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Effectively Manage Safe Work Practices using Process Safety Enterprise®

An ioMosaic White Paper

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Overview

Process Safety Enterprise® (PSE), a cloud-based platform, helps manage safe work practices, 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 permits
- Reporting and Dashboard/KPI: Provides real-time insights into activities
- Safe Work Permit Workflow: Guides users through permit initiation, prework, approvals, execution, extension/renewal, and completion

A case study highlights how PSE and a confined space safe work permit could have helped to prevent this disaster by managing safe work practices effectively.

Introduction

Safe work practices are vital to the Occupational Health and Safety Administration (OSHA) Process Safety Management (PSM) 29 CFR 1910.119 standard. The standard requires safe work practices in section "f(4)" for operating procedures and section "k" for hot work. These practices include confined space entry, line breaking, and lockout/tagout (LOTO). Many companies also utilize a general safe work permit for all work in the covered process in addition to specific work permits. Safe work practices address the activities' hazards and ensure adequate safeguards are in place to manage those hazards before, during, and sometimes after the work is performed.

Businesses often encounter challenges in overseeing these procedures, as they involve the intricacies of developing and implementing each safe work practice. The process includes identifying applicable work practices, generating permits to address potential hazards, and administering training—all of which demand considerable time and resources. Overlooking these responsibilities risks the safety of employees, plant assets, the community, and the environment. Moreover, an accident could lead to production interruptions.

An effective, safe work practice program should include identifying the work practices used at the facility. A policy or procedure should state if certain practices, such as line breaking, are prohibited or require management approval. For the applicable work practices, permits should be created that identify the known hazards and require a trained person to assess and address those hazards before work begins. Air monitoring or other activities during and after work may also be required

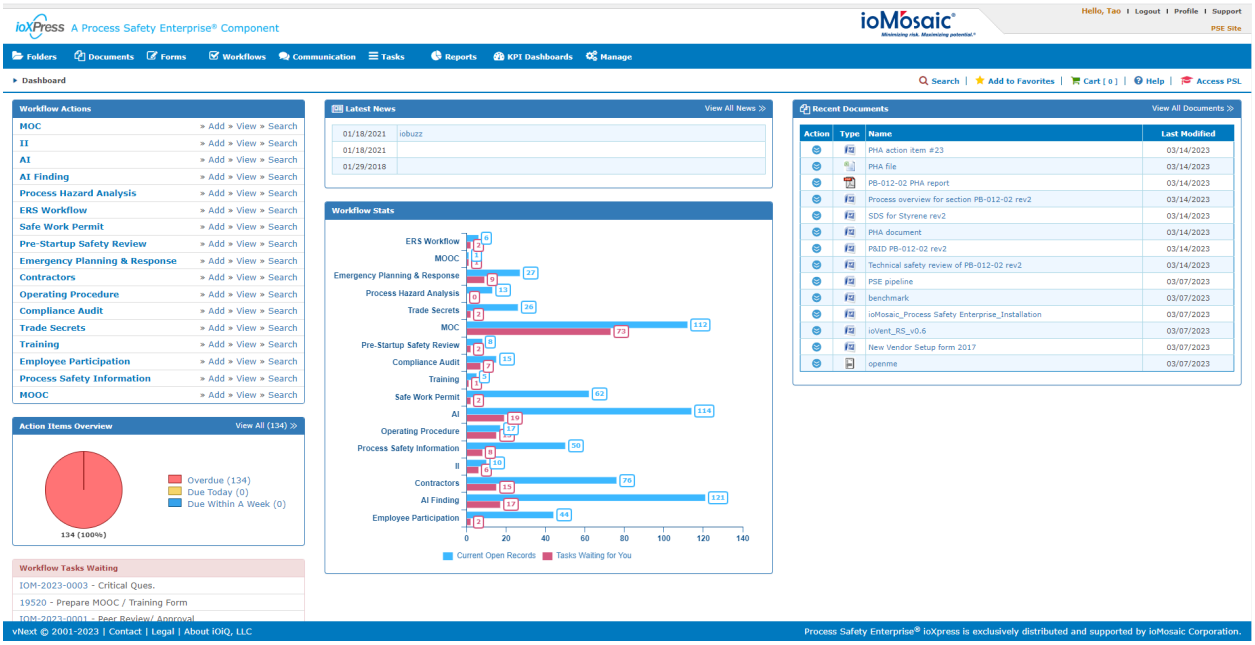
to manage the hazards. Training should be tracked for all employees to be aware of the permit requirements and permit issuers who must thoroughly understand the hazards and how to mitigate or eliminate them. A document management system is needed to create and store the original and completed permits.

