

BAB VI

KESIMPULAN DAN SARAN

6.1 Kesimpulan

1. Secara analisa kualitatif, RCM menghasilkan strategi perawatan yang lebih baik dibanding strategi perawatan sebelumnya baik terhadap resiko keselamatan, lingkungan, produksi, dan biaya. Strategi perawatan RCM menentukan perawatan suatu alat fokus pada fungsi yang paling penting dari alat tersebut (*critical item*). Resiko yang awal dengan menggunakan sistem perawatan konvensional, seperti *Preventive Maintenance* (PM), yang tidak membedakan tingkat kritikal alat dalam penyusunan strategi perawatan. Penyusunan interval dalam sistem PM didasari oleh asumsi dari hubungan sebab akibat antara *scheduled maintenance* dan kehandalan operasi Resiko setelah perawatan diharapkan tidak terjadi kasus dan kemungkinannya sangat kecil sekali, karna telah di antisipasi dengan system perawatan RCM.. Efektifitas penerapan RCM pada *slug catcher* ini baru sebatas meningkatkan kualitas strategi perawatan alat sesuai fungsi kritikal.

Analisa resiko pada 46 peralatan dengan metode FMEA menghasilkan resiko lost time injury adalah 4 kasus, resiko pencemaran lingkungan 2 kasus, resiko kehilangan produksi 4 kasus dan pengeluaran beaya yang besar 2 kasus.

2. Analisa berdasarkan metode FMEA dilakukan untuk mendapatkan sistem perawatan RCM pada alat produksi *slug catcher* di Hangtuah. Analisa ini dilakukan pada 46 peralatan pada *slug catcher* 1 (34 peralatan atau 74%) dan *slug catcher* 2 (12 peralatan atau 26). Dalam pengolahan data pada *Failure Mode and Effect Analysis* (FMEA) diperoleh sekitar 67% atau 31 alat di kedua *Slug Catcher* memiliki *overall risk tinggi* dan *menengah*. Sisanya sebanyak 33% atau 15 alat memiliki *overall risk rendah*. Hal ini menunjukkan ada 67% peralatan pada kedua *slug catcher* yang perlu strategi perawatan tertentu, sedangkan 33% sisanya dijalankan sampai rusak atau *run to failure* karena memiliki tingkat resiko rendah.

6.2 Saran

1. Pelaksanaan RCM dapat berjalan dengan baik dan lancar maka hendaknya menerapkan hasil proses RCM secara konsisten.
2. Dalam penelitian ini, data input yang diperoleh relatif masih kurang, sehingga tingkat akurasi terhadap hasil yang dicapai berkurang. Untuk meningkatkan tingkat akurasi hasil penelitian ini maka dilakukan proses validasi dan penyesuaian terhadap hasil yang diperoleh. Data sejarah kerusakan alat perlu direkam, sehingga ada pemasukan informasi kegagalan yang terjadi seiring dengan pengimplementasian RCM Hal tersebut penting dalam analisa kehandalan suatu alat, agar dapat menyesuaikan perawatan yang lebih tepat terhadap peralatan yang ada

3. Perusahaan perlu merekam semua informasi yang dibutuhkan untuk menyempurnakan dan juga evaluasi penerapan RCM, seperti data kerusakan alat, pelaksanaan perawatan, penggantian alat, biaya, dsb.



DAFTAR PUSTAKA

- Kohar Sulistyadi, "*Panduan Penulisan Skripsi dan Tesis*", Jakarta, 2005
- Corder Antony, "*Teknik Manajemen Pemeliharaan*", Jakarta, Erlangga, 1988
- Crow, Kenneth, "*Failure Modes and Effects Analysis (FMEA)*", DRM Associates, 2002.
- Manimaran, "*Basic Concepts Reliability, MTTF, Availability, etc*", 2000
- Handal Wira Mandiri, PT "*Materi Training RCM*", 25-26 April 2005.
- Moubray, John "*Reliability-Centered Maintenance RCM II*", Industrial Press Inc., New York, 1992.
- O'Connor, Patrick DT "*Practical Reliability Engineering*", John Wiley & sons, Chichester & New York, 1996.
- Pride, Alan "*Reliability-Centered Maintenance, Associate Director Systems Reliability*", Smithsonian Institution, 2005
- Wireman, Terry "*Developing Performance Indicator for Managing Maintenance*", Industrial Press Inc., New York, 1998.
- Assauri S, "*Manajemen produksi dan Operasi*", edisi Revisi Penerbit Fakultas Ekonomi Universitas Indonesia, Jakarta 2004.
- Mirza, "*Sistem Perawatan*", Fakultas Teknologi Industri YAI, Jakarta 2002.

