PTT Phenol Company Limited

Plant Technical

SO-(PH-P1-TE)-1100-008

Reduce steam consumption at Benzene column (V-1101) by reduce pressure

Internal Use Only

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Reviewer list

Reviewer	Position	Unit Code

Edition records

Rev.	Effective Date	Detail	Updated by
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Related Units

Unit Code	Unit Name
PH-P1-TE	Plant Technical

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Related KPI

KPI Measure	Description / Calculation	Target (unit)

Related Law

Law Name

Related Documents

Document ID	Document Name
SO-(PH-P1-TE)-1100-001	CONTROL PARAMETER SPECIFICATION QMAX UNIT

External Reference Documents

Document Name

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1. Purpose/Objective

1.1 ที่มาและความสำคัญ (Background)

According to the emergency shutdown due to power outage leading to high specific energy consumption (SEC) in Apr-21 and the forecast YTD SEC tends to exceed the target plan at 6,498 MJ/T Co-Product as shown in the figure below:

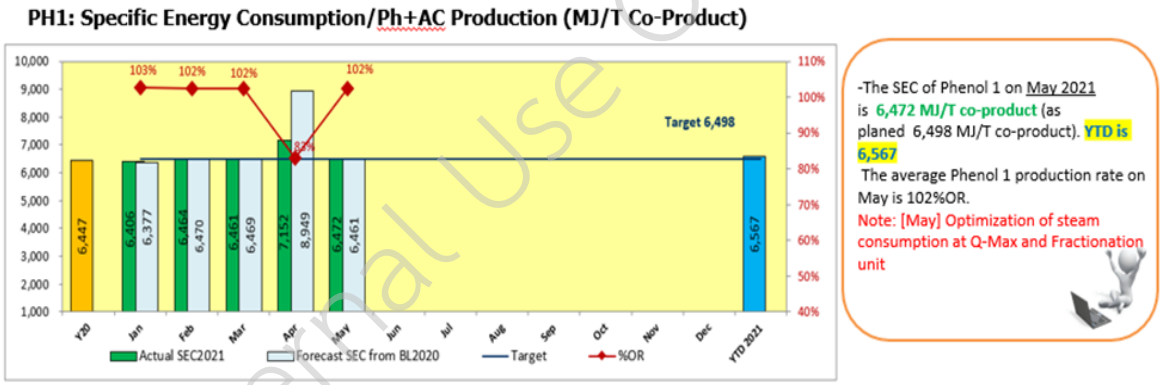

Figure 1 shows the SEC of Phenol 1 in Y2021

Therefore, in order to improve energy efficiency and reduce operating cost, PE would like to submit the operating guideline to minimize steam 40 bar consumption at Benzene Column (V-1101) and continuously control the product quality of distillation in the control specification.

1.2 วัตถุประสงค์ (Objective)

1.2.1 Minimize steam 40 bar consumption of Benzene Column (V-1101) to improve SEC as target.

1.2.2 Control the quality of distillation product at Recycle Benzene (SN-1103) and V-1101 Bottoms (SN-1105) in the control specification.

1.3 ปัญหาและสิ่งที่พบ (Observation)

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2. Scope

This operating guideline is applied with PTT Phenol Co.ltd. (PPCL)

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3. List

3.1 แผนงานการทำงาน (Schedule)

Activities	July-21			
	W1	W2	W3	W4
Review Operating Guideline				
Step 1 - Decrease pressure and S40 steam for 1st-step	Day1			
Step 2 - Decrease pressure and S40 steam for 2nd-step	Day2			
Monitor Conditions and Sampling Results				
Collect Data and Summary				

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3.2 ขั้นตอนการทำงาน (Instruction/Steps)

3.1.1 Off APC, tighten controlling conditions as follows:

Q-Component Target	Target	Current	Lag- indicator
Pressure OVH V-1101 (PIC-11-1301)	0.925	0.95	
Middle temperature (TIC-11-1003)	126 -127	126.0	SN-1103 (Cu < 7 wt%)
Suction Temp of P-1104 (TI-11-0801)	104.5- < 106	105.6	To indicate purity benzene
Bottom temperature (TI-11-1004)	189.8 -190.2	190.4	SN-1105 (Bz < 0.0038 wt%)
R/D ratio	0.72-0.725	0.725	SN-1103 (Cu < 7 wt%)
Steam S40 (m3/hr) (FIC-11-1004)	11.85	12.10	
%MV of Pressure Control of V-1102	23.0- 23.8	23.6	To monitor light component (Bz & toluene loss at V-1101 bottom column

