

**HAZOP for Propellant Powder Production
Conducted for General Manufacturing Company.**

NO.	DEVIATION	CAUSES	CONSEQUENCES	DESIGN SAFETY/ SAFEGUARDS	RISK INDEX	RECOMMENDATIONS
1.	Operations					
2.	Slurry Tank System					
3.	Friction/impact initiation during addition of raw materials	Contact of containers during addition procedures Out-of-place ingredient combinations with high sensitivity	Potential propellant fire/explosion Operator injury Propagation to material in slurry tank	Procedures and training Personnel Protective Equipment Containers for XXX are conductive plastic and a conductive funnel is used for pouring	3E	Conduct friction, impact, and electrostatic (ESD) testing of intermediate combinations of ingredients in dry and solvent-dampened conditions (GEN01-04)
4.	Friction/thermal initiation at contaminated shaft seal	Splashing Operator inattention Dusting	Potential propellant fire/explosion Operator injury Propagation to material in slurry tank	Procedures Training Propellant has never been seen at the shaft seal Personnel Protective Equipment	3D	Consider liquid flushing of slurry tank agitator seals (GEN01-02)
5.	Thermal initiation from cooling jacket failure	Leakage in cooling jacket Plugged cooling jacket lines Power failure leads to material thermal cook off	Potential propellant fire/explosion Personnel injury	Preventative Maintenance Procedures Process has been seen to not pose safety risks when emergency shutdowns occur (such as a power outage)	2E	Assure that the following are included in the Preventative Maintenance Schedule: <ol style="list-style-type: none"> 1. Piping leak prevention 2. Polymer tank cooling jacket 3. Slurry tank cooling jacket 4. Heat exchanger tubes 5. O-rings on the Colloid Mill 6. Line plugging and maintenance (GEN01-07)