LAMPIRAN A



LAMPIRAN A

Sys. Code : 22 **Sys. Name :** PROCESS GAS
Function : To catch/hold/remove slugs (liquid) of the Process Gas (wet) from Hangtuh Riser System (34) and maintain stability of flow to Hangtuh Gas Compression System (23).

Equip. Code : 22MBF001_HT **Equip. Name :** CATCHER, SLUG RISER 1 **Nos. of Tags :** 39
Function : To collect the gas from the incoming field, to catch/hold/remove slugs (liquid) and thus maintain stability of flow to the compressor train scrubbers.

Tag Code	Tag Name	Tag Type	Tag Description
22AT0105_HT	Transmitter,Dewpoint Analyzer	Transmitter, Analyzer	
22AT0205_HT	Transmitter,Dewpoint Analyzer ADGF Slug	Transmitter, Analyzer	
22AT0206_HT	Transmitter,Moisture Analyzer ADGF Slug	Transmitter, Analyzer	
22BDV0041_HT	Valve,Blowdown Riser	Valve, Blowdown	
22FT0001_HT	Transmitter,Flow	Transmitter, Flow	can't find in P&ID
22FT0011_HT	Transmitter,Flow	Transmitter, Flow	
22FT0021_HT	Transmitter,Flow	Transmitter, Flow	Future use
22FT0121_HT	Transmitter,Flow	Transmitter, Flow	
22FT0201_HT	Transmitter,Flow (ADGF)	Transmitter, Flow	
22LSHH0044-HT	Sensor,Level High-High	Switch, Level	
22LSHH0244-HT	Sensor,Level High-High	Switch, Level	
22LSLL0043-HT	Sensor,Level Low-Low	Switch, Level	
22LSLL0243-HT	Sensor,Level Low-Low	Switch, Level	
22LT0040_HT	Transmitter,Level	Transmitter, Level	
22LV0040A_HT	Valve,Level Control Riser	Valve, Level Control	
22LV0040B_HT	Valve,Level Control Riser	Valve, Level Control	
22MBF001_HT	Catcher,Slug Riser	Vessel, Separator	
22PSV0040A_HT	Valve,Pressure Safety Riser (ADGF)	Pressure Safety Valve	
22PSV0040B_HT	Valve,Pressure Safety Riser (ADGF)	Pressure Safety Valve	
22PT0006_HT	Transmitter,Pressure	Transmitter, Pressure	can't find in P&ID
22PT0012_HT	Transmitter,Pressure	Transmitter, Pressure	
22PT0022_HT	Transmitter,Pressure	Transmitter, Pressure	
22PT0030A_HT	Transmitter,Pressure	Transmitter, Pressure	
22PT0030B_HT	Transmitter,Pressure	Transmitter, Pressure	
22PT0031_HT	Transmitter,Pressure	Transmitter, Pressure	
22PT0101_HT	Transmitter,Pressure	Transmitter, Pressure	
22PT0122_HT	Transmitter,Pressure (ADGF)	Transmitter, Pressure	
22PV0121_HT	Valve,Pressure Control (ADGF)	Valve, Pressure Control	
22SDV0040_HT	Valve,Shutdown Riser	Valve, Ball, SDV	
22SDV0052_HT	Valve,Shutdown Riser	Valve, Ball, SDV	
22SDV0062_HT	Valve,Shutdown Riser	Valve, Ball, SDV	
22TT0001_HT	Transmitter,Temperature	Transmitter, Temperature	cae't find in P&ID
22TT0011_HT	Transmitter,Temperature	Transmitter, Temperature	
22TT0021_HT	Transmitter,Temperature	Transmitter, Temperature	
22TT0041_HT	Transmitter,Temperature	Transmitter, Temperature	
22TT0101_HT	Transmitter,Temperature	Transmitter, Temperature	
26HV0001A_HT	Valve,Hand Riser	Valve, Hand	
26HV0001B_HT	Valve,Hand Riser	Valve, Hand	
UM	Ultrasonic Meter	Meter, Flow	

