



# 5<sup>th</sup> Chemical Process Safety Sharing (CPSS)

**Topic : Digital Transformation for Safeguards bypass management**

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**Position : HSE&Facility Manager**

**Company: Solvay(Bangpoo)**

**Specialty Chemicals Ltd.**



5<sup>th</sup> Chemical Process Safety Sharing (CPSS)  
3<sup>rd</sup> December 2019, Thailand



## Digital Tools at SOLVAY Bangpoo site



### Google Form

- Safety Observation Program



Forms



### AppSheet

- Job Safety Analysis
- HSE work coordination
- Contractor Evaluation
- HSE Equipment Inspection
- HSE Emergency Information & Communication
- HSE PSM Audit
- Safeguards bypass management





## AppSheet

### Job Safety Analysis, HSE work coordination ,Contractor Evaluation



## Bangpoo HSE Work Coordination

An app for contractor management in Bangpoo site this app can issue work coordinate form ,assessment Job Safety Analysis (JSA) and evaluate contractor HSE performance.

- AppSheet on mobile , tablet , computer for
1. Job Safety Analysis (JSA)
  2. Area Work Coordination with contractor
  3. Evaluate Contractor after work in area

Change from paper to tablet start on May2019



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## AppSheet

### Safeguards bypass management



## Bypass Management

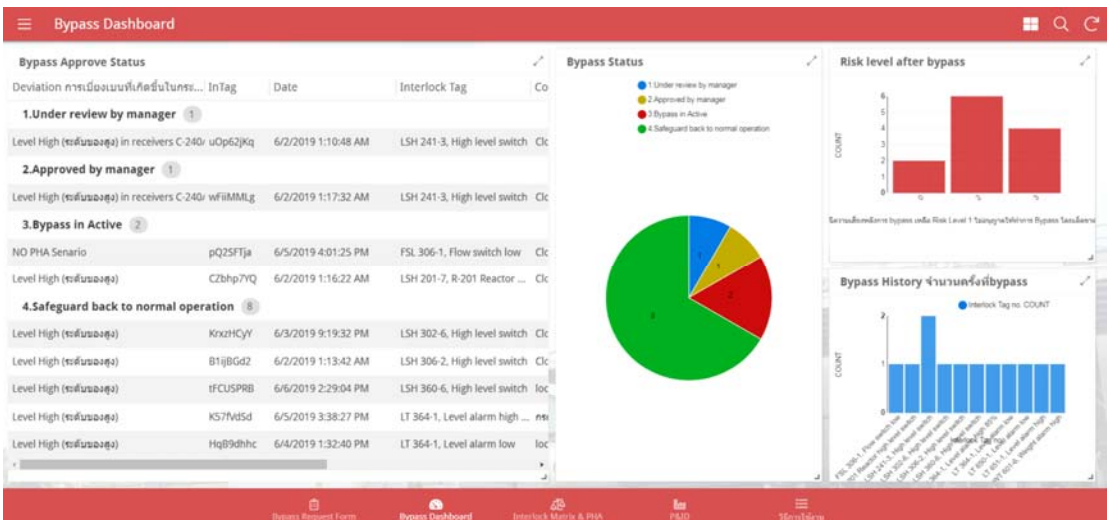
An app for shop floor issue bypass for interlock.

A sample app with a dashboard, charts and workflows.

AppSheet on mobile , tablet , computer for

1. Bypass Request
2. Bypass action approval
3. Risk Assessment , Interlock information built in application

Change from paper to tablet start on Jun 2019



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### Bypass Management

An app for shop floor issue bypass for interlock.  
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### Bypass Management

An app for shop floor issue bypass for interlock.  
A sample app with a dashboard, charts and workflows.

- Bypass Request Form all interlock link to Process Hazard Analysis(PHA) scenario
- Requestor can see residual Risk Level for all interlock bypass.
- Email alert send to Manager for consider mitigation action of bypass before make approval.

Date  
6/5/2019 3:38:27 PM

requester email  
viroj.bhoorod@solvay.com

Interlock Tag no.  
LT 364-1, Level alarm high 85%

Deviation ควบคุมระดับสูงในถัง  
Level High (ระดับสูง)

Type  
DCS Interlock,SIF

Bypass Category ภาวะฉุกเฉิน bypass

Start Up Process Operation

Interlock Action

High level 85% in tank, item T-364, will shut down pump, item P-366

Consequences if bypass Interlock

Case#21 Capacity of container is 20m3 and 28.3m3 for T-364. If operator did not check level in T-364 and loaded another container of IPA to T-364, overflow will happen from PVRV364 to retention.

