

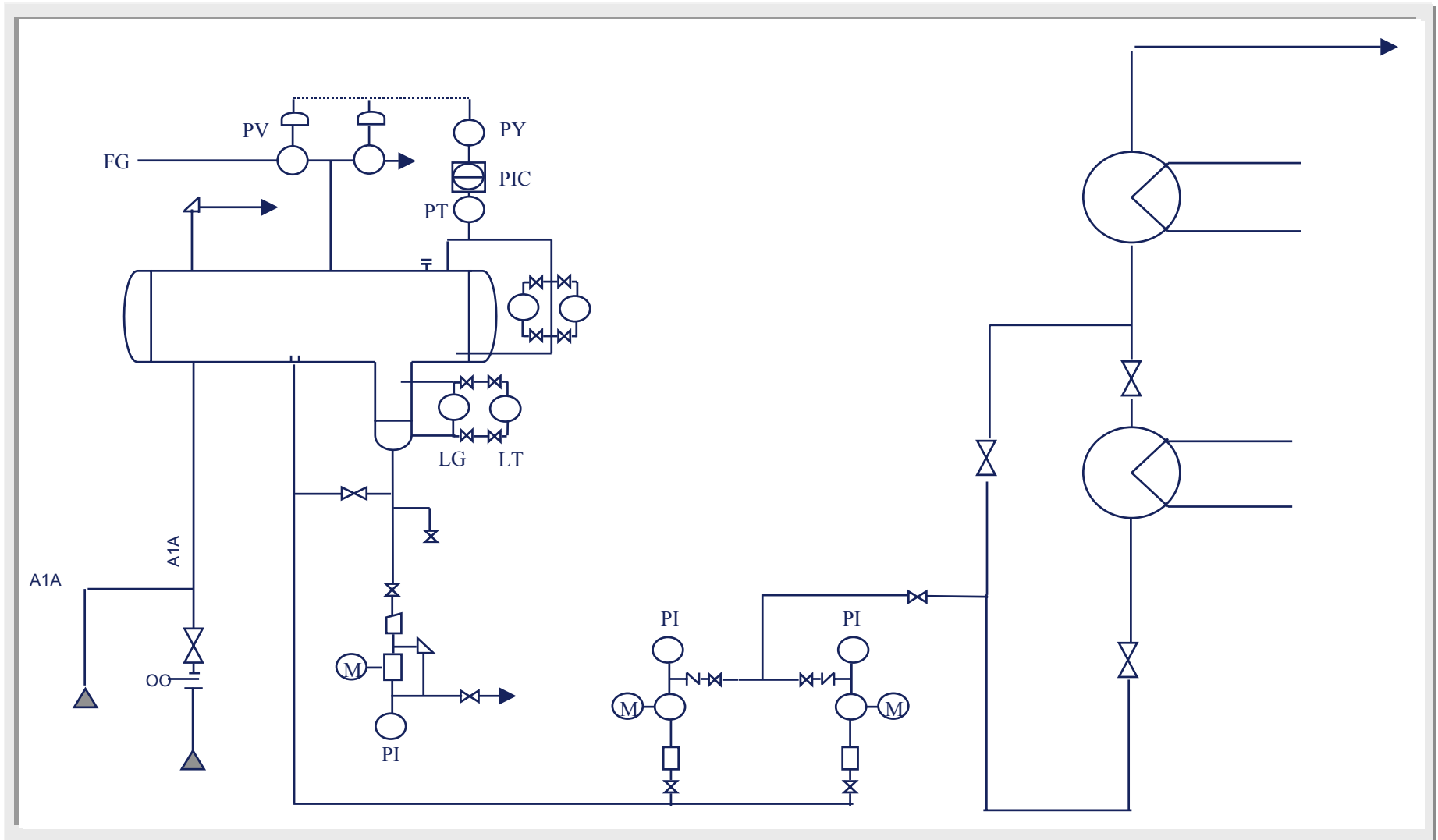


## HAZOP on a small section of plant

- The attached section of a P&ID details a charge pump and part of a feed pre-heat train. Assume the feed is Atmospheric residue
- Select one of your group to act as leader and another to record the HAZOP using the following template
- Conduct a HAZOP using the following parameter-guideword combinations to identify any hazards with the arrangements

Parameter	Guideword
Flow	High, Low, No, Reverse Loss of Containment
Pressure	High, Low, Vacuum
Temperature	High, Low, Freezing
Contamination	Part of

# Exercise 3





**Record your HAZOP using the following proforma and those provided in Attachment 1**

ID	Plant Section	Item	Deviation	Cause	Consequence or Implication	Indication or Protection	Question or Recommendation	Answers/ Notes

## Exercise 3



HAZOP Item No.	Plant Section	Item	Deviation	Cause	Consequence / Implication	Indication / Protection	Questions / Recommendations	Answers / Comments
Drawing number Exercise 3 Revision Simple Title – FEED inlet								
1	Inlet to surge drum	Spectacle Blind	Flow- High	High Flow on inlet	Detect by level guage		R1 FI on line 1 Possible control on line	Best to control the flow in the line from Tank eg use the return line from the feed tank pump
2	Inlet to surge drum	Level Guage	Flow-Low	Excessive pumping rate on main feed pump	Surge drum drained. Risk of cavitation/ damage of feed pump	Relies on manual inspection by field operator	R2 Install LAL/LAH on LT for control room	
3	Inlet to surge drum		Flow No					
4	Inlet to surge drum		Flow Reverse	High pressure in main flow causes back flow in secondary feed		None	R4 Install non return valve	
5	Inlet to surge drum		Loss of Containment	5.1 Unable to swing blind because cannot isolate from upstream  5.2 Rupture of small bore tubing	5.1 Chance of large loss of inventory, likely to contaminate ground/ water course  5.2 Loss of containment	None  Standard of bracing	R5.1 Install double block and bleed for maintenance isolation R5.2 Review procedures to minimise spills of heavy material R5.3 Remove lines less than 1.5 ins wherever possible	

## Exercise 3



6	Inlet to surge drum		Pressure — High	6.1 Excessive pressure of fuel gas 6.2 Rundown of hot feed or feed with volatile components and 6.3 Pressure relief valve fails closed 6.4 Blockage of inlet or outlet of relief valve	Might exceed design pressure of surge drum	PSV provided	Q6.1 If PSV lifted would it reseal ? Q 6.2 How is maintenance anticipated Q6.3 What provision made for residue to drain rather than block pressure relief path ? 6.4 Locate so gas cleans the PSV inlet	A6 System likely to operate OK even if PSV not available R 6 Adopt standard design for PSV which allows for regular maintenance and inspection. Requires LO upstream and downstream valves with bypass
7	Inlet to surge drum		Pressure - Low	Failure of Fuel Gas supply or inlet valves	Main pump continues and draws vacuum in surge tank	Level guage	R7 Install PSL to stop the feed pump so that vacuum is not drawn on the feed tank if FG is blocked	
8	Inlet to surge drum		Vacuum	During maintenance vessel is steam cleaned	Might cool blocked in and experience vacuum		Q8 Is vessel designed for vacuum ?	