3.1.2 ปรับ Mode reflux TIC -11-1003 & Level D-1104 to manual mode during adjust

3.1.3 Start reducing the pressure control of PIC-11-1301 from 0.95 kg/cm2 (Target 0.925 kg/cm2)

- downwards in step of 0.025 kg/cm2/Day = 1 step
- Adjust 1 step / Keep 1 day

3.1.4 Maintain bottom temperature (TI-11-1004) at 189.8-190.2 DegC (It is not lower than 189.8 DegC)

3.1.5 Keep reflux flow FIC-11-1006 from 73.8 to 73.6 m3/h in order to control cumene content in SN-1103 at 6.0-6.2%wt (Control spec ≤7%wt) and minimize benzene content at SN-1105 (Control spec ≤0.0038%wt)

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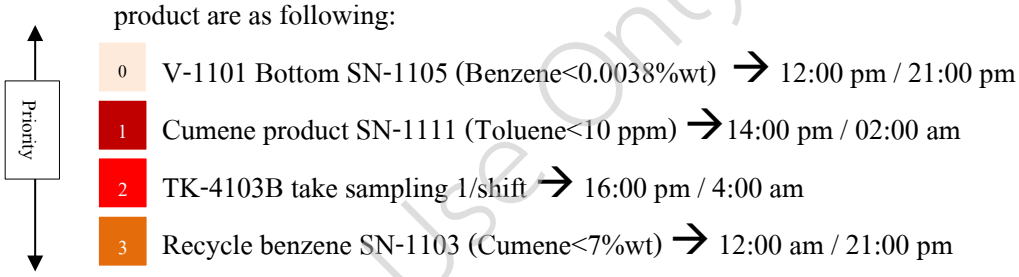
3.1.6 Reduce S40 steam flow (FIC-11-1004) by 0.05 m3/hr per step

* See TI -11-1004 bottom temperature = 189.8 -190.2 C

(Target total S40 steam reduction is 0.25 m3/hr)

3.1.7 Monitor conditions of Benzene Column (V-1101) and the quality of distillation product are as following:



3.1.8 Vent flow through FI-11-1301 may increase slightly, Actual 35 Nm3/h (Benzene Column vent gas from D-1104 ≤ 60 Nm3/hr) and overhead the condenser E-1107 efficiency temp outlet TI-11-1302 may increase slightly too, Actual 35.2 DegC (TI-11-1302 ≤ 40.0 DegC). This should be continuously observed. In case of abnormal increase, this activity should be hold or stopped.

3.1.9 Back to do step 3.2.2 again until meet the target or criteria. Otherwise, hold operating condition of Benzene Column (V-1101) and collect data for summarizing the results

3.1.10 Concern the conditions of Benzene Column (V-1101) as following:

- V-1101 has UC-1104 for protect the pressure Flare header (CAUSE: PSHH -11-1005A/B/C ≥ 1.80kg/cm2 (G)).

