				
		24				Improper installation of head / tail sprocket rim				

		25			Head / tail shaft failed	Normal wear of head / tail shaft				
		26				Foreign object rubbing on head / tail shaft				
		27				Heavy impact on head / tail shaft				
						Bearing failed				
		28		Rail failed	Normal wear of rail					
		29			Improper installation of rail					
		30		Motor failed	**Reference Low Voltage motor FM**					
		31		Gear box failed	**Reference gear box FM**					
		32		Coupling failed	**Reference coupling FM**					
		33		Drive system failed	**Reference chain or chain drive FM**					
		34		Hydraulic drive failed	**Reference hydraulic drive FM**					
		35		Hydraulic system failed	**Reference hydraulic system FM**					
		36		Conveyor pan failed	Normal wear of pan					
		37			Foreign object in pan					
		38			Improper installation of pan					
		39		Trip cord switch failed	Normal wear of trip cord switch					
		40			Improper adjustment of trip cord switch					
		41			Loss of signal to proximity switch					
2	A	1	Does not collect fugitive emissions	Dust Collector failed	**Reference dust collector FM**					

RCM			ELEMENT										FUNCT. LOC.	Made by	Date	
Information Reference			Evaluation of Consequences				CM H1 S1 O1	SR H2 S2 O2	SD H3 S3 O3	Default Tasks						
F	FF	FM	H	S	E	O	.N1	.N2	.N3	H4	H5	S4	Proposed Task	Frequency	Trade	Man hours
1	A	1	Y	N	N	Y	Y						Inspect chain for excessive wear	6 month	mechanical	2
1	A	1	Y	N	N	Y	Y						Inspect chain for excessive wear	1 day	operation	0.5
1	A	2	Y	N	N	Y	Y						Inspect chain for proper adjustment of tension	6 month	mechanical	0.3
1	A	3	Y	N	N	Y	Y						Inspect mechanical chain tensioner for excessive wear	6 month	mechanical	0.3
1	A	4	Y	N	N	Y	Y						Inspect adjustment screws for excessive wear	6 month	mechanical	0.3
1	A	5	Y	N	N	Y	Y						Inspect corrosion of adjustment screws	6 month	mechanical	0.3
1	A	6	Y	N	N	Y	Y						Monitor air flow in clinker cooler	1 shift	operation	0.3
1	A	7	Y	N	N	Y	Y						Inspect chain sprockets for out of alignment condition	6 month	mechanical	0.3
1	A	8	Y	N	N	Y	Y						Inspect rollers for out of alignment condition	6 month	mechanical	0.5
1	A	9	Y	N	N	Y	Y						Check for proper application of chain before installation	ea repair	mechanical	0.3
1	A	10	Y	N	N	Y	N	N	N				Run to failure			
1	A	11	Y	N	N	Y	Y						Monitor for excessive material on chain	1 hour	operation	0.3
1	A	12	Y	N	N	Y	Y						Test bindicator for proper operation	6 month	instrumentation	1
1	A	13	Y	N	N	Y	Y						Test bindicator for proper operation	6 month	instrumentation	1
1	A	14	Y	N	N	Y	Y						Test bindicator by simulation for loss of signal	6 month	instrumentation	0.3
1	A	15	Y	N	N	Y	Y						Test zero speed switch for proper operation	6 month	instrumentation	0.3
1	A	16	Y	N	N	Y	Y						Test zero speed switch by simulation for loss of signal	6 month	instrumentation	0.3
1	A	17	Y	N	N	Y	Y						Test zero speed switch for proper adjustment	6 month	instrumentation	0.3
1	A	18	Y	N	N	Y	Y						Test torque limit switch for proper operation	6 month	instrumentation	0.3
1	A	19	Y	N	N	Y	Y						Test torque limit switch for proper adjustment	6 month	instrumentation	0.3
1	A	20	Y	N	N	Y	Y						Test proximity switch by simulation for loss of signal	6 month	instrumentation	0.3
1	A	21											**Reference Process Station / PLC RCM**			
1	A	22											**Reference Bearing RCM**			
1	A	23	Y	N	N	Y	Y						Inspect for excessive wear of head / tail sprocket rim	6 month	mechanical	0.5
1	A	24	Y	N	N	Y	Y						Check for proper installation of head / tail sprocket rim during installation	ea repair	mechanical	0.3
1	A	25	Y	N	N	Y	Y						Inspect for excessive wear of head / tail shaft	6 month	mechanical	0.5
1	A	26	Y	N	N	Y	Y						Inspect for foreign object rubbing on head / tail shaft	1 shift	operation	0.3
1	A	27	Y	N	N	Y	N	N	N				Run to failure			
1	A	28	Y	N	N	Y	Y						Inspect rails for excessive wear	1 month	operation	0.3
1	A	29	Y	N	N	Y	Y						Check for proper installation of rails during installation	ea repair	mechanical	0.3
1	A	30											**Reference Low Voltage motor RCM**			
1	A	31											**Reference gear box RCM**			
1	A	32											**Reference coupling RCM**			
1	A	33											**Reference chain or chain drive RCM**			
1	A	34											**Reference hydraulic drive FM**			
1	A	35											**Reference hydraulic system FM**			
1	A	36	Y	N	N	Y	Y						Inspect for excessive wear of pan	1 month	operation	0.3
1	A	37	Y	N	N	Y	Y						Inspect for foreign objects in/on pan	1 shift	operation	0.3
1	A	38	Y	N	N	Y	Y						Check for proper installation of pan during installation	ea repair	mechanical	0.3
1	A	39	Y	N	N	Y	Y						Test the trip cord switch for proper operation	1 month	instrumentation	0.3
1	A	40	Y	N	N	Y	Y						Test the trip cord switch for proper adjustment	1 month	instrumentation	0.3
1	A	41	Y	N	N	Y	Y						Test proximity switch by simulation for loss of signal	1 month	instrumentation	0.3
2	A	1											**Reference dust collector RCM**			



