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Effectively Manage Pre-Startup Safety Reviews using Process Safety Enterprise®

An ioMosaic White Paper

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Overview

Process Safety Enterprise® (PSE), a cloud-based platform, helps manage Pre-Startup Safety Reviews (PSSRs), ensuring compliance with OSHA's PSM standard. This white paper details the key features of PSE, including:

- Document Control System: Easily stores and retrieves documents
- Intelligent Form Builder: Creates customizable forms
- Action Tracking System: Manages all tasks related to PSSRs
- Reporting and Dashboard/KPI: Provides real-time insights into activities
- PSSR Workflow: Guides users through PSSR definition, required checklists, approvals, pre and post-startup action items, notifications to impacted employees, and completion.

A case study highlights how PSE and a thorough PSSR could have prevented this disaster by effectively managing a startup.

Introduction

PSSRs are crucial for complying with the Occupational Health and Safety Administration (OSHA) Process Safety Management (PSM) 29 CFR 1910.119 standard. The PSSR ensures that changes to the Process Safety Information (PSI) element are reviewed and tested if needed and that all impacted personnel are notified of the change before startup occurs. PSSRs can be extensive for a new facility or very brief for a small change, but these changes must be reviewed, approved, and notified before being used in the covered process.

Businesses often encounter challenges in overseeing this process, as it involves understanding the impact of the change and the various aspects that must be checked and possibly tested. PSSRs must review the construction and design of modified or new facilities and ensure that all safety, operating, maintenance, and emergency response procedures are updated and trained before startup. New facilities must complete a Process Hazard Analysis (PHA), and any recommendations must be resolved or implemented before startup. Modified facilities must have a Management of Change (MOC) with completed action items. Overlooking these requirements risks the safety of employees, plant assets, the community, and the environment. Moreover, an accident resulting from missing or inadequate reviews could lead to production interruptions.

An effective PSSR program should include identifying the required checklists and when they are required for various changes. The checklists should be specific to your facility and processes and can be customized within the PSE workflow. Training should be tracked for all employees

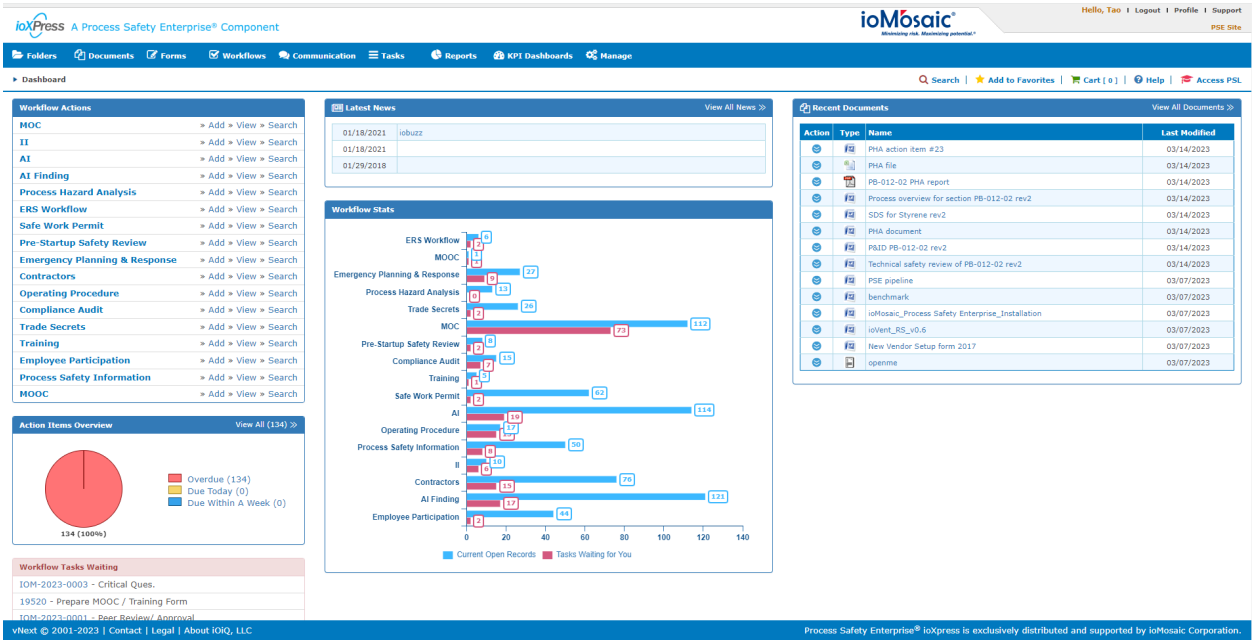
impacted by the change and include the updated Process Safety Information (PSI), such as procedures and chemical hazards. A document management system is needed to create, update, and store the PSI.

