30th Annual European AIChE Seminar

"Excellence in Operations, Workforce Engagement and Human Factors"

BASF Antwerp

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WHY? Workforce Involvement

- Sustainable knowledge management of process safety concepts within the manufacturing departments.
- Striving for “Excellence in Operations” by experience exchange – crossing plant borders into a “Technology Verbund”
- Bring Process Hazard Analysis to Full Potential by focus on further use as Training Instrument.

WHAT? Evaluation AS IS/ TO BE

- "AS IS" at BASF Antwerp
  - Hazard classification 
  - Overview process safety studies 
  - Overview scope & timing revisions 
  - Process Safety management systems
    - Incident database 
    - MOC procedure (SAP) 
    - Maintenance & testing history (SAP) 

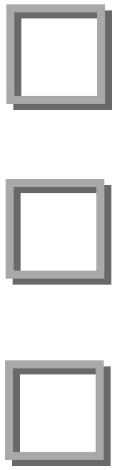
Training at BASF

Knowledge of an installation can be obtained through a combination of:

- Theoretical training
  - Self-study guided by the VAPRO questionnaires
  - Courses organized by BASF
- Practical training
  - Training on the job
  - Simulator training
    - Start up of the installation
    - Manage disturbances in the process

WHAT? Evaluation AS IS / TO BE

- "TO BE" at BASF Antwerp
  - Higher involvement of operators in risk assessment
  - More reporting of near misses to validate next risk assessment
  - Avoid operational errors by broadening the knowledge basis of the process operators



HOW? PHA as training instrument

- Focus on further use as training instrument:
  - Use generic process units as basis for process safety philosophy.
  - Combine P&ID's in one overview diagram, representing only safety critical items.
  - Separate drawings for piping systems (recycle, off spec, start up , … lines) can be very useful for shutdown and start up planning.
  - Expand process manual with an additional paragraph focusing solely on process safety and which summarizes result of risk assessment.

Example : Distillation Column

- Objective of distillation: separation of mixtures in pure components or different fractions.
- Technology is energy intensive as separation is based on gas / liquid interchange. Reboilers and condensors are used respectively for creating the gas and liquid flow.
- “Internals” in a distillation column will not be further discussed as the engineering of these is focused on a lower energy consumption and/or on an efficient separation.