Radius: 17 meters --- (2000 ppm = IDLH)

Retention: 17x7x0.8=95.2m3

Effects : pollutant effect, toxic effect

Human consequences : operator serious injury, single death (H)

Environmental consequences :Environment damage out of the site due to vapour

Risk Level after bypass \*สถานะหาก residual risk is 1, bypass is prohibited. If residual risk is 2, approval by Production Manager required before bypass. If residual risk is 3, bypass is authorized by Chief Leader. กรณีการขอ bypass มี Risk Level 1 ให้ออกใบแจ้ง bypass ตามความเสี่ยง กรณีการขอ bypass มี Risk Level 2 ให้ออกใบแจ้ง bypass โดย Production Manager กรณีการขอ bypass มี Risk Level 3 ให้ออกใบแจ้ง bypass โดย Chief Leader

Signature Chief Leader who issue bypass

Status of Bypass and Risk Mitigation Action

Deviation ภาวะผิดปกติในระบบ...	In Tag	Date	Interlock Tag	Correc
<b>4.Safeguard back to normal operation</b>				
Level High (ระดับสูง)	KS7N5d	6/5/2019 3:38:27 PM	LT 364-1, Level alarm high 85%	รอดัง

View (1) New





**Bypass Management**  
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• Bypass Request Form Summary

**Bypass Request Form**

requester email	Date	Interlock Tag no.	Deviation การเบี่ยงเบนที่เกิดขึ้นโดย...	Type	Bypass Category สาเหตุของการทำงาน byp...	Interlock Action	Consequ...
production.bangpoo@solva...	6/6/2019 10:23:38 AM	LT 650-1, Level alarm low	NO PHA Scenario	Hardware Interlock	Start Up Process Operation	Low level in tank, item T-6...	NO PHA Se
viroj.bhoorod@solvay.com	6/5/2019 4:01:25 PM	FSL 306-1, Flow switch low	NO PHA Scenario	DCS Interlock	Start Up Process Operation	Ethanol pump, item P-311...	NO PHA Se
sittichai.poolsawad@solva...	6/2/2019 11:39:29 AM	LT 651-1, Level alarm high	Level High (ระดับของเหลว)	Hardware Interlock,SIF	Start Up Process Operation	High level in tank, item T-6...	Case#180 I
sittichai.poolsawad@solva...	6/2/2019 1:17:32 AM	LSH 241-3, High level switch	Level High (ระดับของเหลว) in receivers C-2...	Hardware Interlock,SIF	Start Up Process Operation	High level switch in Seco...	Case #210
sittichai.poolsawad@solva...	6/2/2019 1:16:22 AM	LSH 201-7, R-201 Reactor ...	Level High (ระดับของเหลว)	Hardware Interlock,SIF	Start Up Process Operation	High level in Reactor tank...	Case #45 II
sittichai.poolsawad@solva...	6/2/2019 1:14:51 AM	WI 601-6, Weight alarm hi...	Confinement loss (แรงดันในถังเกินขีด...	DCS Interlock,SIF	PM/Maintenance	High level in reactor, item ...	If operator
sittichai.poolsawad@solva...	6/2/2019 1:13:42 AM	LSH 306-2, High level switch	Level High (ระดับของเหลว)	Hardware Interlock,SIF	Testing	High level switch in tank, L...	Case#7 Ca
sittichai.poolsawad@solva...	6/2/2019 1:10:48 AM	LSH 241-3, High level switch	Level High (ระดับของเหลว) in receivers C-2...	Hardware Interlock,SIF	Start Up Process Operation	High level switch in Seco...	Case #210
sittichai.poolsawad@solva...	6/6/2019 2:29:04 PM	LSH 360-6, High level switch	Level High (ระดับของเหลว)	Hardware Interlock,SIF	PM/Maintenance	High level switch in tank, L...	Case#98 O
viroj.bhoorod@solvay.com	6/5/2019 3:38:27 PM	LT 364-1, Level alarm high ...	Level High (ระดับของเหลว)	DCS Interlock,SIF	Start Up Process Operation	High level 85% in tank, ite...	Case#21 C
opas.chokekun@solvay.com	6/4/2019 1:32:40 PM	LT 364-1, Level alarm low	Level High (ระดับของเหลว)	DCS Interlock,SIF	Start Up Process Operation	Low level in tank, item T-3...	Case#21 C
sittichai.poolsawad@solva...	6/3/2019 9:19:32 PM	LSH 307-6, High level switch	Level High (ระดับของเหลว)	Hardware Interlock,SIF	Start Up Process Operation	High level switch in tank, L...	Case#80 O

**Bypass Request Form** | Bypass Dashboard | Interlock Matrix & PHA | P&ID | เมนู

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• Database all interlock matrix and PHA cases.