LAMPIRAN B



LAMPIRAN B - RISK MATRICES

Environment Risk Matrix

Environ: Risk Matrix Definition

Environ Risk

Frequency	Consequence				
	Zero Effect	Slight Effect	Tier 1 (Low)	Tier 2 (Medium)	Tier 3 (High)
A 1yr	L	M	F	M	H
B 10yrs	VL	L	M	M	M
C 100yrs	VL	L	M	M	M
D 1000yrs	VL	VL	L	M	H
E 10000yrs	VL	VL	VL	L	M

RISK MATRICES

LAMPIRAN B - RISK MATRICES

Personnel/Safety Risk Matrix

Personnel Risk Matrix Definition

Frequency	Consequence				
	1 Slight injuries	2 Lost time injury	3 Major injuries	4 Single fatalities	5 Multiple fatalities
A 10	M	H	A	M	M
B 100	L	M	M	M	M
C 1000	VL	L	M	M	M
D 10000	VL	VL	-	M	M
E 100000	VL	VL	VL	M	M

LAMPIRAN C



LAMPIRAN C

NILAI RESIKO ALAT HASIL DISKUSI/WAWANCARA

No	Tag Code	Tagname	Keselamatan		Lingkungan		Ekonomi/Produksi		Biaya		Resiko Keseluruhan
			Frequency	Consequences	Frequency	Consequences	Frequency	Consequences	Frequency	Consequences	
1	22AT0105_HT	Transmitter,Dewpoint Analyzer	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Rendah (L)
2	22AT0205_HT	Transmitter,Dewpoint Analyzer,ADGF Slug	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Rendah (L)
3	22AT0206_HT	Transmitter,Moisture Analyzer,ADGF Slug	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
4	22BDV0041_HT	Valve,Blowdown Riser	(A) 10	(2) Lost Time Injury	(A) 1 Year	Zero Effect	(A) 1 Year	<2 Hrs	(A) 1	US\$ 50,000	Tinggi (H)
5	22FT0011_HT	Transmitter,Flow	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
6	22FT0121_HT	Transmitter,Flow	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
7	22FT0201_HT	Transmitter,Flow	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
8	22LSHH0044-HT	Sensor,Level High-High	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
9	22LSHH0244-HT	Sensor,Level High-High	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
10	22LSLL0043-HT	Sensor,Level Low-Low	(A) 10	(2) Lost Time Injury	(A) 1 Year	Tier 1 (Low)	(B) 5 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Tinggi (H)
11	22LSLL0243-HT	Sensor,Level Low-Low	(A) 10	(2) Lost Time Injury	(A) 1 Year	Tier 1 (Low)	(B) 5 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Tinggi (H)
12	22LT0040_HT	Transmitter,Level	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Rendah (L)
13	22LV0040A_HT	Valve,Level Control Riser	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Menengah (M)
14	22LV0040B_HT	Valve,Level Control Riser	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Menengah (M)
15	22MBF001_HT	Catcher,Slug Riser	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(A) 1 Year	<2 Hrs	(A) 1	US\$ 150,000	Tinggi (H)
16	22PSV0040A_HT	Valve,Pressure Safety Riser,(ADGF)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
17	22PSV0040B_HT	Valve,Pressure Safety Riser,(ADGF)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
18	22PT0012_HT	Transmitter,Pressure	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Menengah (M)
19	22PT0030A_HT	Transmitter,Pressure	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
20	22PT0030B_HT	Transmitter,Pressure	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
21	22PT0031_HT	Transmitter,Pressure	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Menengah (M)

