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|  Process Safety Management Program |
| **Title:** Compliance Guidelines for Maintenance Systems**Document #:** PSM-SY-UN-010 **Issued:** 08/01/14 |
| **Responsible Dept.:** EHS **Version:** New**Approved By:** PSM Focus Group **Page:** 1 of 3 |

**1.0 Purpose:** This document summarizes the method The Pennsylvania State University uses to comply with the requirements relating to the Maintenance Systems Element of the Process Safety Management (PSM) Program.

**2.0 Scope:** The intent of this element is to define the appropriate requirements associated with maintenance activities conducted by Penn State employees on or around a covered process area that can impact the process equipment. Prior to beginning any maintenance work that can impact a covered process area a hazard assessment should be conducted to evaluate and control the hazards anticipated with the tasks. For this element, routine maintenance activities conducted by the operators of the covered process equipment are excluded.

**3.0 Guidelines:** To ensure the on-going safe operations of covered process areas, a systematic approach to consistently control the maintenance operations must be implemented. To be successful, the process must effectively protect employees, the public, contractors and University property from release, fire, explosion, and other dangers resulting from maintenance activities. There are two primary components to this element:

1. Communications between individuals responsible for operations of the covered process equipment and the individuals proposing to conduct maintenance on or around the covered process area.
2. Conducting a project hazard assessment to identify the health, safety and environmental risks of the activity before it occurs and to implement appropriate safe guards to effectively control the hazards and minimizing the impact to the covered process operations.

Any Penn State employee required to conduct non-routine maintenance activities within a PSM covered process area will communicate the proposed scope and schedule for the project to the appropriate equipment operators and facility personnel. The project hazard assessment will be at a minimum conducted by the individual(s) scheduled to complete the tasks and the associated equipment operator(s). In addition, other individuals or departments may participate depending on the complexity of the project including but not limited to facility personnel, Building Operations Engineer, Area Supervisor, Safety Officer and EHS personnel.

The project hazard assessment is a critical component of the maintenance systems requirements and must be a defined robust process to assess risks and associated mitigating safe guards before maintenance activities are to begin in the covered process area. Therefore, at a minimum the project hazard assessment will consist of the following items:

1. Task description – includes sufficient detail including tools required to complete task and identification of any special permits required (e.g. Hot Work, Confined Space Entry, Hazardous Line Opening, etc.).
2. Identification of the group completing the work, including the name of all individuals on the project
3. Identification of potential hazards associated with the project and the mitigating safe guards that will be implemented to reduce hazards to an acceptable level
4. List of required Personal Protective Equipment (PPE) for the project
5. Project area inspection (pre-task)
6. Authorization to begin project (turn-over equipment)
7. Project area post inspection and authorization to return equipment to operation

Individuals conducting work within the Maintenance Systems element require certain information regarding the covered process area prior to beginning a project. At a minimum they must be made aware of the known potential fire, explosion, or toxic release hazards related to their work and the covered process including applicable provisions of the site specific emergency action plan.

Routine maintenance activities should have previously been through a hazard assessment and in most situations standard operating procedures developed for those tasks. As such, those activities would not be covered by the requirements of the Maintenance Systems element. These routine maintenance activities can be conducted either by the equipment operators or other individuals if standard operating procedures have been developed and the individual in question is considered an authorized entrant into the specific covered process area.

If due to the project requirements (e.g. type of specialized work, project timing, required equipment, etc.) the maintenance activity must be completed by a contractor, the contractor company and employees must adhere to the Contractor Management Element (#10).

**4.0 Definitions:** The following definitions provide guidance regarding common issues surrounding the Maintenance Systems Element.

*Approved Entrant* – any employee or contractor that is familiar with the University PSM requirements, understands the safe work practices required within a covered process area, has received and understands the hazards associated with the covered process area and has received the appropriate hazard communications and specific emergency action plan training.

*Covered Process* - any process where a highly hazardous chemical / biological agent or extremely hazardous substance deemed by Penn State is used, handled or stored. This also includes critical process operations identified by the University that would benefit from PSM program implementation.

*Hazard -* A hazard is the potential for harm. In practical terms, a hazard often is associated with a condition or activity that, if left uncontrolled, can result in an injury or illness, negative environmental event or equipment damage.

