### TSC Category
Production

### TSC
Emergency Shut-down and Restart

### TSC Description
Manage shut-down and restart of production processes to minimise loss and damage of assets as well as ensure the safety of personnel during emergency situations

<table>
<thead>
<tr>
<th>TSC Proficiency Description</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Level 6</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>BPM-OPR-2006-1.1</td>
<td>BPM-OPR-3006-1.1</td>
<td>BPM-OPR-4006-1.1</td>
<td>Manage shut-downs and restarts of production processes ensuring maximum safety to personnel and minimum impact to the biopharmaceuticals manufacturing facilities and production productivity</td>
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<tr>
<td>Execute emergency shut-downs according to guidelines and instructions</td>
<td>Coordinate the shut-downs and restarts of production processes in a safe and efficient manner</td>
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### Knowledge
- Organisational processes to shut down manufacturing equipment, systems and facilities during emergencies
- Safe handling of equipment to protect oneself and others from risks
- Organisational procedures to isolate utilities supplies and other components of the manufacturing systems and processes
- Organisational procedures to restart manufacturing equipment, systems and facilities following emergencies
- Organisational procedures for assessing emergency situations and controlling automatic shut-downs
- Methods of minimising loss and damage and of dealing with waste and residual materials during shut-downs
- Lock-out, tag-out, isolation and de-isolation requirements, procedures and related equipment
- Start-up operating procedures, facilities and equipment operation parameters and production steady state
- Commissioning, pre-start checking and troubleshooting of start-up associated equipment
- Methods and limitations of depressurisation, pressurisation, blow-down, temperature
- Principles of operations of manufacturing facilities and equipment
- Routine problems, faults and their resolution
- Methods of starting, stopping, operating and controlling processes
- Corrective actions appropriate to the problem causes
- Functions and troubleshooting of major components and their problems
- Types and causes of problems within one’s scope of skills level and responsibilities
- Emergency shut-down procedures
- Organisational procedures relating to manufacturing facilities shut-downs and restarts
- Workplace Safety and Health (WSH) regulations
## Abilites

- **Perform shut-downs of the manufacturing facilities and their associated control systems and equipment according to instructions**
- **Isolate and shut down utilities supplies and services to the manufacturing facilities, confirming the environments are secure**
- **Perform restarts of the manufacturing facilities and their associated control systems and equipment**
- **Document actions performed during emergency shut-downs and restarts**

<table>
<thead>
<tr>
<th>Abilities</th>
<th>Activities</th>
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<tbody>
<tr>
<td>- Perform shut-downs of the manufacturing facilities and their associated control systems and equipment according to instructions.</td>
<td>- Assess critical situations to determine appropriate shut-down responses based on type of incidents and nature of the situations.</td>
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<tr>
<td>- Isolate and shut down utilities supplies and services to the manufacturing facilities, confirming the environments are secure.</td>
<td>- Implement preparatory work for emergency shut-downs.</td>
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<tr>
<td>- Perform restarts of the manufacturing facilities and their associated control systems and equipment.</td>
<td>- Identify areas to isolate in the event of an emergency shut-down.</td>
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<tr>
<td>- Document actions performed during emergency shut-downs and restarts.</td>
<td>- Inspect the equipment and systems for visible faults and defects to request maintenance of the equipment and systems as required.</td>
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</table>

- **Complete shut-down records.**
- **Approve permits allowing employees to work during plant shut-downs.**
- **Determine holding sites in the event of an emergency shut-down.**
- **Conduct pre-operational checks on utilities and equipment conditions and start up the manufacturing facilities.**
- **Check that the process control systems are operating and make appropriate adjustments to meet specifications.**

<table>
<thead>
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<tr>
<td>- Review safety systems to ensure that the units have been made safe.</td>
<td>- Identify the causes of the shut-downs.</td>
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<td>- Obtain confirmation of the identified shut-downs from production teams to verify both the nature and the reliability of the shut-downs.</td>
<td>- Initiate procedures to rectify the faults or shut-down causes through repair of the operational faults or re-adjustments before returning the systems to start-up status.</td>
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<td>- Commission the start-up processes in accordance with organisational procedures and workplace safety and health procedures.</td>
<td>- Escalate any further ongoing production problems to appropriate persons or authorities.</td>
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