22	22PT0101_HT	Transmitter,Pressure	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Rendah (L)
23	22PT0122_HT	Transmitter,Pressure (ADGF)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Menengah (M)
24	22PV0121_HT	Valve,Pressure Control (ADGF)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Menengah (M)
25	22SDV0040_HT	Valve,Shutdown Riser	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Rendah (L)
26	22SDV0052_HT	Valve,Shutdown Riser	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Rendah (L)
27	22SDV0062_HT	Valve,Shutdown Riser	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Rendah (L)
28	22TT0011_HT	Transmitter, Temperature	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
29	22TT0021_HT	Transmitter, Temperature	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
30	22TT0041_HT	Transmitter, Temperature	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Rendah (L)
31	22TT0101_HT	Transmitter, Temperature	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Rendah (L)
32	26HV0001A_HT	Valve, Hand Riser	(C) 1000	(1) Slight Injuries	(B) 10 Year	Zero Effect	(D) 50 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Sangat Rendah (VL)
33	26HV0001B_HT	Valve, Hand Riser	(C) 1000	(1) Slight Injuries	(B) 10 Year	Zero Effect	(D) 50 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Sangat Rendah (VL)
34	UM	Ultrasonic Meter	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Menengah (M)
35	22BDV0241_HT	Valve, Blowdown Riser (ADGF)	(A) 10	(2) Lost Time Injuries	(A) 1 Year	Zero Effect	(A) 1 Year	<2 Hrs	(A) 1	US\$ 50,000	Tinggi (H)
36	22LT0240_HT	Transmitter, Level (ADGF)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Rendah (L)
37	22LV0240A_HT	Valve, Level Control Riser (ADGF)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Menengah (M)
38	22LV0240B_HT	Valve, Level Control Riser (ADGF)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Menengah (M)
39	22MBF002_HT	Catcher, Slug Riser (ADGF)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(A) 1 Year	<2 Hrs	(A) 1	US\$ 150,000	Tinggi (H)
40	22PSV0240A_HT	Valve, Pressure Safety Riser (ADGF)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
41	22PSV0240B_HT	Valve, Pressure Safety Riser (ADGF)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
42	22PT0002_HT	Transmitter, Pressure (ADGF)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(B) 5 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Menengah (M)
43	22PT0201_HT	Transmitter, Pressure (ADGF)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Rendah (L)
44	22SDV0240_HT	Valve, Shutdown Riser (ADGF)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Rendah (L)
45	22TT0121_HT	Transmitter, Temperature (BBFE)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(A) 1	US\$ 50,000	Menengah (M)
46	22TT0201_HT	Transmitter, Temperature (ADGF)	(B)100	(1) Slight Injuries	(A) 1 Year	Zero Effect	(C) 10 Year	<2 Hrs	(B) 0.2	US\$ 10,000	Rendah (L)

Ringkasan resiko keseluruhan :

- VL = 2 alat
- L = 13 alat
- M = 26 alat
- H = 6 alat

Matrik Resiko Keselamatan

Frequency	Consequences				
	Eight cases	Lost case rate	Main cases	Service failures	Multiple failures
A 1%	VL	VL	VL	VL	VL
B 10%	L	H	H	H	H
C 100%	VL	L	L	L	M
D 1000%	VL	VL	VL	VL	H
E 10000%	VL	VL	VL	VL	H

Matrik Resiko Lingkungan

Frequency	Consequences				
	Zero effect	Slight effect	Too little	Too much	Too big
A 1%	L	H	H	H	H
B 10%	VL	L	H	H	H
C 100%	VL	L	L	L	M
D 1000%	VL	VL	VL	VL	H
E 10000%	VL	VL	VL	VL	H

Kode Warna:
 Putih: Rendah
 Hijau: Sangat Rendah
 Merah: Tinggi
 Kuning: Menengah

Matrik Resiko Ekonomi/Kehilangan Produksi

Frequency	Consequences				
	1-10%	11-20%	21-30%	31-40%	41-50%
A 1%	VL	VL	VL	VL	VL
B 10%	H	H	H	H	H
C 100%	L	H	H	H	H
D 1000%	VL	L	L	L	L
E 10000%	VL	VL	VL	VL	L

Matrik Resiko Biaya

Frequency	Consequences				
	<0.1 mil	0.1-2 mil	2-3 mil	3-5 mil	>5 mil
A 1%	0.000000	0.000000	0.000000	0.000000	0.000000
B 10%	US\$ 10.000	US\$ 20.000	US\$ 30.000	US\$ 40.000	US\$ 50.000
C 100%	US\$ 5.000	US\$ 10.000	US\$ 15.000	US\$ 20.000	US\$ 25.000
D 1000%	US\$ 1.000	US\$ 2.000	US\$ 3.000	US\$ 4.000	US\$ 5.000
E 10000%	US\$ 500	US\$ 1.000	US\$ 1.500	US\$ 2.000	US\$ 2.500

Sumber : Matrik Resiko, ConocoPhillips Indonesia (2000)

LAMPIRAN D



FMEA AND RISK ANALYSIS

LAMPIRAN D - FMEA AND RISK ANALYSIS

Equip. Code : 22MBF001_HT Equip. Name : CATCHER, SLUG RISER 1 Nos. of Tags : 34

Function : To collect the gas from the incoming field, to catch/hold/remove slugs (liquid) and thus maintain stability of flow to the compressor train scrubbers.