*Hazard Assessment* - A process or technique that focuses on project tasks as a way to identify hazards before the work begins. It focuses on the relationship between the worker, the equipment, the task, the tools, and the work environment. After potential hazards are identified, appropriate steps are taken to eliminate or reduce them to an acceptable risk level.

*Hazardous Line Opening –* physically disconnecting or intentionally compromising (e.g. drilling, cutting, etc.) a process line that is used to transfer a hazardous chemical or biological agent.

*Hot Work* - any operation that could cause a source of ignition (fire or spark) in a hazardous area.

*Non-Routine Maintenance* – any activity or task that has not previously been risk assessed or does not have a written standard operating procedure.

*Project Hazard Assessment* – systematic method to identify the hazards associated with a defined project and determining the appropriate protection measures which must be employed to reduce the risk from occupational and process safety hazards.

*Risk* - combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill-health (or harm to the environment) that can be caused by the event or exposures.

*Safe Work Permit* – a hazard assessment method to document the work to be completed, the hazard(s) involved, and the precautions to be implemented to reduce the risk of the project. It ensures that all hazards and precautions have been considered before work begins.

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|  Process Safety Management Program |
| **Title:** Maintenance Systems Procedure**Document #:** PSM-SOP-UN-007 **Issued:** 07/23/2015 |
| **Responsible Dept.:** EHS **Version:** Rev1**Approved By:** PSM Focus Group **Page:** 1 of 6 |

**1.0 Purpose:** This document is intended to guide employees of The Pennsylvania State University (Penn State) in the requirements of the Maintenance Systems element within the Process Safety Management (PSM) Program. Maintenance activities must be performed in a manner to prevent the release of a highly hazardous chemical / biological agent, equipment damage, by-passing process safe guards or causing employee injury. This procedure is intended to maintain appropriate safe guards when employees are working on or around covered process areas identified by Penn State.

**2.0 Scope:** The Maintenance Systems element requirements apply to all University employee maintenance activities that have the potential for affecting the covered processes identified by Penn State. Prior to beginning any maintenance work that can impact a covered process area a hazard assessment should be conducted to evaluate and control hazards anticipated with the maintenance activity. For this element, routine maintenance activities conducted by the operators of the covered process equipment are excluded. In addition, emergency responses to imminent health, safety or environmental problems are exempt from this procedure.

**3.0 Responsibility:** The following list of employees has specific responsibilities assigned to them in accordance with the requirements of the Maintenance Systems element. Specific Budget Executives and Budget Administrators may assign these responsibilities to a Department or individual other than the one identified in this procedure as appropriate.

 Budget Executives and Budget Administrators:

1. Primary responsibility to maintain a safe work environment within their jurisdiction, by monitoring and exercising control over their assigned areas.
2. Assign a representative from each academic and administrative unit to ensure compliance with this procedure.
3. Ensure Maintenance Systems responsibilities are carried out in the academic departments or administrative units for which they are responsible.
4. Monitor implementation of the Maintenance Systems program.

Director Energy and Engineering:

1. Ensure employees within their area(s) of responsibility understand and follow the Maintenance Systems requirements outlined in this procedure.

Director Design & Construction:

1. Ensure employees within their area(s) of responsibility understand and adhere to the Maintenance Systems requirements outlined in this procedure

Manager Engineering Services:

1. Ensure employees within their area(s) of responsibility are aware, understand, and adhere to the requirements outlined in this procedure.

Building Operations / Utility Engineers:

1. Function as Project Leader in applicable projects – preparing and communicating the Project Overview to affected departments
2. Participate in Project Hazard Assessments as appropriate.

Physical Plant Supervisor:

1. Ensure employees within their area of responsibility understand and adhere to the Maintenance Systems requirements outlined in this procedure.
2. Function as Project Leader in applicable projects - preparing and communicating the Project Overview to affected departments
3. Participate in Project Hazard Assessments as appropriate.
4. Take prompt corrective action when unsafe process safety conditions or practices are observed or reported.