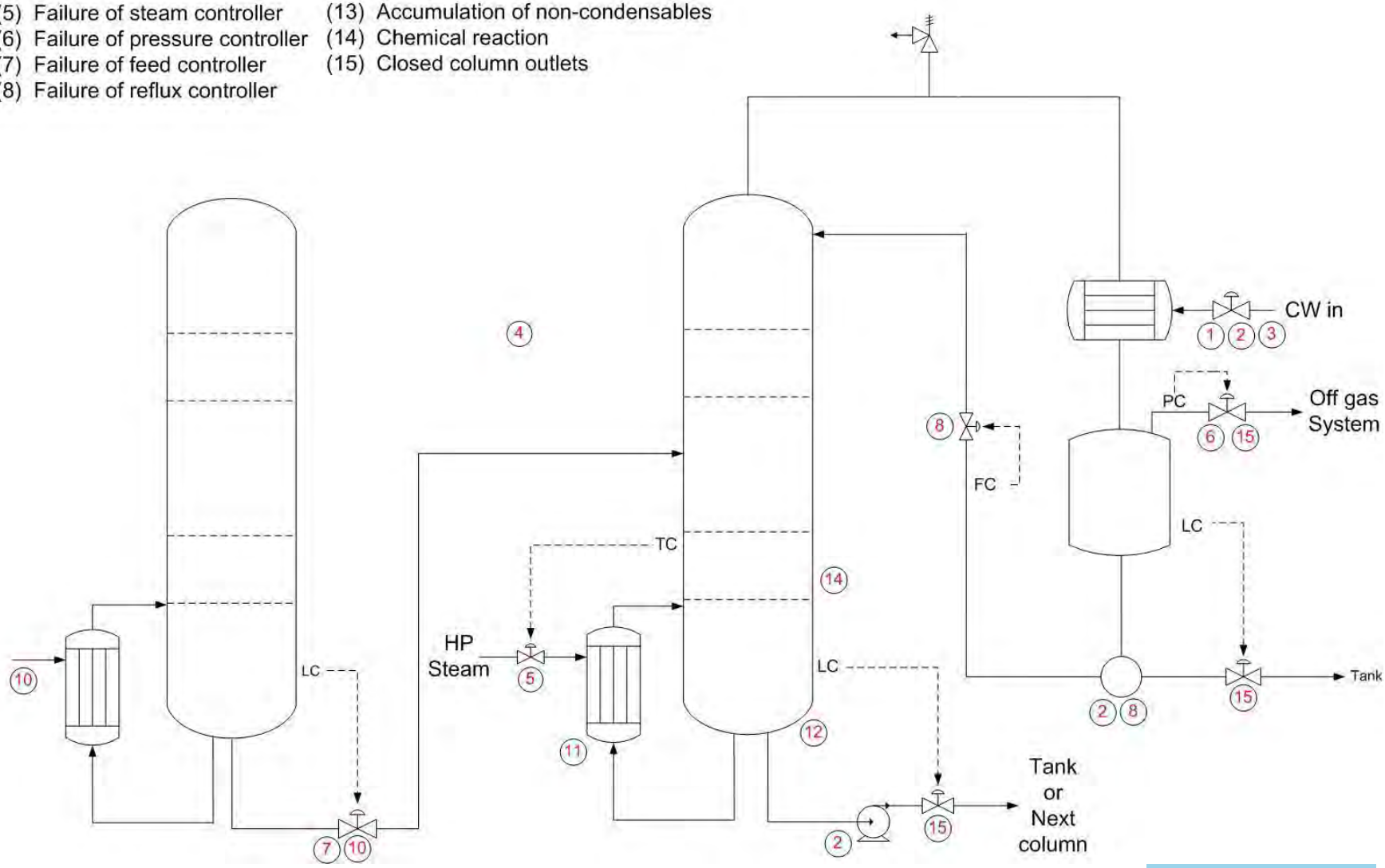
Distillation Overpressure Relief

(1) Loss of cooling
(2) Loss of power
(3) Loss of steam
(4) Loss of instrument air