Tag Code	Tag Name	Tag Type	Safety Risk	Env. Risk	Eco. Risk	Foll. Risk	Ovr. Risk
22AT0105_HT	Transmitter,Dewpoint Analyzer	Transmitter, Analyzer	L	L	L	L	L
Failure Mode Effect							
External leak	Small leak that is expected to be a hidden failure. Low safety, environmental, production loss expected.		VL	VL	VL	VL	L
Fails High	Dew-point and flow of the gas may be measured higher than actual. Primarily used to detect excessive liquid carryover from slug catcher.		L	L	L	L	L
Fails Low	Dew-point and flow of the gas may be measured lower than actual. Lower than actual dew point readings may not trigger the high dew point alarm. Primarily used to detect excessive liquid carryover from slug catcher.		L	L	L	L	L
Fails to Respond	Dew-point and flow of the gas may be measured lower than actual. Lower than actual dew point readings may not trigger the high dew point alarm. Primarily used to detect excessive liquid carryover from slug catcher.		L	L	L	L	L
Internal leak	Small leak that is expected to be a hidden failure. Output may be erratic but unlikely. Possible violation of electrical classification.		VL	VL	VL	VL	L

LAMPIRAN E



MAINTENANCE STRATEGY

LAMPIRAN E - TASK SELECTION

Equip. Code : 22MBF001_HT Equip. Name : CATCHER, SLUG RISER 1

Tag Code	Tag Name	Tag Type	Safety Risk	Env. Risk	Eco. Risk	Foll. Risk	Ovr. Risk
22AT0105_HT	Transmitter,Dewpoint Analyzer	Transmitter, Analyzer	L	L	L	L	L
Causes Name	Strategy	Activities	Interval	Unit	Task Note		
Circuit defective	Run To Failure	Allow this component to operate until failure is detected.	Instrument Tech		Perform corrective maintenance following detection of failure.		
Dirt Accumulation	Run To Failure	Allow this component to operate until failure is detected.	Instrument Tech		Perform corrective maintenance following detection of failure.		
Loose Parts/Defective Connections	Run To Failure	Allow this component to operate until failure is detected.	Instrument Tech		Perform corrective maintenance following detection of failure.		
Out Of Calibration	Run To Failure	Allow this component to operate until failure is detected.	Instrument Tech		Perform corrective maintenance following detection of failure.		
Subcomponent Failure	Run To Failure	Allow this component to operate until failure is detected.	Instrument Tech		Perform corrective maintenance following detection of failure.		

Tag Code	Tag Name	Tag Type	Safety Risk	Env. Risk	Eco. Risk	Foll. Risk	Ovr. Risk
22AT0205_HT	Transmitter,Dewpoint Analyzer ADGF Slug	Transmitter, Analyzer	L	L	L	L	L
Causes Name	Strategy	Activities	Interval	Unit	Task Note		
Circuit defective	Run To Failure	Allow this component to operate until failure is detected.	Instrument Tech		Perform corrective maintenance following detection of failure.		
Dirt Accumulation	Run To Failure	Allow this component to operate until failure is detected.	Instrument Tech		Perform corrective maintenance following detection of failure.		
Loose Parts/Defective Connections	Run To Failure	Allow this component to operate until failure is detected.	Instrument Tech		Perform corrective maintenance following detection of failure.		
Out Of Calibration	Run To Failure	Allow this component to operate until failure is detected.	Instrument Tech		Perform corrective maintenance following detection of failure.		
Subcomponent Failure	Run To Failure	Allow this component to operate until failure is detected.	Instrument Tech		Perform corrective maintenance following detection of failure.		