An effective PSSR workflow helps companies document, plan, execute, and store the needed documents. This workflow can help companies comply with the PSM requirements of the 29 CFR 1910.119 standard.

For businesses serious about implementing a comprehensive PSM compliance system, ioMosaic offers the Process Safety Enterprise® (PSE) (Figure 1). PSE is a cloud-based platform enabling easy ongoing management of process safety data, helping businesses achieve compliance, manage risk, and remain competitive. Unlike any other system available in the market today, PSE is a centralized web-based application that integrates all PSM elements and workflows, making it THE ultimate solution for managing PSSRs effectively. This white paper delves into the key features of the PSSR workflow and how it benefits companies seeking to improve and elevate their systems to manage the inherent hazards of making changes in a covered process.

To help you better understand the requirements of the PSM standard, we recommend a PSM Essentials eLearning course like the one offered by Process Safety Learning®.

Figure 1. Process Safety Enterprise® (PSE)



Source: ioMosaic Corporation – PSE

Document Control System

The document control system of PSE's platform is a key component for facilitating easy access to all critical process safety data. It allows users to easily access and add documents using a simple drag-and-drop (Figure 2) feature. This action quickly organizes documents into folders for easy retrieval. Its advanced search function indexes all documents with full text, allowing users to find necessary information quickly. An embedded document viewer feature not only enhances accessibility but also bolsters security measures. By granting users view-only permissions, they can view documents as images, preventing unauthorized downloads and eliminating the need to log into their computers for access. This document control component is an effective tool for managing various types of data, including but not limited to completed checklists, engineering data, Process Safety Information (PSI), equipment forms, procedures, records, pictures, videos, animation, and reports. This component further ensures that all stakeholders have easy access to vital information related to PSSRs stored in a centralized location.

Figure 2. Drag and drop feature to add document(s)