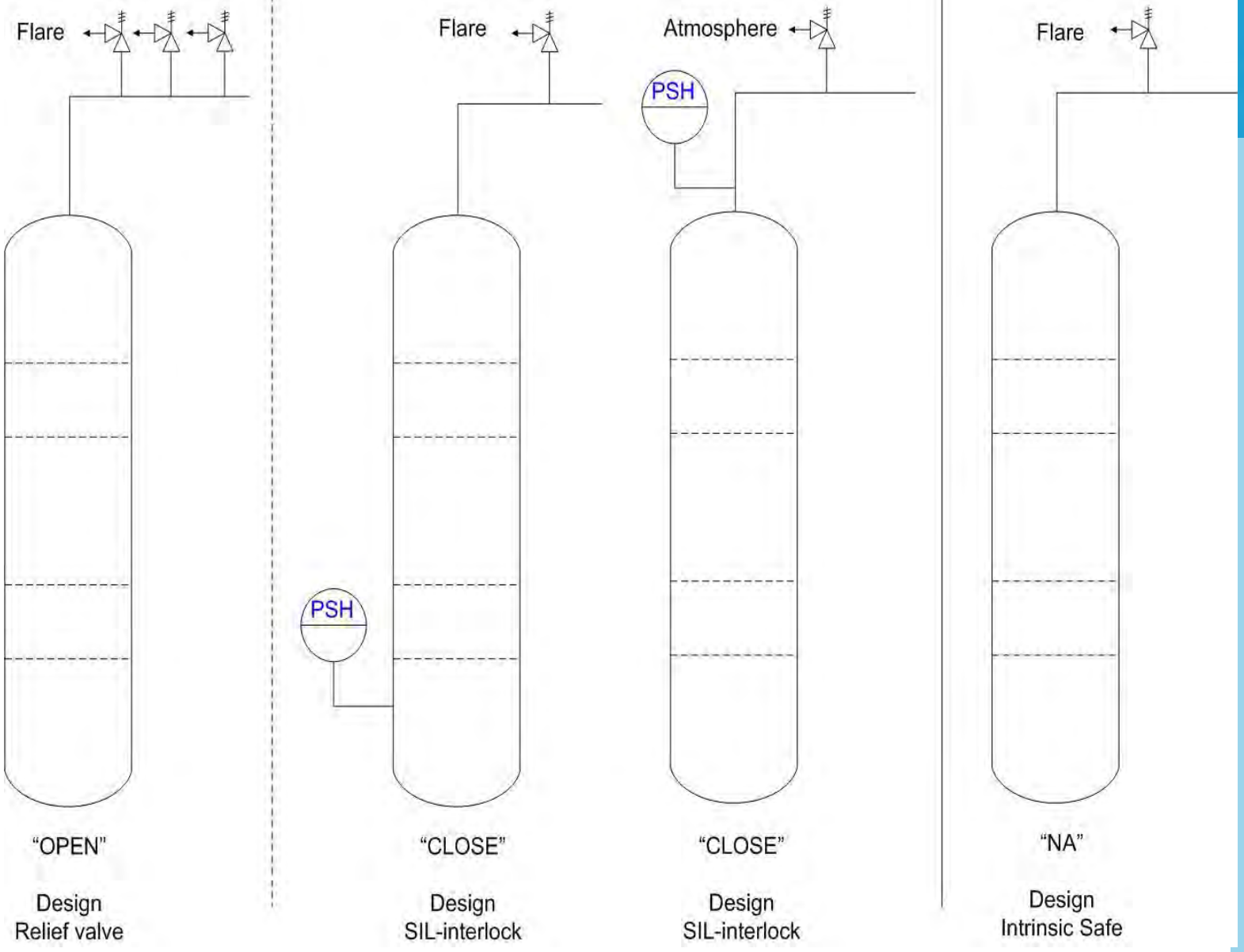
(5) Failure of steam controller
(6) Failure of pressure controller
(7) Failure of feed controller
(8) Failure of reflux controller

(9) Valve opening to an external source
(10) Loss of heating upstream column
(11) Failure of exchanger
(12) Exterior fire

(13) Accumulation of non-condensables
(14) Chemical reaction
(15) Closed column outlets