Effective, safe work practice systems help companies document, plan, execute, and store required safe work practices. 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 safe work practices effectively. This white paper delves into the key features of the safe work practice workflow and how it benefits companies seeking to improve and elevate their systems to manage the hazards of various work practices.

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)

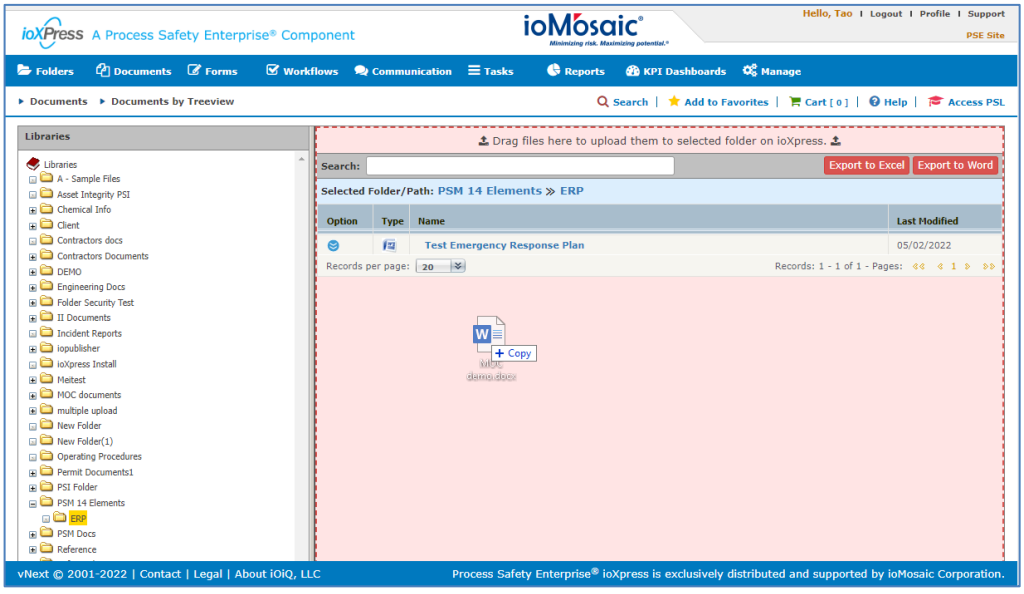


Source: ioMosaic Corporation – PSE

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 safe work permits, 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 safe work practices stored in a centralized location.

