

Health · Safety · Environment (HSE)

CoreSafety® Application for Risk-Based Process Safety

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Do you have any of these issues?

- Only limited persons know where PHA^(*) data such as HAZID, HAZOP, LOPA^(**) is stored
- PHA data is not actively used for optimization of asset management program
- Risk profile of facilities is not shared in organization

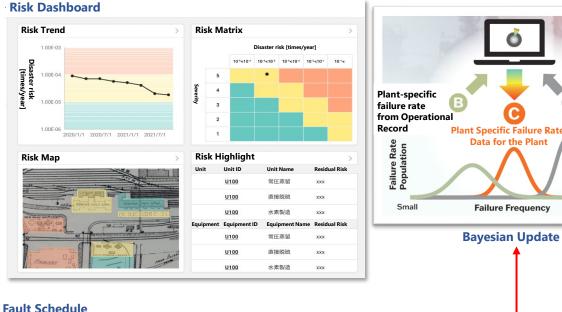
(*)PHA : Process Hazard Analysis

(**) HAZID : Hazard Identification Study HAZOP : Hazard and Operability Studies LOPA : Layer of Protection Analysis

Functional Features

CoreSafety[®], one of JGC in-house application, can summarize and register PHA results to visualize Risk Profile, and easily accessed through a web browser

- Risk Dashboard
- Up-to-date risk by Bayesian Update^(***)
- Fault Schedule (i.e., hazard register)
- Functional Requirements' management tied with risk scenario
- Safety Performance KPI monitoring



	Unit	P&ID	Equipment Tag Equipm	nent Name	Initiating Event Group	Loss of Containment			tive Initiating Event icy [times/year]	
	041	41-PID-PS-1160	041-T-1003 Depropa	nizer Column	気相出口閉塞	圧力超過なし(内部破損	/Process upset)	5.04 x	(10 ⁻¹	
	041	41-PID-PS-116	Outline of a risk scenario						< 10 ⁻¹	
	041	41-PID-PS-116						1.65 x 10 ⁻¹		
	Initiator Tag		Initiator Name					Initiato	or Frequency [times/year]	
▼	041-FV-27	710	041-T-1002塔底 コンデン	セート流量調整	弁				1.65 x 10 ⁻¹	
C	onsequence	Type Severity	у	Consequen	ice			et Mitigated Event hood [times/year]	Residual Risk [times/ye	
	Safety 4			utors of	a risk scenari	o (i.e. failure	rate of initiators,		Risk	
	Economic loss 3			probability of failure on demand of safeguards)					Scenario	
	Environm	ent ₂					(Safety, Economic	loss, Env	vironment)	
	041	41-PID-PS-116)	041-T-1003		I Requirement educing the rist		tor and safeguard	s Mea	sures	

(***) A statistical method that updates the probability for a hypothesis as more evidence or information becomes available.

Enhancing planetary health

Initial Input

from General

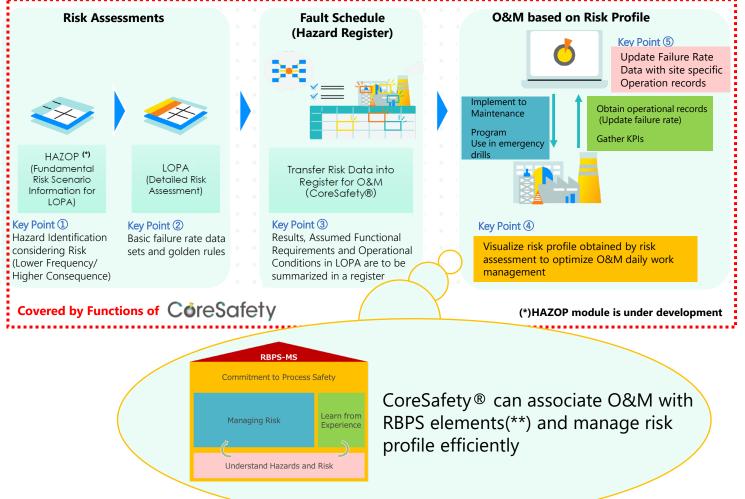
Failure Rate

Large

Data

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Implementation of Smart RBPS (Risk Based Process Safety)



Assured by Collaborative Research Projects:

Advantages of CoreSafety®

Smart RBPS methodology taken in CoreSafety is assured by a collaborative research project involving academia, regulatory bodies, and industry in Japan.

• Risk Profile Library:

1. Based on our experience

Be built on extensive Process Safety Management (PSM) and Process Hazard Analysis (PHA) experience in global Oil & Gas, Chemical, and Nuclear industry projects.

2. Standardized Profiles

Provides standardized risk profiles for various equipment types (e.g., pumps, fractionation columns, drums).