Manager, Building Services / Maintenance Programs:

1. Ensure employees within their area of responsibility understand and adhere to the Maintenance Systems requirements outlined in this procedure.
2. Function as Project Leader in applicable projects - preparing and communicating the Project Overview to affected departments
3. Participate in Project Hazard Assessments as appropriate.
4. Take prompt corrective action when unsafe process safety conditions or practices are observed or reported.

Operations/Facility Manager:

1. Ensure employees within their area of responsibility understand and adhere to the Maintenance Systems requirements outlined in this procedure.
2. Function as Project Leader in applicable projects - preparing and communicating the Project Overview to affected departments
3. Take prompt corrective action when unsafe process safety conditions or practices are observed or reported.

Safety Officer:

1. Coordinate implementation of the Maintenance Systems program within the work unit.
2. Ensure required training is provided to employees within the work unit.
3. Report Process Safety issues to appropriate line management and/or Process Safety Program Manager that may help eliminate or mitigate the consequences of releases in a covered process area.

Process Safety Program Manager – EHS Department:

1. Oversee all aspects of the University’s Maintenance Systems program.
2. Coordinate, implement and document training programs related to the University’s PSM Maintenance Systems program.
3. Periodically review the Maintenance Systems program, consult with program stakeholders and update the element requirements as appropriate.
4. Track and report metrics established for this element to affected groups and senior leadership as appropriate.
5. Coordinate auditing compliance to the Maintenance Systems element.

Employees:

1. Adhere to the requirements of the Maintenance Systems program.
2. Report Process Safety issues to appropriate line management and/or Process Safety Program Manager that may help eliminate or mitigate the consequences of a catastrophic release in a covered process area.

**4.0 Definitions:**

*Approved Entrant* – any employee or contractor that is familiar with the University PSM requirements, understands the safe work practices required within a covered process area, has been informed of and understands the hazards associated with the covered process area and has received the appropriate hazard communications and specific emergency action plan training.

*Authorized Employee –* any employee who has received the appropriate information to be designated as an Approved Entrant and has the technical knowledge to work on the equipment associated with the covered process area.

*Covered Process* - any process where a highly hazardous chemical / biological agent or extremely hazardous substance deemed by Penn State is used, handled or stored. This also includes critical process operations identified by the University that would benefit from PSM program implementation.

*Hazardous Line Open –* physically disconnecting or intentionally compromising (e.g. drilling, cutting, etc.) a process line that is used to transfer a hazardous chemical or biological agent.

*Non-Routine Maintenance* – any activity or task that has not previously been risk assessed or does not have a written standard operating procedure.

*Operations/Facility Manager* – a person who has control / oversight of building use, stewardship, operation, repair, and general administration of campus facilities. Also includes the operational responsibility of a specific unit operation within a facility.

*Physical Plant Supervisors* – individuals within the Office of Physical Plant that manage employee(s) expectations, training, resource allocation, evaluates performance and ensures that work is carried out in accordance to University policies in such a manner that no one’s security, safety or health is jeopardized.

*Project Leader* – the Penn State site employee responsible for the project that is being performed on-site.

*Project Hazard Assessment* – systematic method to identify the hazards associated with a defined project and determining the appropriate protection measures which must be employed to reduce the risk from occupational and process safety hazards.

*Process Hazards* - these are fire, explosion, or the health or environmental effects resulting from the loss of containment of substances which present hazards by virtue of:

1. The inherent properties of the materials used,
2. Their potential reactions,
3. The process variables, or
4. The specific facility equipment employed

*Risk* - combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill-health (or harm to the environment) that can be caused by the event or exposures.

*Safe Work Permit* - a hazard assessment method to document the work to be completed, the hazard(s) involved, and the precautions to be implemented to reduce the risk of the project. It ensures that all hazards and precautions have been considered before work begins.

**5.0 Procedure:** Penn State expects employees performing work to operate a safe worksite. The following steps outline the requirements relating to project hazard assessments and communication for maintenance work being conducted by employees within defined covered process areas.

1. This procedure is intended to supplement the University Work Management process and integrate into those functions. This procedure does not circumvent those requirements.
2. Only authorized employees are allowed to work on covered process equipment or around covered process equipment if they have the potential to affect the process. To become authorized, employees must obtain specific information relating to the work area including:
	1. Known hazards relating to release of the highly hazardous chemical / biological agent, including fire, explosion or health effects
	2. Appropriate site access and communication requirements for the specific covered process area
	3. Applicable provisions of the site emergency action plan including understanding of the alarm notification systems
	4. Understanding of the key PSM program requirements impacting their activities (e.g. Safe Work Permit, Management of Change, Incident Reporting, etc.)