**Interlock Matrix & PHA**

Tag	Tag number	DCS Interlock	Trigger	Action	RESET	P&ID	PHA Scenario Description	PHA Process Deviation	PHA
<b>Safety Instrumented Functions (SIF) 54</b>									
LSH 201-7, R-201 Reactor ...	3-1	Hardware Interlock,SIF	LSH 201-7, High level in Re...	High level in Reactor tank, ite Manual	BSP-03: LIST OF R-201 INT...	Amphoteric (J-557) Charge L...	Level High (ระดับของเหลว)	4,548	
XV 201-10, Reactor discha...	3-3	DCS Interlock,SIF	Reactor discharge valve, X...	Reactor discharge valve, XV 2 Auto	BSP-03: LIST OF R-201 INT...	Condensate A-21 & Erucic co...	Confinement loss (แรงดันใ...	41	
XV 201-1 Solid Charging va...	3-5	DCS Interlock,SIF	PT201-16 Pressure higher ...	*1.Solid Charging valve, XV 2 Auto	BSP-03: LIST OF R-201 INT...	R-201	1.Solid feeding 2.Level Hig...	44, 4	
WIA201-1,R-201 Reactor w...	3-6	DCS Interlock,SIF	WIA201-1,R-201 Reactor w...	Close XV201-1,XV201-2,XV20...	BSP-03: LIST OF R-201 INT...	Studied in the storage tank...	Reverse flow (การไหลย้อน...	48	
LSH 231-8, R-231 Blend hL...	4-1	Hardware Interlock,SIF	LSH 231-8, High level in BL...	High level in Blend tank, item Manual	BSP-04: LIST OF R-231 INT...	Wettem 3083 Open vent il...	P+ High Pressure ความดันสูง	9,093	
XV 231-5, Blend discharge ...	4-3	DCS Interlock,SIF	Blend discharge valve, XV ...	Blend discharge valve, XV 23 Auto	BSP-04: LIST OF R-231 INT...	Rhodapex CO-436 Send sa...	Confinement loss (แรงดันใ...	101	
XV 231-7 Solid charging va...	4-4	DCS Interlock,SIF	Solid charging valve, XV 23...	Solid discharge valve, XV 231 Auto	BSP-04: LIST OF R-231 INT...	Rhodapex CO-436 Charge...	Level High (ระดับของเหลว), C...	9,093	
WIA231-15, R-231 Blend w...	4-5	DCS Interlock,SIF	Weight Scale WIA231-15 r...	close XV 231-3, or XV 231-7, c Auto	BSP-04: LIST OF R-231 INT...	Amphoteric (J-557) Charge...	Level High (ระดับของเหลว)	429,	
PT231-16 Pressure more t...	4-7	DCS Interlock,SIF	PT231-16 Pressure more L...	Open PCV231-16 to scrubber	BSP-04: LIST OF R-231 INT...	Rhodapex CO-436 Charge...	High Pressure (ความดันสูง)	79,11	
LSH 240-3, High level switch	6-1	Hardware Interlock,SIF	LSH 240-3, High level switch	High level switch in Primary Manual	BSP-06: LIST OF INTERLOCK	Condensate A-21 & Erucic co...	Level High (ระดับของเหลว) in ...	34,21	
LSH 241-3, High level switch	6-2	Hardware Interlock,SIF	LSH 241-3, High level switch	High level switch in Secondar Manual	BSP-06: LIST OF INTERLOCK	Condensate A-21 & Erucic co...	Level High (ระดับของเหลว) in ...	34,21	
LSH 207-3, C-207 level high	7-1	Hardware Interlock,SIF	LSH 207-3, High level switch	High level switch in HCL dosi Auto	BSP-07: LIST OF INTERLOCK	Raw Material Charging Syst...	Level High (ระดับของเหลว)	124	
XV 207-1, HCL discharge v...	7-2	DCS Interlock,SIF	XV 207-1, HCL discharge v...	HCL discharge valve, item XV Auto	BSP-07: LIST OF INTERLOCK	Raw materil fed	Level High (ระดับของเหลว)	45,21	
LSH301-2 High level switc...	7-3	Hardware Interlock,SIF	LSH301-2 High level switc...	High level LSH301-2 close XV Auto	BSP-07: LIST OF INTERLOCK	C-301 Mixing tank 1.5m3	Level High (ระดับของเหลว)	118	