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



Source: ioMosaic Corporation – PSE

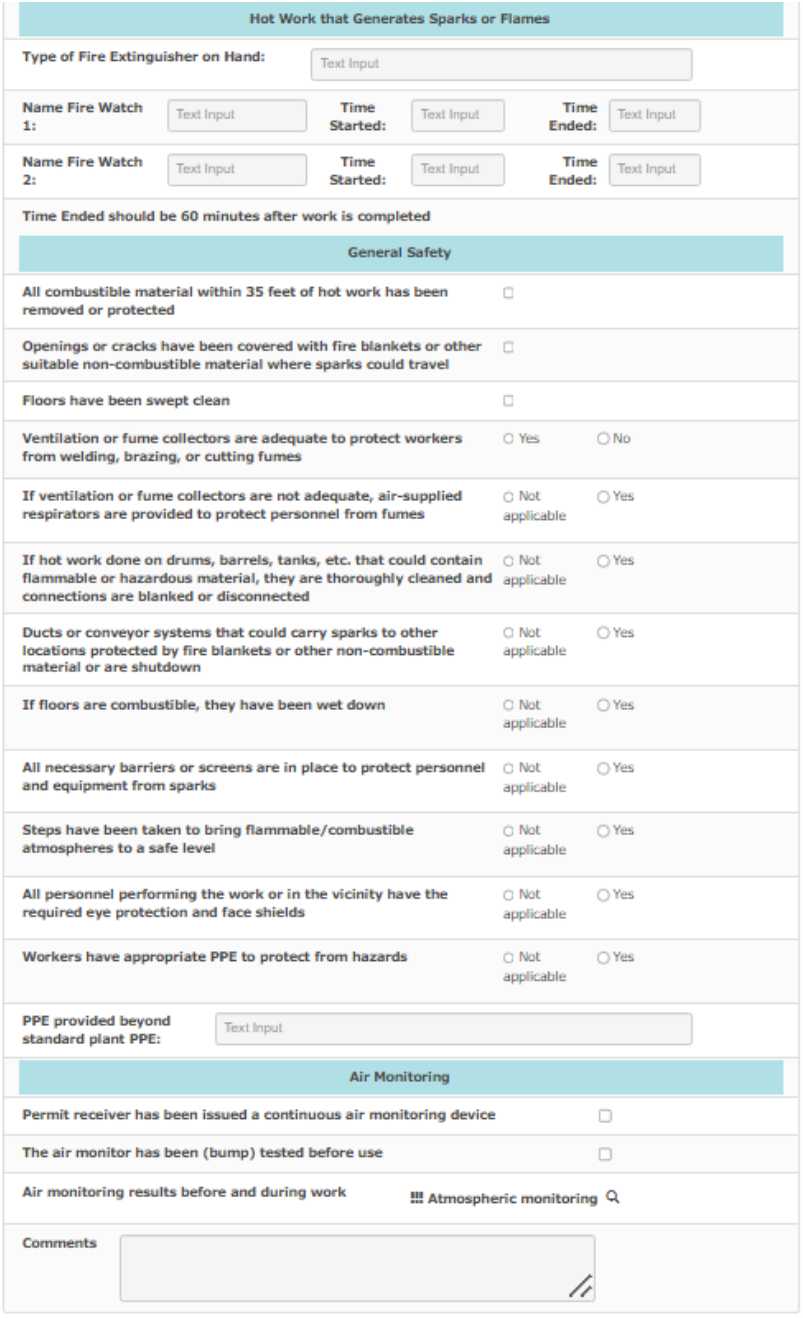
Intelligent Form Builder

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 work permits.

The ability to customize forms for unique, safe work practices 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 safe work process by capturing data accurately and efficiently.

Figure 3 shows an example of the hot work permit form.

Figure 3. Example of Safe Work Permit Form – Hot Work



Hot Work that Generates Sparks or Flames

Type of Fire Extinguisher on Hand: Text Input

Name Fire Watch 1: Text Input | Time Started: Text Input | Time Ended: Text Input

Name Fire Watch 2: Text Input | Time Started: Text Input | Time Ended: Text Input