Source: ioMosaic Corporation – PSE

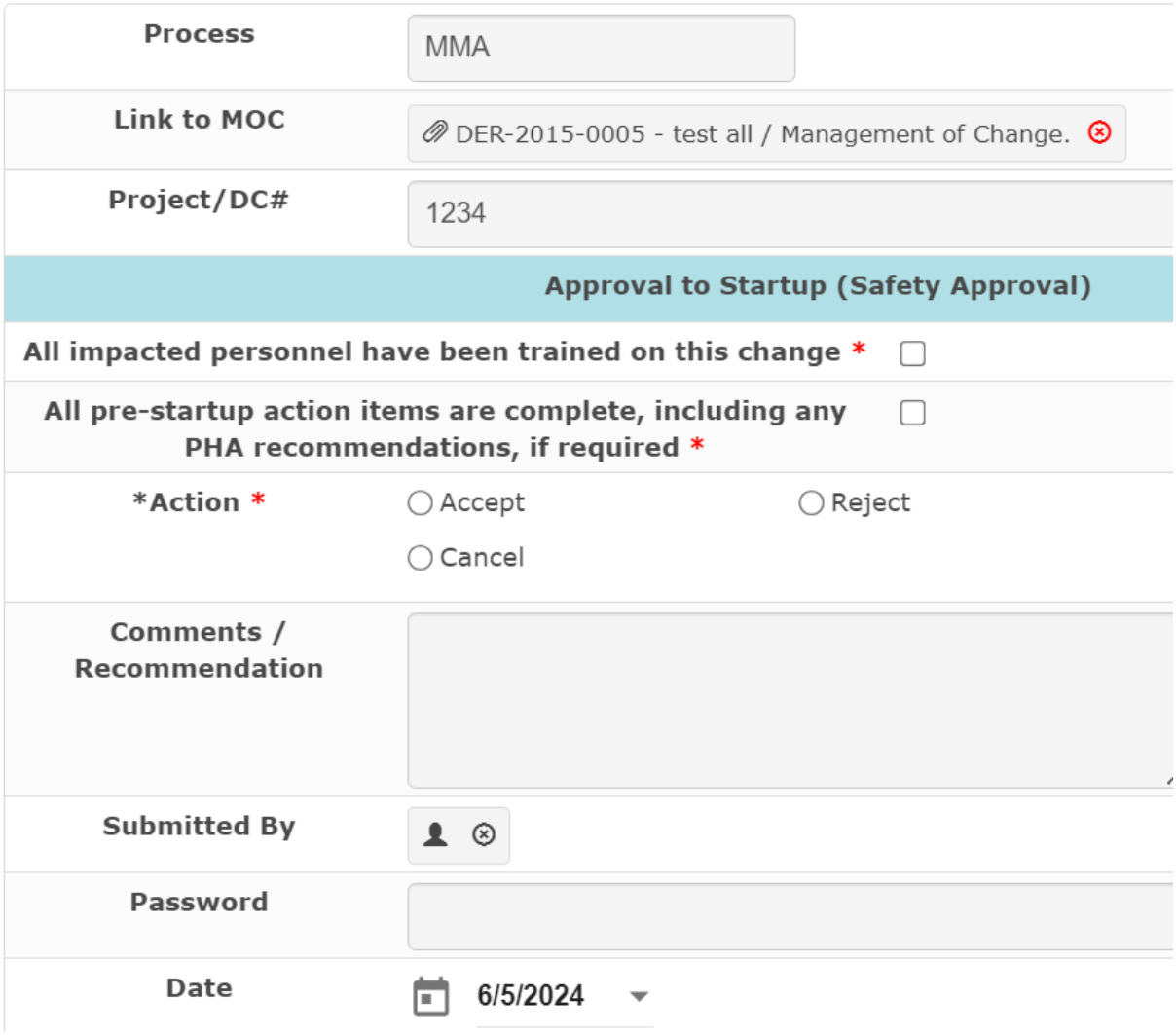
Intelligent Form Builder

PSE also includes an intelligent form builder for efficient data capture and linking to documents in a central digital library. This dynamic form builder enables users to create practical, customizable PSSR checklists.

The ability to customize forms for unique checklists ensures that all necessary data is captured accurately and consistently. Moreover, this feature allows for easy export of data to an Excel format, making data analysis and sharing even more seamless. Implementing a customizable form builder like the one in PSE streamlines a PSSR process by capturing data accurately and efficiently.

Figure 3 shows an example of a PSSR form.

Figure 3. Example of the Approval to Startup PSSR Form



Source: ioMosaic Corporation – PSE

Pre-Startup Safety Review (PSSR) Workflow

PSE is the only process safety platform that integrates all of OSHA's Process Safety Management (PSM) elements using visual workflows in a single enterprise system. This workflow includes PSM's 14 elements, action tracking modules, and document control. The Training workflow can be used to notify and train impacted employees on the coming change. The PSSR workflow allows you to manage the hazards of these changes while documenting the review and testing requirements, approvals, and completed checklists.

The PSSR workflow establishes steps for the PSSR definition, execution, approval, notification, and startup of the change. Pre- and post-startup action items can be tracked to completion. This workflow (and all PSE workflows) can be easily customized to meet your company's specific needs.

