



Benefits of performing PSSR

- The change is more likely **to operate as intended**.
- **New chemicals or materials** used in the process are understood in regard to safety, health, environmental and material performance issues.
- Scheduling & Tracking of equipment which is **designed, fabricated, procured, installed, operated, and maintained** in a manner appropriate for its intended application.
- **The safety systems are confirmed to be operating as designed.**
- **Personnel are thoroughly trained** and have access to current and up-to-date procedures (Operating & Maintenance) and process safety information.
- Support **corporate operational discipline and social responsibility.**
- **Quality Management System** of defined company standards are maintained.
- **Regulatory requirements fulfilment.**
- **Plan vs Actual deviations** can be tracked for capital projects & modification.
- **Engineering calculations and assumptions** used for design and installation match recognized and generally accepted good engineering practices (RAGAGEP) which describe applicable codes and standards.
- **Strengthening the other PSM elements interfaced with PSSR.**

The Term Simple PSSR does not mean this category is less important than a complex PSSR. It indicate a less resource-intensive approach to verifying for startup when the trigger event has a lower level of risk. Complex PSSR will require some level of special planning and effort due to its unique risk-based characteristics or novelty to the site.

Typically a two-person team, the PSSR team leader & one member are involved in PSSR. But in case of complex PSSR , team can be higher based on the trigger event’s nature, requirement of expert for potentially unique instances. Team should include :

- Chemist / Line function / Area incharge
- Civil or Structural Engineer
- Fire & Emergency response team / Fire chief
- Maintenance personnel

What is Pre-Startup Safety Review (PSSR) ?

“Pre-Startup Safety Review PSSR is a formal review of a manufacturing process to verify that critical areas of the affected process have been assessed and addressed prior to using the process. Using the process could include: commissioning, introducing hazardous chemicals, or introducing energy.” Pre-Startup Safety Review (PSSR) means a final check prior to initiating the use of process equipment. It ensures that new or modified processes are ready for start up as per companies defined safety management system program. Company can built the PSSR program that best fits its risk levels, organizational culture, and resources. Chemical Process Industries apply PSSR to their operations to comply with applicable laws and enhance their manufacturing performance.

Following basic steps to be considered for any PSSR

1. **Train the entire workforce on PSSR as per their roles and responsibilities defined during PSSR execution.**
2. **Identify trigger events and determine if PSSR to be performed.**
3. **Determine the type of PSSR implementation (Simple or Complex).**
4. **PSSR Team Building**
5. **Conduct the defined PSSR**
6. **Completion of relevant Documents**
7. **Track post start up PSSR action items.**
8. **Incorporate Lessons Learned for continuous improvement in companies PSSR program.**

PSSR is carried out for Capital Projects, Change in Operating Facilities, Temporary Changes, Post turnaround Start-up, Non-Routine Maintenance, Startup after Emergency Shutdown, Restarting a Mothballed Process (the term mothballed means a section of a unit or process has been out of use for an extended period of time). PSSR is scheduled with each unique change impacting facilities process safety performance & overall manufacturing reliability.

- Technical consultants or equipment specialists
- Materials engineers/metallurgists
- Original equipment manufacturer (OEM) representatives - a factory or team services engineer
- Process control (electrical/instrumentation) engineers
- Purchasing or stores personnel
- Quality assurance specialists
- Safety/process safety professionals
- Contractor participants who involved in system
- Environment Person
- Industrial hygienists / Ergonomist
- Lab personnel

- Few companies follow single format for Simple or Complex PSSR and applicable check points are considered in it.
- Some companies even bundle elements together in one MOC/PSSR administrative-level management system procedure.

PSSR checklist should incorporate following items such that it reduce the rework and post start-up problems :

Following five elements must be covered in any PSSR :

1. **Construction and equipment meet the designed specifications.**
2. **Safe work practices, Operating procedures, Maintenance procedures and Emergency response procedures are in place and adequate.**
3. **Process Hazard Analysis (PHA) has been performed (If needed) and recommendations have been resolved or implemented, and modified facilities meet Management of Change (MOC) requirements.**
4. **Training of each employee involved in the process is completed.**
5. **Facility's document-retention guidelines are met.**

1. General Safety as per Layout and nearby operations
2. Occupational Health & Ergonomics
3. Machinery / Equipment Safety
4. Inventory (Raw Material , Intermediate, Product, By-Product, Chemicals, Catalyst etc) Storage, handling & management, containment
5. Human Factors
6. Process & Utility Pipes, fittings and Process vents
7. Pressure / Vacuum Relief systems
8. Control Room safety (DCS installations)
9. Responsible Care
10. Local exhaust / Ventilation / HVAC / FAU / AHU / Duct
11. Drain System
12. Illumination
13. Hazard Communication
14. Laboratory aspects & controls
15. Maintenance aspects & controls
16. Pre-commissioning & commissioning aspects
17. Electrical Safety & area classification
18. Regulatory compliance
19. Process Hazard Analysis
20. Quality Assurance
21. Mechanical Integrity
22. Safe work Practices / Operating practices
23. Training & Performance
24. Contractor Safety
25. Interlocks & Alarms
26. Environment
27. Field Verification : Hardware
28. Field Verification or Simulation : Software

PSSR checklist based on facility's database are developed and analysed by experts (internal or external) for associated risk at site considering something that occurs early in the trigger event's review or something that occurs at the end and its repetitiveness.

Use of Complex PSSR in case any of the below applicable:

- Change involves equipment in a process that involves material with :
 - Health rating of 3 or 4
 - Reactive ratings of 3 or 4
 - Flammability rating of 3 with operating temp 23 deg. C
 - All material with flammability rating of 4
- Project / Modification cost above 10 lakhs
- Three or more tie-in points
- New type of equipment that is first time used at site and no previous experience of it.
- Reportable incidents are linked in case of any failure to new or modified facility
- Changes involved in new control system or modification that affect safety controls or interlocks.
- Change involves new or modified Fire protection system.

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