Time Ended should be 60 minutes after work is completed

General Safety

All combustible material within 35 feet of hot work has been removed or protected	☐	
Openings or cracks have been covered with fire blankets or other suitable non-combustible material where sparks could travel	☐	
Floors have been swept clean	☐	
Ventilation or fume collectors are adequate to protect workers from welding, brazing, or cutting fumes	○ Yes	○ No
If ventilation or fume collectors are not adequate, air-supplied respirators are provided to protect personnel from fumes	○ Not applicable	○ Yes
If hot work done on drums, barrels, tanks, etc. that could contain flammable or hazardous material, they are thoroughly cleaned and connections are blanked or disconnected	○ Not applicable	○ Yes
Ducts or conveyor systems that could carry sparks to other locations protected by fire blankets or other non-combustible material or are shutdown	○ Not applicable	○ Yes
If floors are combustible, they have been wet down	○ Not applicable	○ Yes
All necessary barriers or screens are in place to protect personnel and equipment from sparks	○ Not applicable	○ Yes
Steps have been taken to bring flammable/combustible atmospheres to a safe level	○ Not applicable	○ Yes
All personnel performing the work or in the vicinity have the required eye protection and face shields	○ Not applicable	○ Yes
Workers have appropriate PPE to protect from hazards	○ Not applicable	○ Yes

PPE provided beyond standard plant PPE: Text Input

Air Monitoring

Permit receiver has been issued a continuous air monitoring device	☐
The air monitor has been (bump) tested before use	☐

Air monitoring results before and during work — Atmospheric monitoring

Comments

Source: ioMosaic Corporation – PSE

Safe Work Permit Workflow

PSE is the only process safety platform integrating 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 require and track training for permit awareness and issuing. The Safe Work Permit workflow allows you to manage the hazards of these activities while documenting the requirements, approvals, and completed permits.

The Safe Work Permit workflow establishes steps for the initiation, calculations, lockout/tagout, approvals, extension or renewal, and completion of the permits. The area must also be clean and ready to be returned to service once the work is completed. This workflow (and all PSE workflows) is easily customized to meet the specific needs of any company.

PSE's Safe Work Permit workflow module includes questions to help employees determine the required permits and supplies associated with the OSHA standard or guideline. The workflow also contains pre-built permits for twelve typical activities, including excavation, working at heights, and energized work. Forms must be completed before approval to start work is granted. Approvals can be company-specific.

The workflow also includes a step for necessary calculations or prework for activities such as excavation, lifting, and working near overhead lines. If LOTO is required, a step ensures that all LOTO requirements are met before moving to the next permit.

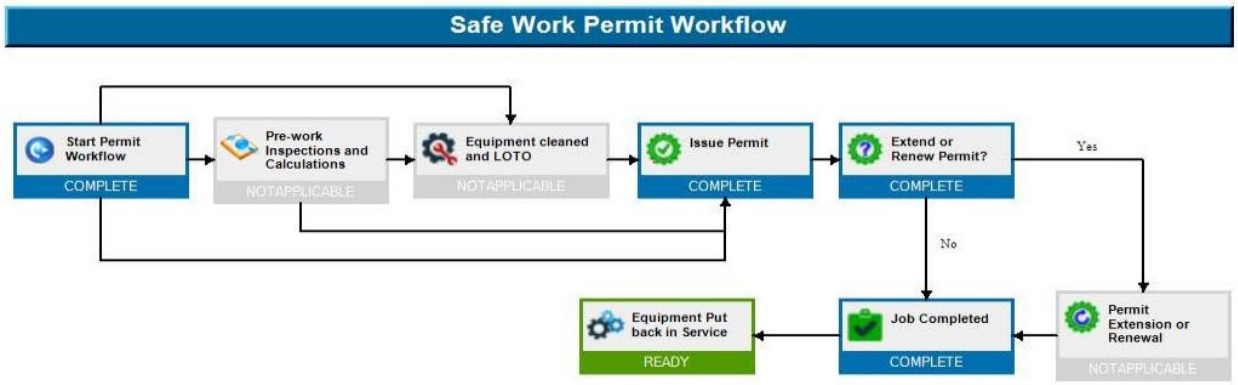
Most permits are issued for one day, but sometimes, work is delayed. Many companies also renew the permit after extended breaks, such as lunch, if air monitoring is required to ensure conditions have not changed and the area is safe. This workflow provides a controlled process for extending or renewing the permit.

The final step of the workflow is for operations to review the area and agree that the work is completed, the area is clean, and the equipment or process is ready to go back into service. If issues are identified, operations can document them and assign someone to address the issue(s) before the equipment or process is put back into service.