MAINTENANCE STRATEGY DEVELOPMENT SLUG CATCHER 1

Equipment Name	Failure Mode	Strategy	Task Name	Interval	Unit	Comment
CATCHER, SLUG RISER	External Leak	Operator Round	Perform Visual inspection. Check for leaks.	1	Shift	Perform corrective maintenance following detection of failure
	Internal Component Failure	Failure Finding	Perform Visual inspection for proper operation	1	Year	Vessel Entry may be as per required.
	Plugs Off (Internal Blockage)	Failure Finding	Perform Visual inspection for proper operation	1	Year	Vessel Entry may be as per required.
22AT0105_HT Transmitter,Dewpoint Analyzer	External leak	Operator Round	Perform Visual inspection. Check for leaks.	1	Shift	Perform corrective maintenance following detection of failure
	Fails High	Preventive Maintenance	Perform detailed calibration inspection	6	Months	Trend result. Look for any deviation from normal.
	Fails low	Preventive Maintenance	Perform detailed calibration inspection	6	Months	Trend result. Look for any deviation from normal.
	Fails to Respond	Failure Finding	Perform Visual inspection for proper operation	1	Shift	Monitored by Operators for any anomaly.
	Internal leak	Preventive Maintenance	Perform detailed calibration inspection	6	Months	Trend result. Look for any deviation from normal.
22BDV0041_HT Valve,Blowdown Riser	Fail to Close	Preventive Maintenance	Perform valve greasing and stroke exercise	1	Year	Trend result. Look for any sticking movement
	Fails Closed	Preventive Maintenance	Perform valve greasing and stroke exercise	1	Year	Trend result. Look for any sticking movement
	Fail to Open	Preventive Maintenance	Perform valve greasing and stroke exercise	1	Year	Trend result. Look for any sticking movement
	Fails Opened	Preventive Maintenance	Perform valve greasing and stroke exercise	1	Year	Trend result. Look for any sticking movement
22FT0011_HT Transmitter,Flow	External leak	Operator Round	Perform Visual inspection. Check for leaks.	1	Shift	Perform corrective maintenance following detection of failure
	Fails High	Preventive Maintenance	Perform detailed calibration inspection.	6	Months	Trend result. Look for any deviation from normal.
	Fails low	Preventive Maintenance	Perform detailed calibration inspection.	6	Months	Trend result. Look for any deviation from normal.
	Fails to Respond	Failure Finding	Perform Visual inspection for proper operation.	1	Shift	Monitored by Operators for any anomaly.
	Internal leak	Preventive Maintenance	Perform detailed calibration inspection.	6	Months	Trend result. Look for any deviation from normal.
22LSHH0044-HT Sensor,Level High-High	External Leak	Operator Round	Perform Visual inspection. Check for leaks.	1	Shift	Perform corrective maintenance following detection of failure

	No Response (Fails on Demand)	Failure Finding	Perform Visual inspection for proper operation.	1 Shift	Monitored by Operators for any anomaly.
22LV0240A_HT Valve,Level Control Riser (ADGF)	External Leak	Operator Round	Perform Visual inspection. Check for leaks.	1 Shift	Perform corrective maintenance following detection of failure
	Fail to Close	Preventive Maintenance	Perform detailed calibration inspection.	6 Months	Trend result. Look for any deviation from normal.
	Fails to Open on Demand	Preventive Maintenance	Perform detailed calibration inspection.	6 Months	Trend result. Look for any deviation from normal.
	Fails to Remain Close	Preventive Maintenance	Perform detailed calibration inspection.	6 Months	Trend result. Look for any deviation from normal.
	Opens Above Set Point	Preventive Maintenance	Perform detailed calibration inspection.	6 Months	Trend result. Look for any deviation from normal.
	Opens Below Set Point	Preventive Maintenance	Perform detailed calibration inspection.	6 Months	Trend result. Look for any deviation from normal.
22PSV0040B_HT Valve,Pressure Safety Riser (ADGF)	External Leak	Operator Round	Perform Visual inspection. Check for leaks.	1 Shift	Perform corrective maintenance following detection of failure
	Fail to Close	Preventive Maintenance	Perform detailed calibration inspection by government inspector	3 Year	Follow inspector recommendation
	Fails to Open on Demand	Preventive Maintenance	Perform detailed calibration inspection by government inspector	3 Year	Follow inspector recommendation
	Fails to Remain Close	Preventive Maintenance	Perform detailed calibration inspection by government inspector	3 Year	Follow inspector recommendation
	Opens Above Set Point	Preventive Maintenance	Perform detailed calibration inspection by government inspector	3 Year	Follow inspector recommendation
	Opens Below Set Point	Preventive Maintenance	Perform detailed calibration inspection by government inspector	3 Year	Follow inspector recommendation