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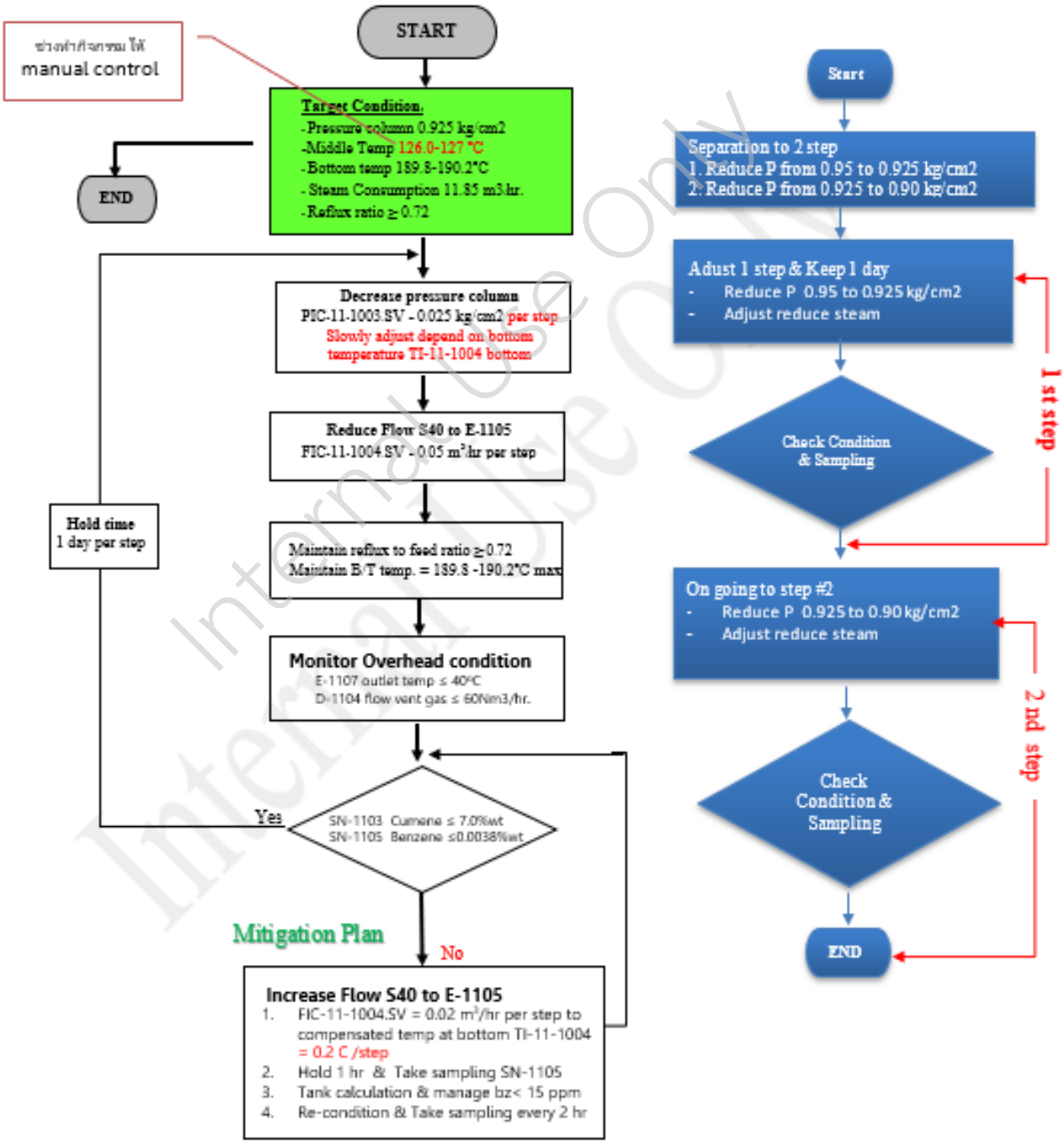
Trial workflow for steam optimization



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Recycle Benzene	SN-1103 (0)	Sampling time
Cumene	7%wt max.	Routine 1/wk (Sat.), Additional request 1/after adjust

V-1101 Bottom	SN-1105 (1)	Sampling time
Benzene	0.0038%wt max.	Routine Mon/Wed/Fri, Additional request 1/after adjust

Cumene Product	SN-1111(2)	Sampling time
Cumene	99.92wt% min.	Routine 1/ Shift
Benzene	20 ppm max.	Routine 1/ Shift
Non-aromatic	100 ppm max.	Routine 1/ Shift
Cymene	15 ppm max.	Routine 1/ Shift
Toluene	10 ppm max.	Routine 1/ Shift
	Product tank 4103B (3)	1/shift

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Daily Target Plan

Q-Component Target	Target	Current	Jun 30, 21		Jun 1, 21		Jul 5, 21	
			D	N	D	N	D	N
Pressure (PIC-11-1301), kg/cm2A	0.90	0.95	0.925	0.925	0.925	0.925	0.925	0.925
Middle temperature (TIC-11-1003), °C	126-127	126	126-127	126-127	126-127	126-127	126-127	126-127
Bottom temperature (TI-11-1004), °C	189.8-190.2	190.4	189.8-190.2	189.8-190.2	189.8-190.2	189.8-190.2	189.8-190.2	189.8-190.2
R/D ratio	0.72-0.725	0.725	0.72-0.725	0.72-0.725	0.72-0.725	0.72-0.725	0.72-0.725	0.72-0.725
S40 Steam, m3/h	11.8	12.1	12.0	12.0	11.9	11.9	11.85	11.85
Benzene Column vent gas from D-1104, Nm3/hr (FI-11-1301)	≤60	35	35 (<60)	35 (<60)	35 (<60)	35 (<60)	35 (<60)	35 (<60)

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