Figure 4 illustrates the Safe Work Permit 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 Safe Work Permit workflow within PSE ensures hazardous activities are identified and managed per the OSHA standards and guidelines.

Figure 4: Example of Safe Work Permit Workflow

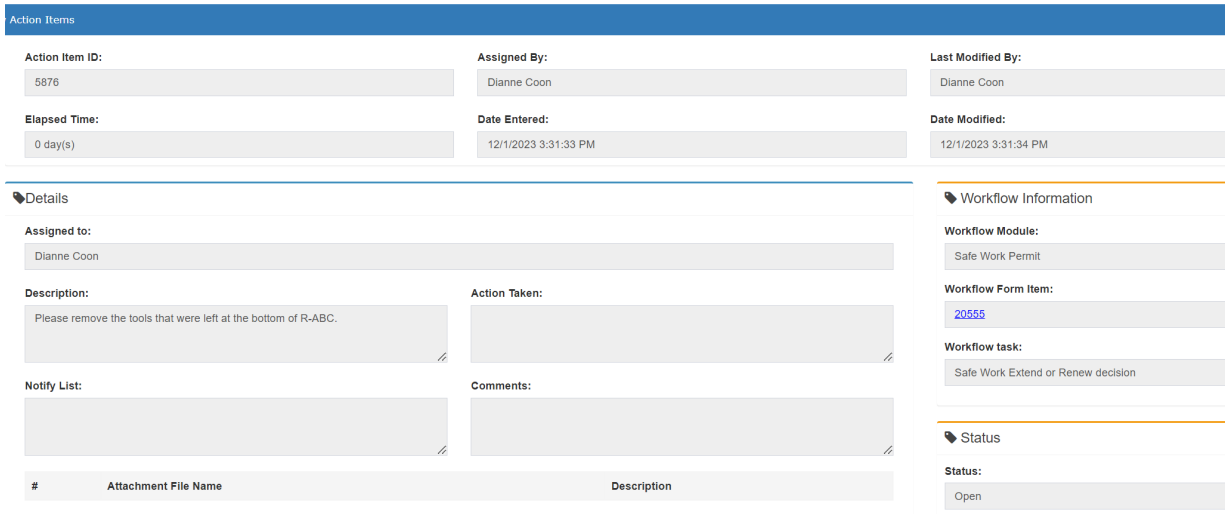


Source: ioMosaic Corporation – PSE

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 Safe Work Permits. 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. Safe Work Permit Action item



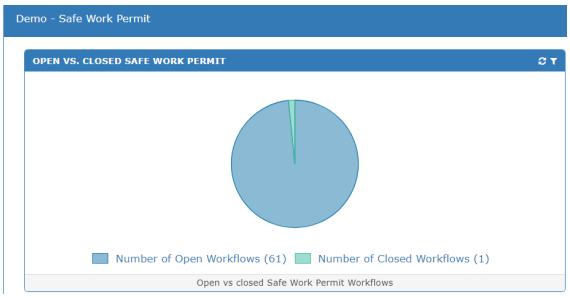
Source: ioMosaic Corporation – PSE

Reporting and Dashboard/KPI

An effective dashboard and concise planning report (Figures 6 and 7) are invaluable 'must-have' assets 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 work permit 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

Figure 7. Planning Table for Open Permits

PLANNING TABLE FOR OPEN PERMIT WORKFLOWS

worknumber	equipment	plant	area	permitincluded	prework	loto	scheduledate	actualdate	currentstep
20555	the leg of R-ABC must be welded	Refinery	Lignin Production	General permit only	No	No	12/14/2023	12/1/2023	Equipment Put back in Service
15908	test	Post Refinery Kettles	Shipping/Traffic South	LOTO,	No	Yes	1/4/2024		Equipment cleaned and LOTO
15902	test	Hard Resin Kettles	Lignin Production	General permit only	No	No	2/6/2024		Issue Permit