Due to the technical aspects related to the various covered process areas, an authorized employee for one covered process does not authorize them for other covered processes within the University.

1. A master list will be maintained identifying who is considered an Approved Entrant for each specific covered process. The training requirements associated with 5.2 are required to be conducted annually. Training and associated demonstration of competency will be managed in accordance with the Training and Assessment Element (#09).

If an employee does not appear on the Approved Entrant list, the appropriate training must be completed prior to beginning the work activity and gaining access to the covered process area.

1. Prior to beginning any maintenance work, certain information associated with the project and the covered process area must be communicated between the affected groups (e.g. equipment operators, facility personnel, work group, etc.). The minimum information is summarized below:
	1. Project Overview – general outline of project scope, including timeline, personnel and equipment/chemicals that are required for the activity.
	2. Identification of the individuals completing the work (names of all employees working on the project) including on-site project supervisor with appropriate contact information (e.g. cell phone numbers, etc.).
	3. Identification of potential hazards associated with the project and the mitigating safe guards that will be implemented to reduce hazards

The Project Leader is responsible to prepare the Project Overview at least five (5) business days before the project is intended to begin. The Penn State Project Leader is to forward the appropriate information to the Operations / Facility personal and equipment operators prior to the project starting.

For smaller activities where a Project Leader is not directly assigned, the work group receiving the Work Order will address the information requirements within this section utilizing the Safe Work Permit (SWP) – Attachment A. The SWP requirements are outlined within Section 5.5.

1. The on-going safe operation of all covered process areas is paramount and the non-routine maintenance work must be assessed based on the specific work activities or risks going on or around the covered process equipment prior to work commencing. To maintain safe work practices throughout this activity, a project hazard assessment must be completed prior to the start of each shift. This process is to identify potential risks associated with the specific work activity and identify appropriate mitigating safe guards required. The project hazard assessment will consist of the following items:
	1. Task description – includes sufficient detail including tools required to complete task and identification of any special permits required (e.g. Hot Work, Confined Space Entry, Hazardous Line Opening, etc.).
	2. Identification of potential hazards associated with the project and the mitigating safe guards that will be implemented to reduce hazards to an acceptable level
	3. List of required Personal Protective Equipment (PPE) for the project
	4. Project area inspection (pre-task)
	5. Authorization to begin project (turn-over equipment)
	6. Project area post inspection and authorization to return equipment to operation

The project hazard assessment is required to be documented through the use of the SWP. The purpose of the SWP is to document the project hazard assessment and authorize the start of work between the equipment operators and the work group conducting the maintenance activity. The SWP is only valid for the date and time period specified (no longer than 12 hours) on the permit. A copy of the current SWP must be displayed at the work site during the work activity.

The completed SWP and supporting permits will be filed and maintained by the Project Leader and equipment operators with other documentation relating to the project. The SWP will be retained for at least one year after the completion of the project.

1. In addition to the University’s requirements for employee injury reporting, non-injury incidents or Process Safety Incidents must be reported while working in the covered process area. The employee is required to immediately report a Process Safety incident that resulted in or could have resulted in, a release of a highly hazardous chemical or biological agent to their Supervisor and the Process Safety Program Manager (PSPM). The Process Safety Incident Reporting Form must be completed by the employee and submitted to the PSPM. Depending on the severity of the incident, a team investigation may be initiated within 48 hours of the event. The complete Process Safety incident reporting and investigating requirements are provided in the Incident Investigation Element (#15).
2. All employees are required to report any unsafe conditions that they encounter immediately to their Supervisor, the equipment operators, Operations / Facility personnel and/or Penn State Project Leader. All employees are expected to immediately cease any activities if they believe there is an imminent hazard to themselves, other employees, contractors, students, equipment, or facilities.
3. The PSPM will periodically evaluate performance within the requirements of this element.
4. **Attachments**

Attachment A – Safe Work Permit

Attachment B – Hazardous Line Opening Permit