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**Risk Register of Major (Potential) Hazards in Urea Plants**

**Mitigation Recommendations**

- Install oil system besides compressors / turbines, install fire detectors, cameras.
- Pay proper attention to the installation of high pressure butterfly valves between flanges with lens gaskets, doors.
- Mechanically secure the granulator doors in open position even when inspecting the granulator through open gasses occur and pressures increase. Avoid overheating of urea melt lines, pay attention to no flow conditions.
- Pay proper attention to the installation of high pressure butterfly valves between flanges with lens gaskets, doors.
- Be aware that high pressure lines / valves can contain high pressure pockets and apply proper maintenance on these block valves, limit number of people at these locations during maintenance, wear proper personal protection.
- Pay attention in the detailed design and fabrication and inspection of nozzles of HP urea equipment. Install a tracing line upstream safety valve, trace body of safety valve and flush body and downstream line of safety valve above mentioned treshhold value (discharge 3rd and 4th stage downstream cooler are critical areas).
- Assure a proper design and experienced and qualified fabricator for HP urea vessels, perform quality control work area to be cleared of contract workman before initiating start up activities.
- Proper interdepartmental communication to be ensured between maintenance supervisor and control room and the树脂ing department.
- Use a qualified welder, some welding workers are unqualified in welding procedures.
- One person passes out.
- Large ammonia emission, complaints from neighbours.
- Moderate
- Catastrophic
- Mitigated Risk Ranking
- V3 June 29, 2017

**Risk Analysis**

- Catastrophic
- Intolerable
- Unlikely
- Likely
- Major
- Moderate
- Likely
- Moderate
- Likely
- Moderate
- Likely
- Moderate
- Likely
- Minor
- Likely
- Rare
- High
- Likely
- Major
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<th>Item</th>
<th>Description</th>
<th>Incidents</th>
<th>Operational</th>
<th>Synthesis</th>
<th>Recirculation</th>
<th>Feed</th>
<th>HP Equipment</th>
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Catastrophic
Moderate
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Unmitigated Risk Ranking
Likely
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Severe
Catastrophic
Moderate
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