Source: ioMosaic Corporation – PSE

Case Study – The Consequences of Not Managing Work Practices

The Challenge

The US Chemical Safety and Hazard Investigation Board (CSB) investigated a confined space incident from October 2, 2007, at the Xcel Energy Company Hydroelectric Tunnel near Georgetown, Colorado. Five contracted painters entered a large tunnel with one entrance/exit to recoat a portion of a steel section with epoxy. The area was cleaned with a highly flammable chemical, Methyl Ethyl Ketone (MEK). During the application of the epoxy, the workers had issues with the epoxy applying evenly and brought in additional MEK to flush the lines. The MEK vapors ignited at some point, likely due to static electricity. The fire spread to the containers of additional MEK and epoxy and blocked the only exit for the workers. The workers ran away from the fire but could not go very far due to the steep tunnel incline that could not be climbed.

The trapped workers looked for fire extinguishers on their side of the blaze, but none were present. Workers on the other side tried to use fire extinguishers to put out the fire, but they were inadequate. The Georgetown Fire Department was called, but they were not trained or equipped to handle a fire in a confined space. The fire department from Denver was called, but they were about an hour away. While they were enroute, bottles of oxygen and respirators were fed down the steep side of the tunnel, but they did not arrive in time. By the time the Denver Fire

Department arrived, the five workers had perished from smoke inhalation. Three others were injured during the attempted rescue.

The CSB found that Xcel had not evaluated or managed the hazards of this work before it began. A confined spaces rescue plan had not been developed, and the closest trained rescue units were more than an hour away. From communications with the trapped workers, it was determined that they survived for about 45 minutes, which would have been sufficient time if a trained rescue unit had been onsite or nearby. CSB also found that the workers had little training for these hazards and that the RPI coatings company had a poor safety record. They were chosen to do this job based on price.

The US Bureau of Labor Statistics states that there have been 1030 worker fatalities from 2011-2018 from occupational injuries involving a confined space. Please see this link for details.

Xcel Industries could have prevented this disaster if they had hired trained contractors (using the PSM requirements on vetting contractors beforehand) and used a confined space permit to evaluate and manage the hazards. The confined space permit would have required atmospheric monitoring before and during the work with flammable materials and a rescue plan with equipment and trained personnel who could quickly extract the workers in an emergency.

A Safe Work Permit program should have been in place to avoid this disaster. However, an existing program solely relying on individuals to execute the permit requirements and maintain the documentation can be prone to human error. Creating a documented program that relies on an electronic platform for permit initiation, prework, approvals, execution, extensions/renewals, and completion can improve process safety oversight and employee and contractor safety. An electronic program can also reduce the risk of worker fatalities and injuries using appropriate hazard management.

Our Approach

Process Safety Enterprise® Safe Work Permit 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 Colorado incident referenced in the case study. 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, safe work permits.

PSE's built-in features, such as the automatic assignment of approvals, action item tracking, document linking, and email notifications, all contribute to ensuring the documentation and execution of Safe Work Permits are properly captured, accessible, and visible to employees.

The Benefits

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

The twelve established work permits streamline initiating, approving, executing, completing, and documenting the required permits. Extending and renewing permits is easy and ensures hazards are addressed if the work is extended or after breaks when additional air monitoring is needed before work resumes.

Finally, the PSE workflows have KPIs that track open workflows and the percentage of extended or renewed workflows. The KPIs are graphed with interactive data, allowing you to drill down to the specific data. Reports can also be generated to view the permitted work being completed that day.

Conclusion

Managing Safe Work Permits 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 timely.

PSE's customizable workflow module includes twelve typical permits within a workflow to initiate, conduct prework, approve, execute, extend/renew, and complete the required permits. 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.

Authors

1. Jian Lan: lan.j.nh@iomosaic.com
2. Dianne Coon: coon.d.nh@iomosaic.com

Useful Links

PSE link to software demo requests

PSE link to PSE overview

PSM Essentials Training link

Confined space fatality data 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