OVERPRESSURE PROTECTION DISTILLATION COLUMNS



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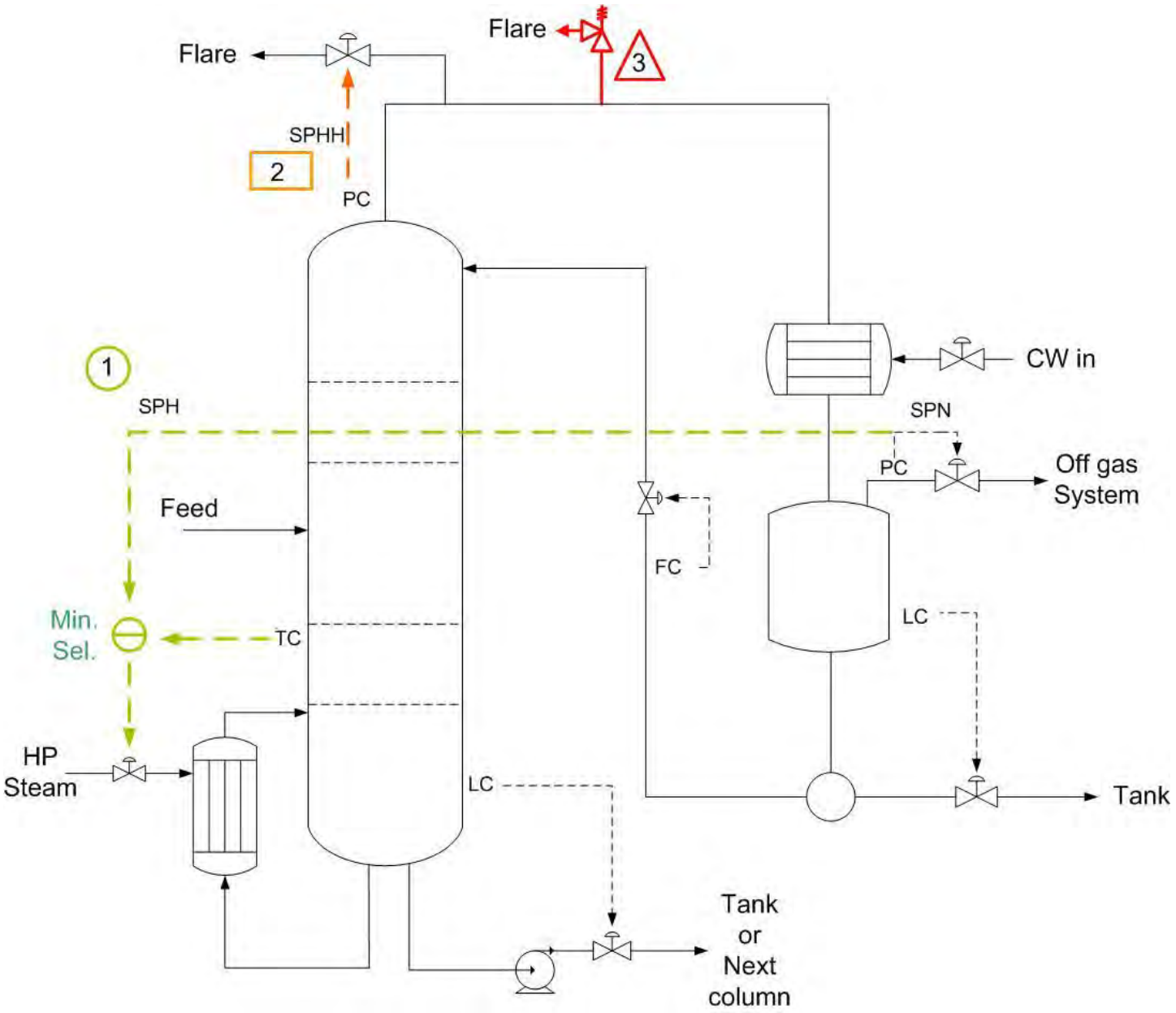
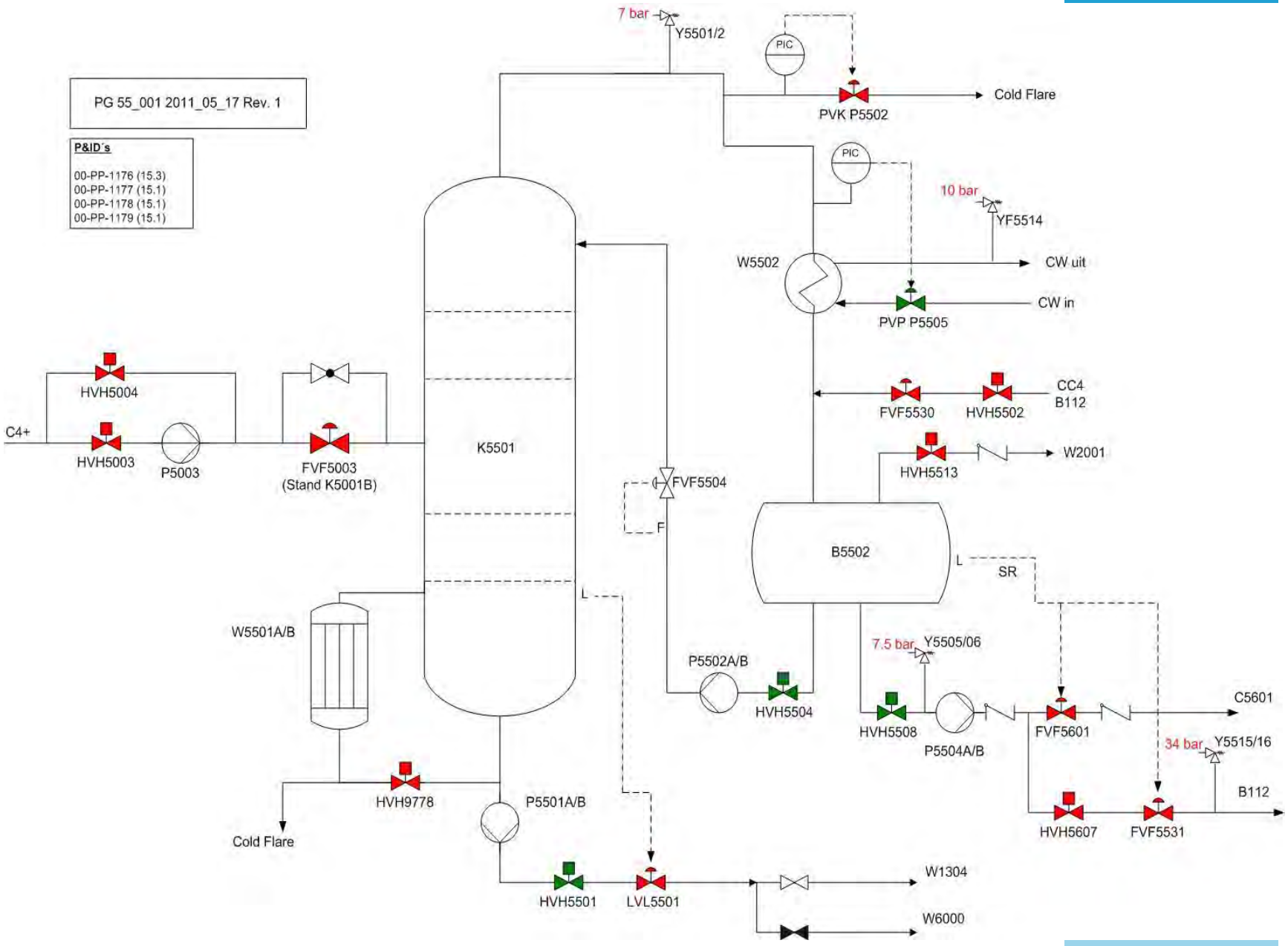
