

## **Work scope details:**

**Title:** Routine Maintenance of the Steam Distribution System

**Work Scope Summary:** This work plan outlines the routine maintenance activities for the steam distribution system and associated equipment at ORNL. The tasks include troubleshooting, parts replacement, and repairs across various disciplines, ensuring compliance with engineering standards and safety protocols.

### **Key Work Scope Components:**

- Millwright tasks: pump maintenance, mechanical repairs, filter replacements.
- Pipefitting and welding tasks: piping repairs, valve replacements, welding operations.
- Electrical tasks: voltage readings, troubleshooting power issues, minor wiring installations.
- Instrumentation and control tasks: diagnostics, calibrations, and control wiring.
- Utility mechanic tasks: concrete repairs, utility trench work, masonry.
- Laborer tasks: material handling, site cleanup, tool operation.
- Boilermaker tasks: maintenance of pressure vessels, cleaning tubes.
- Carpenter tasks: scaffolding construction, elevated platforms.
- Insulator tasks: insulation replacement and disposal.

## **Relevant previous events and lessons learned:**

Event Title	Event Summary	Lessons Learned	Reference Link
Steam System Failure Incident	A steam leak occurred due to improper valve maintenance, leading to a temporary shutdown.	Importance of thorough valve inspections and adherence to maintenance schedules.	[N/A]
Electrical Shock Incident	An electrician received a shock while troubleshooting a live circuit due to inadequate lockout/tagout (LOTO) procedures.	Emphasized the need for strict adherence to LOTO protocols before working on electrical systems.	[N/A]
Asbestos Exposure Case	Workers were exposed to asbestos during insulation removal without proper PPE.	Reinforced the necessity of using appropriate PPE and conducting exposure assessments before work.	[N/A]
Equipment Failure During Maintenance	A crane malfunctioned during a lift, causing injury due to lack of pre-lift checks.	Highlighted the importance of conducting thorough equipment inspections and pre-lift planning.	[N/A]
Confined Space Incident	A worker was injured while performing maintenance in a confined space without proper ventilation.	Stressed the need for proper ventilation and monitoring in confined spaces.	[N/A]

## **Missing Hazards:**

Hazard	Missing or Inadequate Mitigation in Current Work Control Document	Recommended Mitigation for Revision	Reference Link	SBMS Link
Electrical hazards	Not addressed	Implement strict LOTO procedures and ensure all workers are trained on electrical safety.	<a href="#">OSHA Electrical Safety</a>	[N/A]
Asbestos exposure	Not addressed	Conduct a thorough asbestos risk assessment and ensure all workers use appropriate PPE.	<a href="#">EPA Asbestos</a>	[N/A]
Confined spaces	Not addressed	Develop a confined space entry plan including ventilation and monitoring protocols.	<a href="#">OSHA Confined Spaces</a>	[N/A]
Noise exposure	Inadequate mitigation	Implement noise monitoring and provide hearing protection where noise levels exceed permissible limits.	<a href="#">OSHA Noise</a>	[N/A]
Material handling	Inadequate mitigation	Provide training on proper lifting techniques and use mechanical aids for heavy lifting.	<a href="#">OSHA Material Handling</a>	[N/A]
Tool operation	Not addressed	Ensure all workers are trained on the safe operation of tools and equipment being used.	[N/A]	[N/A]
Heat stress	Not addressed	Implement heat stress monitoring and provide hydration breaks during high-temperature work.	<a href="#">OSHA Heat Stress</a>	[N/A]
Work at heights	Not addressed	Establish a fall protection plan and ensure all workers are trained on fall hazards.	<a href="#">OSHA Fall Protection</a>	[N/A]

## Failure mode analysis:

<b>Current Control</b>	<b>Failure Mode of the Control</b>	<b>Effect of Failure</b>	<b>Cause of Failure</b>	<b>Recommended Action</b>
LOTO procedures	Permit not obtained or expired	Risk of electrical shock or equipment injury	Lack of communication or oversight	Implement a tracking system for permits and ensure regular audits.
PPE requirements	PPE not used or inadequate	Increased risk of injury or exposure	Lack of enforcement or training	Conduct regular PPE audits and training refreshers.
Pre-job safety review	Review not conducted	Unidentified hazards leading to accidents	Time pressures or oversight	Mandate pre-job reviews for all tasks and document findings.
Equipment inspections	Equipment not inspected before use	Potential equipment failure	Inadequate scheduling or reminders	Create a checklist for inspections and assign responsibility for compliance.
Emergency response plan	Plan not communicated	Delayed response to incidents	Poor communication	Conduct regular drills and ensure all personnel are familiar with emergency procedures.
Training and competency	Workers not adequately trained	Increased likelihood of accidents	Lack of training programs	Develop a comprehensive training program and maintain records of training completion.
Communication protocols	Vague guidance on tasks	Misunderstandings leading to errors	Lack of clarity in instructions	Standardize communication protocols and ensure all workers understand their roles.

<b>Current Control</b>	<b>Failure Mode of the Control</b>	<b>Effect of Failure</b>	<b>Cause of Failure</b>	<b>Recommended Action</b>
Hazard assessments	Incomplete hazard assessments	Unidentified risks	Lack of thoroughness in assessments	Implement a standardized hazard assessment process for all tasks.