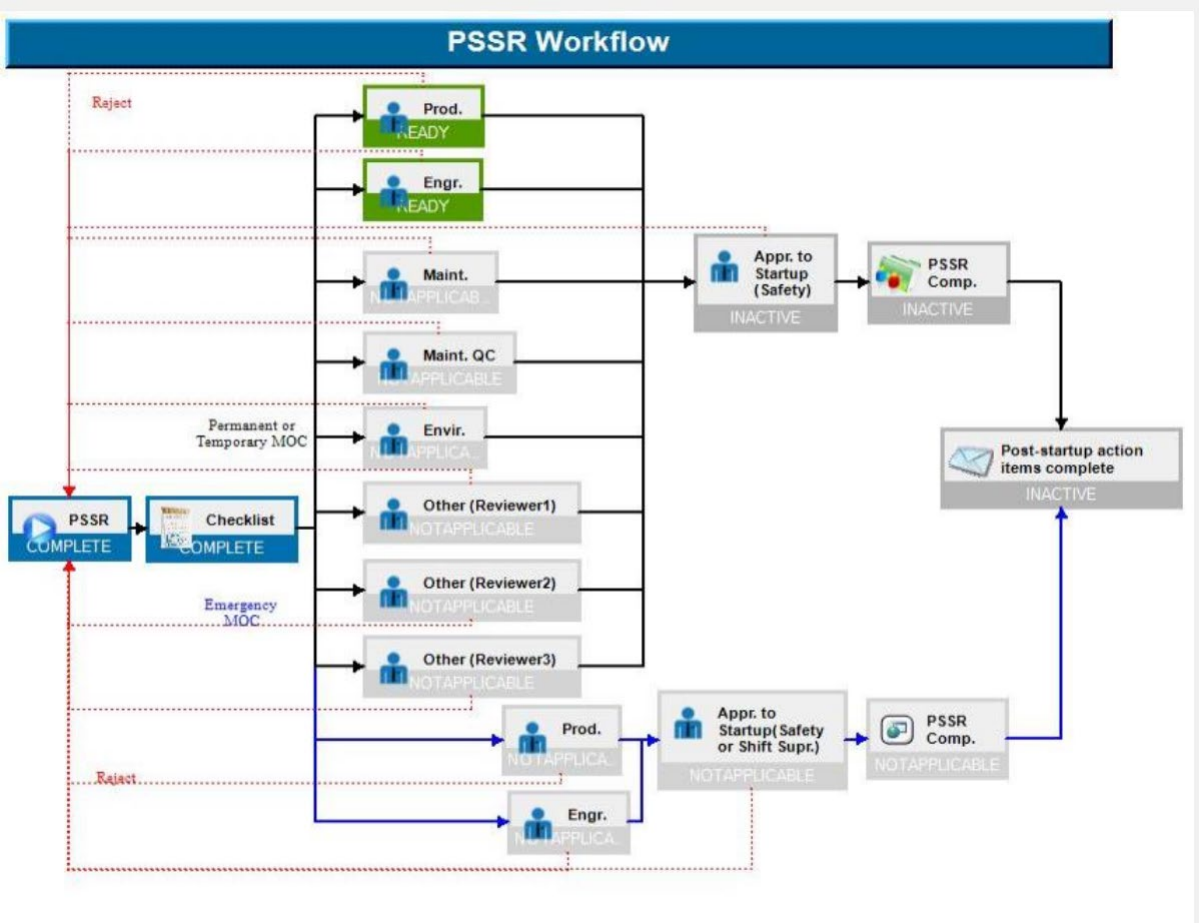
PSE's PSSR workflow module includes questions to help employees determine the required checklists and obtain the required approvals before startup. The workflow also contains action items that can be tracked to completion for pre and post-startup items and email notifications for the production supervisors and safety managers that the PSSR is complete and the change is ready and approved for startup. Training of impacted personnel is also required before startup.