LAMPIRAN F




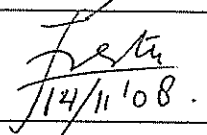
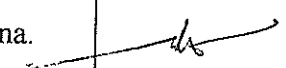
Lampiran F

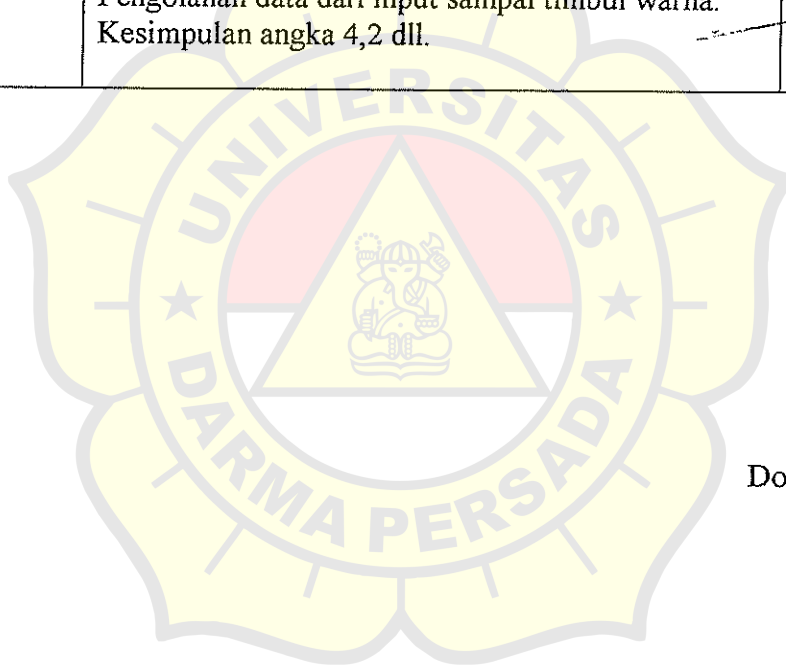
LIST OF ABBREVIATIONS / DAFTAR SINGKATAN DAN TERJEMAHAN.

The following abbreviations are used in this document:

- RCM : Reliability Centered Maintenance
System pengaturan perawatan yang mengacu / terpusat pada kehandalan
- MOGPU : Moveable Offshore Gas Production Plant
Fasilitas gas produksi lepas pantai yang dapat dipindah pindahkan kan.
- FMEA : Failure Mode and Effect Analysis
Suatu metoda yang mengacu pada analisa akibat dan macam / tipe kegagalan.
- Copi : ConocoPhillips Indonesia Ltd
- Offshore Platform : anjungan di lepas pantai
- BBTU : Billion British Thermal Unit
Satuan untuk menghitung gas.
- MMSCF: Million Square Cubic Feet.
Satuan untuk menghitung gas.
- Slug Cather : bejana sarana penangkap cairan / fraksi berat seperti minyak mentah, condensat, air dan pasir.
- Separator gas : pemisah gas.
Sarana pemisah berupa bejana yang fungsinya memisah 2 atau 3 fraksi benda (cair dan gas, atau gas minyak dan air)
- Refrigeration : sarana / alat pendinginan.
Untuk mendinginkan gas.
- Scrubber : bejana penampungan dan pemisahan fluida dan gas.

Lembar Perbaikan
SIDANG TUGAS AKHIR (TA)
15 Agustus 2008

o Nama Penguji	Perbaikan	Tanda tangan
Ir. Jamaluddin Purba MT	Latar belakang dan tujuan disesuaikan - Bab III metodologi pengumpulan data disesuaikan dengan penjelasan dalam gambar - Untuk menentukan FMEA datanya dikumpulkan dan dicari penyebab untuk FMEA. - Daftar Pustaka disesuaikan dengan aturan	
Ir. Senti Siahaan ME	- Judul, pendahuluan, rumusan masalah, rumus 2 dalam teori/ manual kerja, flow chart, skematic RCM & kesimpulan	
Ade Supriatna ST MT.	Hal 62 tentang peralatan yang diteliti Hal 67 Angka 2 dalam tabel Standar Resiko. Pengolahan data dari input sampai timbul warna. Kesimpulan angka 4,2 dll.	



Mengetahui,
Dosen Pembimbing

Ir Budi Sumartono MT