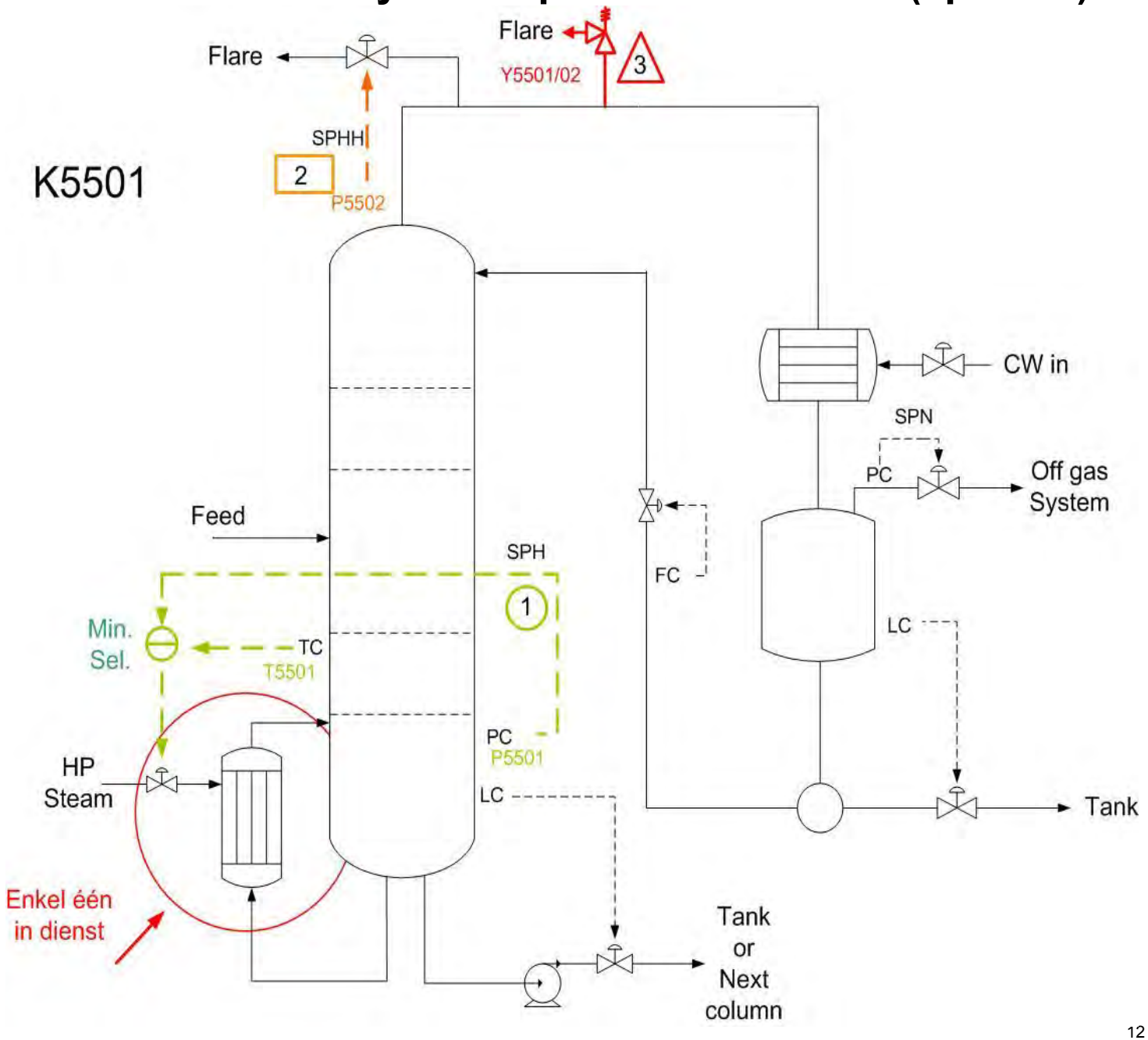
Process Safety Concept – Steamcracker (generic)