The final step of the workflow is to ensure all post-startup action items are completed before the workflow is closed.

Figure 4 illustrates the Pre-Startup Safety Review (PSSR) workflow steps. Completed steps are in blue, Inactive steps in light gray, not applicable steps in dark gray, and Ready steps are in green. The workflow can only be closed once all required steps are completed.

The PSSR workflow within PSE ensures changes to the covered process are managed and reviewed before startup per the OSHA standards and guidelines.

Figure 4: Example of the PSSR Workflow

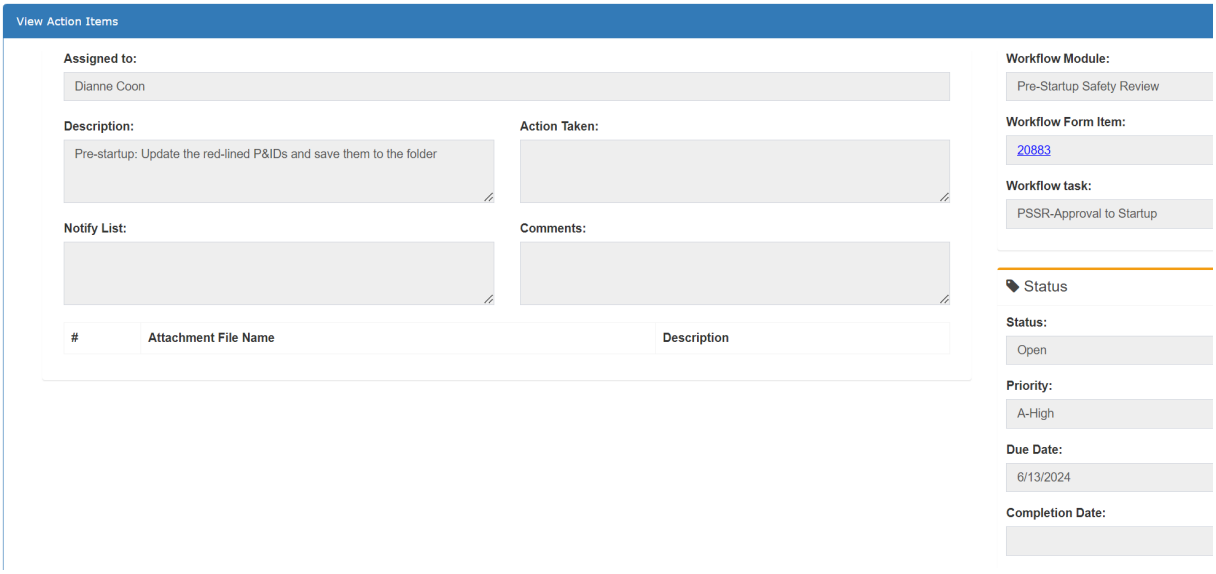


Source: ioMosaic Corporation – PSE

Action Tracking System

PSE features a comprehensive action item management system (Figure 5). It tracks all tasks related to each process safety management workflow, such as PSSRs. This feature ensures that all action items are managed within the platform, reducing or eliminating the risk of overlooked or forgotten tasks. An additional feature, the 'Automatic Reminders,' enforces all tasks to be completed on time.

