

HAZARDS AND OPERABILITY ANALYSIS FOR THE CHEMICAL PROCESS OF A GENERIC MANUFACTURING COMPANY

No.	Item	Deviation	Causes	Consequences	Safeguards	Haz Cat	Recommendations
1	Atmosphere / Purge Piping						
1-01	Atmosphere Supply to Furnace						
1-01.1		High Flow	Upstream pressure regulator failure Orifice failure Flow meter failure	High pressure in furnace Accumulation of hydrogen with oxygen at a lower temperature could cause explosion Damaged seals Seal fire	High pressure switch (set at 1.5 psi) Purge cycle must complete prior to introduction of atmosphere Piping can handle maximum pressure	2D	SAR GEN SA-01 Install high-pressure relief valves on atmosphere supply lines.
1-01.4		Misdirected Flow	Sample Petcock port valves open	Fire, explosion	Location Lack of knowledge that port valves exist	2D	SAR GEN SA-02 Consider locking petcock valves used for leak check of manual safety shutoff valves.
1-01.7		High Temperature	Building fire	Equipment damage Material failure Fire propagation	No smoking within 10 feet of furnace Personnel instructed to evacuate the building High temperature limit	1D	SAR GEN SA-03 Consider implementing an operating procedure to shutoff the hydrogen supply during a building evacuation.
1-01.10		Leak	Mating flanges not tightened Flange failure Impact from an external source (truck, crane, etc.) Corrosion	Hydrogen release and accumulation, potential external fire Burns when combustion system is on - Difficulties regulating zone temperature Low flow/ low pressure	Line is physically protected from external impact Hydrogen/nitrogen is non-corrosive (internal corrosion) Hydrogen sensors to be installed in building No smoking within 10 feet of seal area	2D	SAR GEN SA-04 Include annual leak test of the atmosphere piping on the PM schedule.