Process Safety Concept – Steamcracker (specific)



Process Safety Concept – Steamcracker (specific)



Process Safety Concept – Instrumentational

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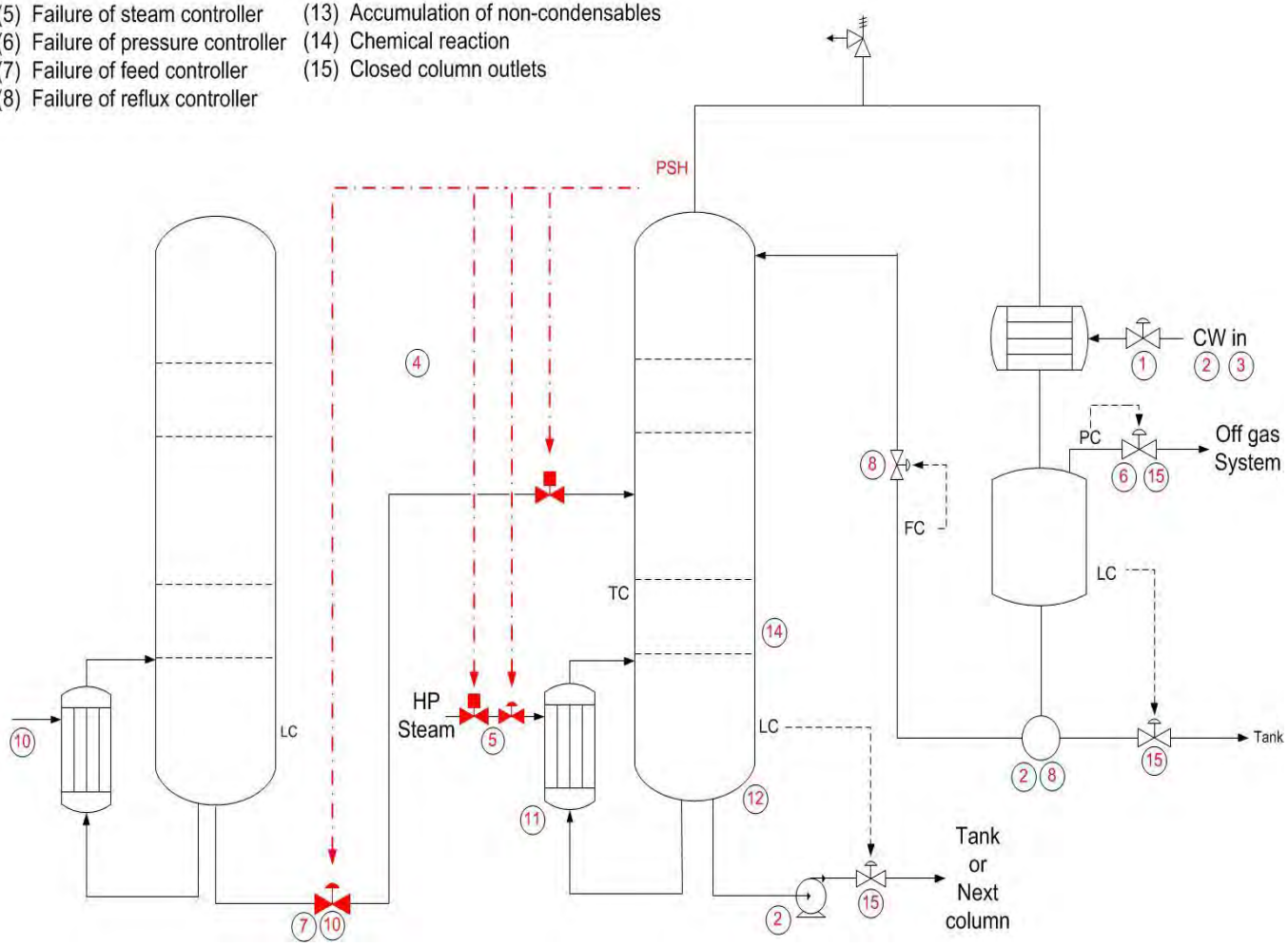

Feedback Operators

- Advantages of further in-depth training:
  - Useful for panel operator – broader knowledge of scenarios.
  - Better understanding of limitations installed in the plant (orifices, locked valves, key arrangements, etc.)
  - Schematic diagram, only focusing on safety concept.
- Disadvantages :
  - Too short.
- Higher engagement
  - Questions / E-mails from operators for a variety of themes.