Figure 5. PSSR Action item



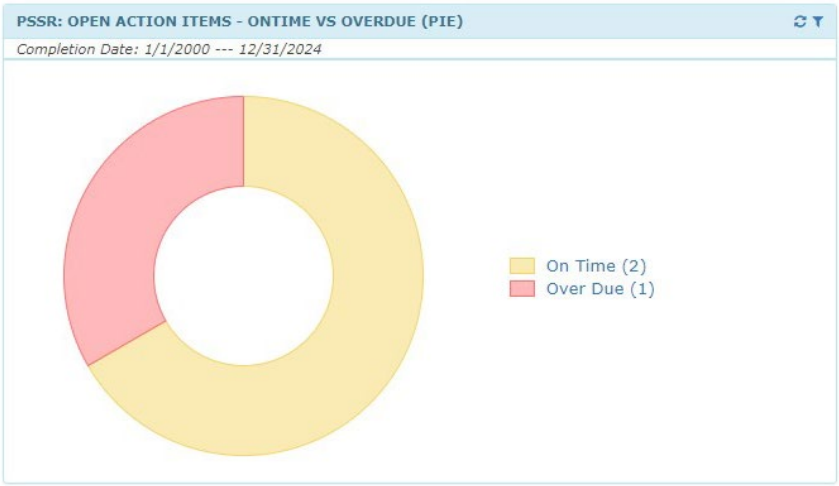
Source: ioMosaic Corporation – PSE

Reporting and Dashboard/KPI

An effective dashboard (Figure 6) is an invaluable 'must-have' asset for any data-driven enterprise looking to increase performance and productivity. Well-designed dashboards featuring various widgets such as bar charts, pie charts, line charts, and tables provide a comprehensive overview of the PSM program from a single source. These dashboards allow business owners to make quick, informed decisions at a glance based on real-time data.

Moreover, the reporting and dashboard capabilities provide real-time visibility into PSSR activities, allowing organizations to identify trends and areas of concern quickly. This capability enables timely corrective action, reducing the risk of incidents and non-compliance. PSE's robust reporting and dashboard/KPIs are essential tools for optimizing operations and mitigating potential risks.

Figure 6. Dashboard/KPI



Source: ioMosaic Corporation – PSE

Case Study – The Consequences of Not Managing PSSR

The Challenge

The US Chemical Safety and Hazard Investigation Board (CSB) investigated an explosion and fire that occurred on June 13, 2013, at the Williams Geismar Olefins plant in Geismar, Louisiana. The incident resulted in two employee fatalities and 167 injuries.

The site had two reboilers, A and B, that were swapped back and forth in production. When one reboiler fouled, it was shut down and cleaned, and the other reboiler was put back into service. On this day, the Operations Supervisor suspected Reboiler A was fouled and decided to switch to Reboiler B. The CSB determined that, somehow, liquid propane had entered the shell side of Reboiler B while it was idle and this event was undetected by the plant personnel. Also unknown to the plant was that the block valve that allowed access to the propylene fractionator's pressure relief device was closed.

The Operations Supervisor opened the hot quench water valve on the tube side to Reboiler B, which began to heat the unknown liquid propane on the shell side. The propane expanded as it heated until the pressure exceeded the mechanical pressure limit of the reboiler, and the shell failed. With the shell confinement suddenly gone, the bulk of the propane abruptly lowered to atmospheric pressure. At atmospheric pressure, the liquid propane was above its boiling point (i.e., in a superheated state). The propane was explosively released into the surrounding area as a Boiling Liquid Expanding Vapor Explosion (BLEVE). The process vapor ignited a massive fireball,

and the force of the explosion launched a portion of the reboiler piping into a pipe rack approximately 30 feet overhead.

The CSB found that Williams had implemented their Process Safety Management (PSM) program ineffectively. A Management of Change (MOC) was done after the block valves were installed in 2001, and the overpressure hazard was not evaluated in a Process Hazard Review (PHA). MOCs must be completed before the change is implemented per the PSM standard, and the impacts on safety and health must be evaluated. The CSB determined that the MOC also did not require an updated operating procedure for switching the reboilers, considering the new block valves and the dangers of overpressure if they were closed during startup.

The CSB also found that some key PSSR questions answered after the block valves were installed were either skipped or answered incorrectly. The unanswered questions included whether the hazards of the change had been evaluated and recommendations implemented, whether impacted personnel had been trained on the change, and whether the block valves were car-sealed open. A key incorrect answer was a "yes" for whether the operating procedures had been updated.