3. Efficient Assessment

Enables efficient risk assessments without needing detailed design information.

e.g.) Two Phase Separator

Standardized **P&ID** and **Risk Scenario** are available for risk assessments

CoreSafety®-Risk-Based Process Safety Application



User Benefits

BEFORE

Scenario Number 2a				icenario Title: Hexane Storage Tank Overflow. ipill not contained by the dike.								
Date: Consequence Description/Category Risk Tolerance Criter		Number 2a Spill no			rio Title: He×a not contained b	y the dike.				_		
		Date		Scenario Number	Equipmen			tle: Hexane Sto stained by the		Overflow.		
(Category or Frequer Initiating Event (typically a frequency)		Consequence Description/Categ Risk Tolerance Cri (Category or Frequ		2a						Frequency	-	
				Date: Consequence Description/Category		Scenario Number			itle: Hexane Storage Tank Overflow. ntained by the dike.			
Enabling Event or Condition Conditional Modifie		Initiating Event (typically a frequency) Enabling Event or Condition		Risk Tolerance Criteria (Category or Frequency) Initiating Event (typically a frequency)		Date: I Consequence I Description/Category t		Description		Probability	Frequency (per year)	
								Release of hexane outside the dike due to tank overflow and failure of dike with potential for ignition and fatality.				
		Conditional Modif		Enabling Event or		Risk Tolerance Criteria (Category or Frequency)		Maximum Tolerable Risk of a Serious Fire Maximum Tolerable Risk of a Fatal Injury				<1 × 10- <1 × 10-
Frequency of Unmiti Independent Protecti				Condition Conditional Modifiers (il		Initiating Event (typically a frequency)		Arrival of tank truck with insufficient room in the tank due to failure of the inventory control system. Frequency based on plant data.				1
		Frequency of Unm				Enabling Event or Condition					N/A	
		Independent Prote				Conditional	Conditional Modifiers (if applicable)					
Safeguards(non-IPLs Total PFD for all IPL		Safeguards(non-IF		Frequency of Unmitigate				Probability of ignition			1	
				Independent Protection I				Probability of personnel in affected area		0.5		
						1			Probability of fatal injury		0.5	
								Others			N/A	
Frequency of Mitigat						Frequency of Unmitigated Consequence				2.5 × 10-		
Risk Toleran	ce Crite					Independen	t Protection I	ayers				
Actions Required to Meet Risk Tolerance Criteria		Frequency of Mitig		Safeguards(non-IPLs)				Operator checks level before unloading (PFD from Table 6.3)		1 × 10-1		
								Dike (existing) (PFD from Table 6.5)			1 × 10-2	
Notes		Risk Tolerand		-				SIF (to be added-see Actions)			1 × 10-2	
		Actions Required Meet Risk Tolerar		Total PFD for		. Safeguards(non-IPLs)					
References (LOPA analy		Criteria Notes		Frequency of Mitigated C Risk Tolerance Criteria N Actions Required to Meet Risk Tolerance Criteria				as it is part of	the BPCS sy	arm is not an IPL stem already		
						Total PED 6	Total PFD for all IPLs		credited in LI read by operator. Note: Including added IPL		1 × 10 ⁻⁵	
						Frequency of Mitigated Co				1-10-	2.5 × 10-	
				Notes		· <u> </u>	Risk Tolerance Criteria Met? (Yes/No): Yes, with added SIF.					2.0 4 10
		LOF A analys	References (links to origi		Actions Req Meet Risk T	Actions Required to Add SIF with PFD of 1 × 10-2.			10-2. on: Plant Technica	lant Technical/ J. Doe June 2002		
				LOPA analys		Notes		Human action the PFD of the	at 1 × 10 ⁻¹ a level indica	s although actions tion loop sets the o n tracking databas	simple and no verall PFD for t	ime constrais his IPL.
						References (links to origi			D, P&ID, etc.):		

PHA by Excel/Paper

Implementation CoreSafety

- Visualizes Risk and Optimizes O&M Tasks
- Brings "Risk Data" to the center of RBPS Management System.

AFTER RBPS's cycle is improving

Actual Benefits of adopting CoreSafety®

Achievement of ALARP^(*) Decision for Higher Risk Items

(*)ALARP : As Low As Reasonably Practicable

Improved Response and Procedure for Safety Critical Alarms by efficient training utilizing CoreSafety[®]

High Integrity and Reliability of Equipment and Safety Systems

> Enhanced Risk Management at MOC and PTW ^(**)

> > (**)MOC : Management Of Change, PTW : Permit To Work

Sophisticated Emergency Planning for Designated Process Incidents

Enhancing planetary health