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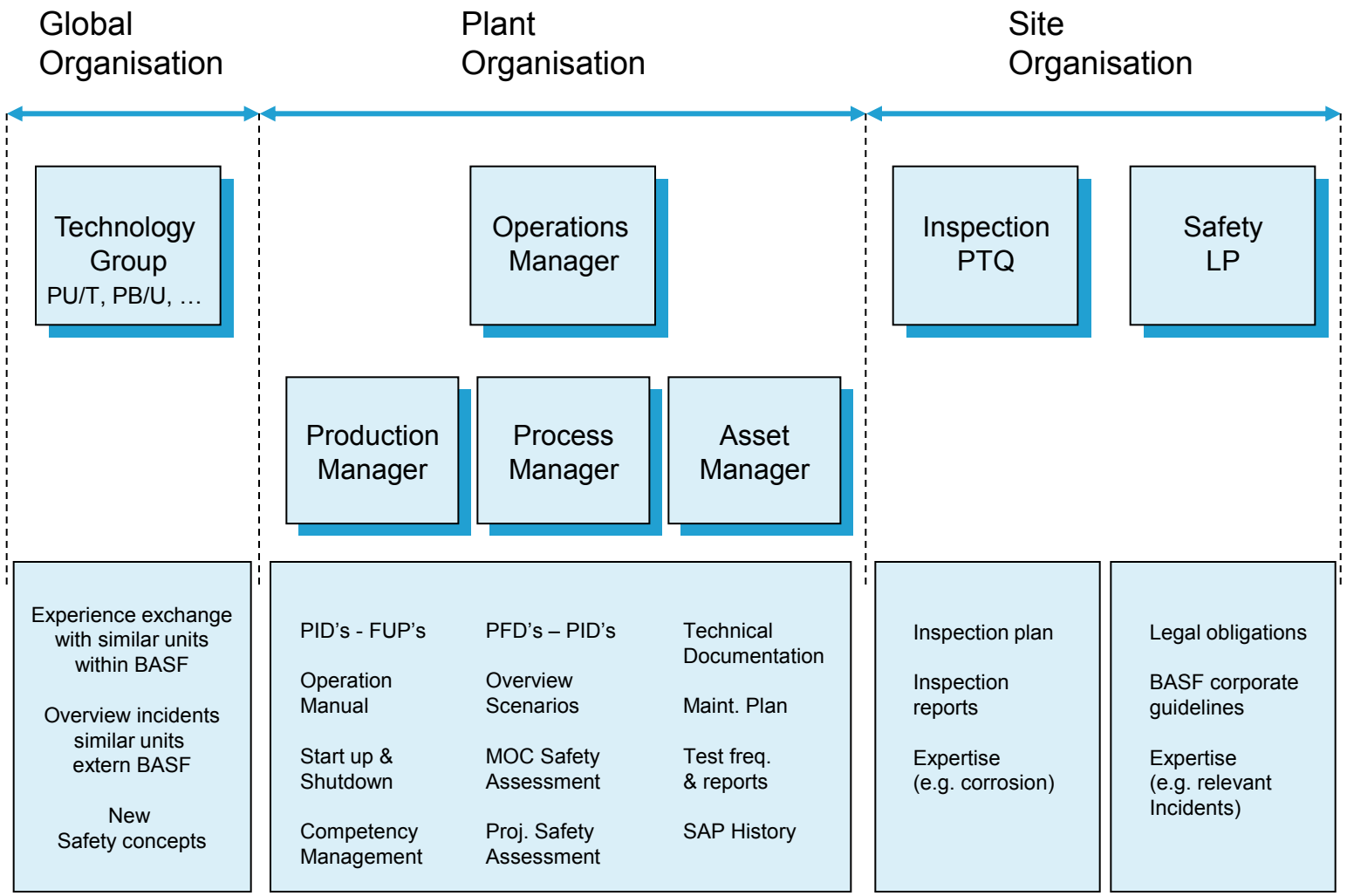
HOW? *To be continued ….*

- What are the deliverables from the organization during PHA:
  - Roles and responsibilities clearly defined by OPAL-project.
  - Will add extra dimension to validation and quality of risk assessment
  - Move from “Project PHA” to “Life Cycle PHA”

- Foresee in-depth training for each role – combined effort by LPP / PTQ / PTP – see overview

How / to be ctd ... necessary competencys



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