**Bypass Request Form** | Bypass Dashboard | **Interlock Matrix & PHA** | P&ID | เมนู

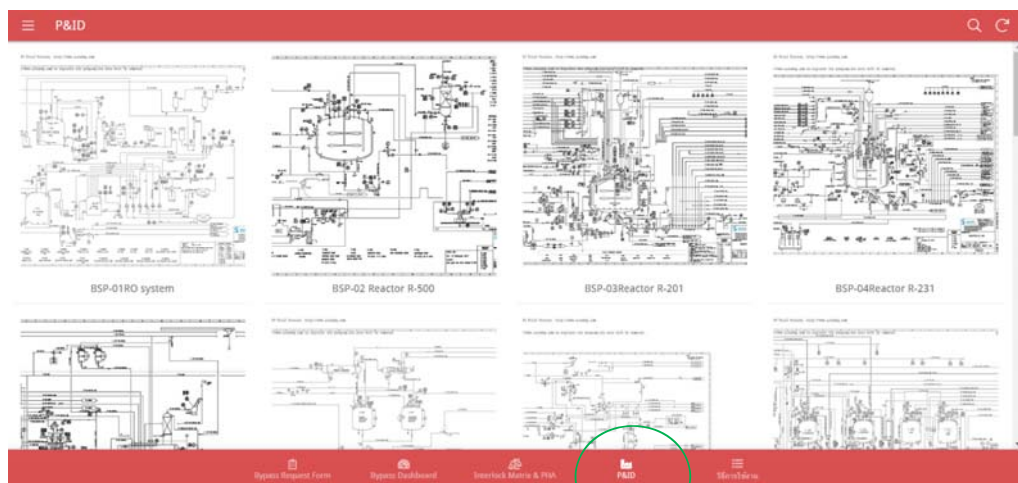
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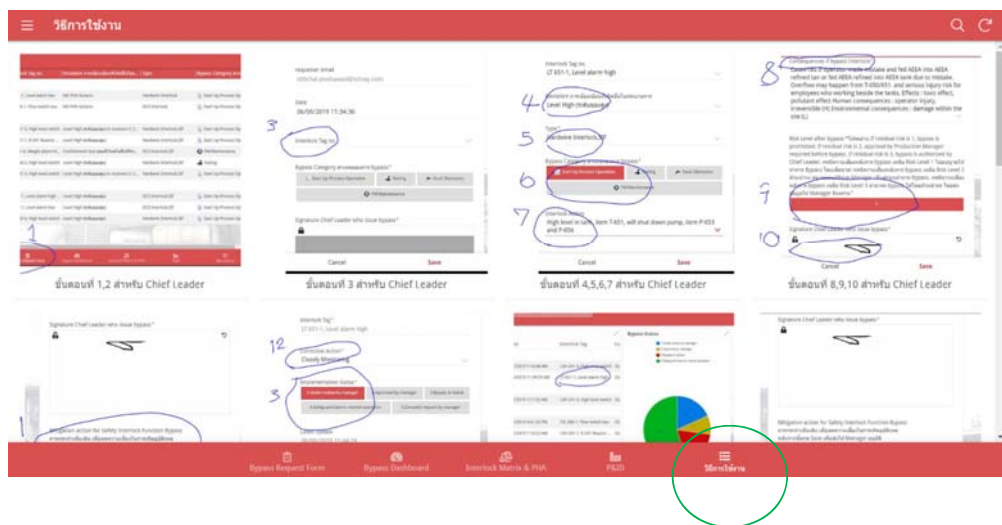
• All P&ID



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• Work Instruction How to use it.

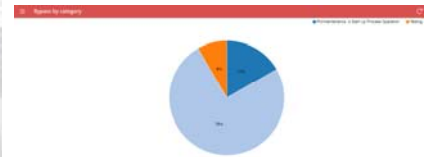
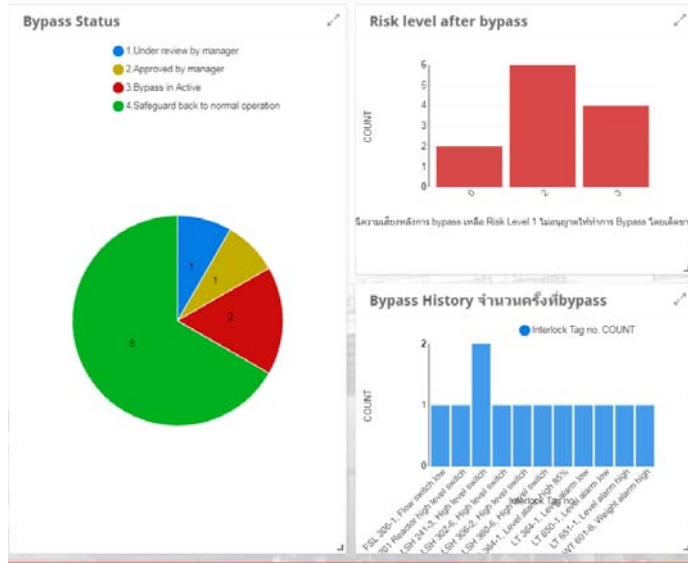




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• Analysis Data for improvement



Thank you for your attention



5th Chemical Process Safety Sharing (CPSS)  
3rd December 2019, Thailand