In 2006, Williams conducted a PHA that identified the overpressure hazard of the reboiler block valves. The recommendation was to install a car seal on at least one of the manual valves for Reboilers A and B to ensure access to the pressure relief device. The recommendation did not reflect the current practice of cleaning the standby reboiler, filling it with nitrogen, and keeping the block valves closed while offline. The overpressure hazard was still present and unaddressed in the operating procedure for bringing the standby reboiler back online. Only the active reboiler had the block valve car-sealed open. Implementing the car seal on the block valves required an MOC and PHA per the PSM standard. The CSB determined there was confusion about when an MOC was required and believed that the PSSR might have identified the false assumption that both reboiler block valves could be car-sealed open simultaneously. The explosion and fire at Williams resulted from these deficiencies in the PSM program, as identified by the CSB.

A more robust and thorough PSM program should have been in place to avoid this disaster. However, an existing program solely relying on individuals to execute the PSM requirements and maintain the documentation can be prone to human error. Creating a documented program that relies on an electronic platform for MOCs, PSSRs, and PHAs can improve process safety oversight and ensure that all required actions and questions are completed to protect employee and contractor safety. An electronic program can also reduce the risk of worker fatalities and injuries using appropriate hazard management. For the entire CSB report, please see this link.

Our Approach

The Process Safety Enterprise® PSSR Workflow is a cloud-based platform that provides a centralized database accessible and visible to all employees and contains a step-by-step guided workflow. This workflow could have minimized or eliminated the Geismar incident referenced in the case study when used with the MOC and PHA workflows. Additionally, PSE can integrate multiple sites and various data into one uniform system (which would have further minimized the incident) by:

- Developing a unique ID system to differentiate facilities and areas
- Setting up sign-on access for users at all facility sites
- Identifying and developing consistent data definitions and Key Performance Indicators (KPIs)
- Standardizing search queries to ensure data quality
- Devising site-specific and corporate reporting capabilities

Customizable workflows are available within PSE and can assist with creating unique PSSR checklists and workflows.

PSE's built-in features, such as the automatic assignment of approvals, action item tracking, document linking, and email notifications, ensure that PSSR documentation and execution are properly captured, accessible, and visible to employees.

The Benefits

For companies serious about their process safety compliance and PSSR process, PSE is a user-friendly platform with workflows for document control that is scalable and affordable.

The workflow streamlines initiating, executing, approving, completing, and documenting the required PSSR checklists and action items.

Finally, the PSE workflows have KPIs that track open workflows and action items. The KPIs are graphed with interactive data, allowing you to drill down to the specific data. Reports can also be generated to view the open PSSRs.

Conclusion

Managing PSSRs effectively and consistently can be challenging; fortunately, Process Safety Enterprise® (PSE) provides an integrated solution that makes the process more efficient and effective. With its dynamic form builder, action tracking feature, and integrated workflows to standardize the process, companies reduce the risk of incidents and non-compliance.

PSE offers additional benefits, including enhanced collaboration, improved data management, and increased compliance with process safety regulations. With the reporting and dashboard capabilities, organizations can easily identify trends and potential areas of concern, gaining real-time visibility into all process safety-related activities. The automatic notification system sends reminders and alerts, ensuring items are addressed before the workflow is closed.

PSE's customizable workflow module allows users to customize PSSR checklists and assign specific personnel to conduct the PSSR, approve required steps, and complete the assigned action items. This process ensures that all necessary information is captured in one centrally located platform.

PSE is the only product of its kind in the market today that provides an all-inclusive process safety compliance platform that makes compliance easy.

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Useful Links

PSE link to software demo requests

PSE link to PSE overview

PSM Essentials Training link

CSB report link

Additional PSE White Papers:

- PSM Compliance Made Easy with Process Safety Enterprise®
- Effectively Manage Mechanical Integrity with PSE
- Effectively Manage Processes Chemicals Equipment and Personnel with PSE
- Process Safety Enterprise® Asset Integrity Management Service (AIMS) and KPI Dashboard