A new fast Process Safety Check

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Abstract:

A traditional German chemical site came under leadership by an international chemical company. Starting in 2017 the whole site shall be checked from the process safety point of view in two steps.

At the first step over 100 site parts must have a fast safety check to get a first risk ranking.
In the second step the selected high risk areas will be analyzed by complete HAZOP/LOPA analyses until 2021.

Core of the presentation is the new developed fast check method and its first using experiences. The fast check method follows all current requirements in the modern process practices:
High work load, sometimes more, sometimes less experienced operators, engineers and managers
the mixture of German and international history and status in process safety analysis.

Keywords:

Process Safety; risk analysis; fast check; LOPA; HAZOP

Risk Evaluation and Ranking of the Units

The most important process safety aspects can be checked and evaluated in a 4 hour assessment.
One check unit covers one, two or three process steps. The process safety check answers whether further investigations like HAZOP or LOPA analysis are necessary. The result of checks in a couple of units (for one site e.g. 80) is the risk ranking for distributing time, man power and investments in an effective way.

The process safety check is based on the customer´s specific safety history and is introduced by a process experienced engineer as facilitator.

Preparing the assessment, plant manager, operator und engineer fill in a short form with 10 articles. The form will be delivered to the facilitator, together with drawings and other available documents. One or two weeks later the assessment starts with discussion and completion of the form content. The second part of the assessment is needed for creating and evaluating the four safety worst case scenarios which characterize the current unit.

Process Safety Check - Evaluation

The risk level for every checked unit is listed in the following table. Consequence severity (e.g. A to E) and frequency (e.g. S to Z) give risk color (e.g. red-yellow-green) from the customers risk matrix for every worst case scenario.

Check Unit	**Plant Description**	**Worst Case Scenarios Risk Evaluation**			
CO 3	Ash Conditioning	C U	D W	E W	E S
CO 5	Combustion	A V	A U	B V	B X
CO 6	Boiler Plant	A T	A T	A T	E V
CR 1	Crystallisation	B X	B X	B V	A X
CR 2	Potash Lye Tank	B W	D W	D W	E W
H 5	Hyrogenchlorid Generation	A U	B X	D V	E V
H 8	Filtration	B T	C V	D W	-
H 16	Hydrogen Plant	A W	A W	A X	A X
R 1	Drying and Milling	A T	B T	D V	E W
R 2	Neutralization	A W	A W	B U	B U
R 7	B-Solution	B U	E V	-	-
U 10	Compressed Air	C T	-	-	-
U 11	Vacuum	E W	E U	-	-
U 12	Cooling Water	C X	A T	B F	C U

Consequence Severity Classes	A, B, C, D, E
Frequency Classes	S,T,U,V,W,X,Y,Z

Process Safety Check - Ranking

The second table shows the results of the same check units as ranking from the biggest to the lowest risk. For the ranking the severity class is calculated as value (A = 5, B = 4…), and for a single worst case scenario the values for red an yellow Worst case scenarios are added to two risk ranking values.

Check Unit	**Plant Description**	**Worst Case Scenarios Risk Evaluation**				**Ranking**	
						rot	gelb
CO 5	Combustion	A V	A U	B V	B X	14	4
CR 1	Crystallization	B X	B X	B V	A X	12	5
H 16	Hydrogen Plant	A W	A W	A X	A X	10	10
R 2	Neutralization	A W	A W	B U	B U	10	8
H 5	Hyrogenchlorid Generation	A U	B X	D V	E V	9	2
CR 2	Potash Lye Tank	B W	D W	D W	E W	4	4
U 12	Cooling Water	C X	A T	B F	C U	3	12
CO 6	Boiler Plant	A T	A T	A T	E V		15
R 1	Drying and Milling	A T	B T	D V	E W		11
H 8	Filtration	B T	C V	D W	-		9
CO 3	Ash Conditioning	C U	D W	E W	E S		5
R 7	B-Solution	B U	E V	-	-		4
U 11	Vacuum	E W	E U	-	-		
U 10	Compressed Air	C T	-	-	-		

Consequence Severity Classes	A, B, C, D, E
Frequency Classes	S,T,U,V,W,X,Y,Z