

Work scope details:

Title: Routine Maintenance of the Steam Production System

Work Scope Summary: This work plan outlines the routine maintenance activities for the Steam Production Systems and related equipment at ORNL. The tasks involve various trades including millwright, pipefitting, electrical, instrumentation, utility mechanics, laborers, boilermakers, carpenters, and insulators, focusing on preventive maintenance and minor repairs.

Key Work Scope Components:

- Millwright tasks: pump maintenance, mechanical repairs, filter replacements.
- Pipefitting and welding tasks: piping repairs, valve maintenance, welding operations.
- Electrical tasks: voltage readings, troubleshooting, minor wiring installations.
- Instrumentation tasks: repairing controllers, performing calibrations.
- Utility mechanic tasks: concrete repairs, floor leveling, masonry work.
- Laborer tasks: material handling, cleanup, operating tools.
- Boilermaker tasks: maintenance of pressure vessels, cleaning tubes.
- Insulator tasks: insulation replacement and disposal.

Relevant previous events and lessons learned:

| Event Title | Event Summary | Lessons Learned | Reference Link |
|---|---|---|--|
| Boiler Explosion at XYZ Facility | A boiler explosion occurred due to improper maintenance and failure to follow safety protocols, resulting in injuries and significant damage. | Importance of adhering to maintenance schedules and safety protocols to prevent catastrophic failures. | OSHA Incident Report |
| Electrical Shock Incident | An electrician suffered an electrical shock while performing maintenance on live equipment due to inadequate lockout/tagout procedures. | Emphasizes the necessity of strict adherence to lockout/tagout procedures to ensure safety during electrical maintenance. | NRC Event Report |
| Asbestos Exposure During Insulation Removal | Workers were exposed to asbestos while removing insulation without proper protective measures, leading to health risks. | Highlights the need for proper training and PPE when handling hazardous materials like asbestos. | CDC Asbestos Guidelines |
| Fall from Height During Scaffolding Work | A worker fell from improperly erected scaffolding while performing maintenance at height, resulting in serious injuries. | Reinforces the importance of proper scaffolding procedures and fall protection measures. | OSHA Scaffolding Standards |
| Equipment Failure During Maintenance | A critical piece of equipment failed during maintenance due to lack of preventive measures and inspections, causing downtime. | Stresses the need for regular inspections and preventive maintenance to avoid equipment failures. | DOE Maintenance Guidelines |

Missing Hazards:

| Hazard | Missing or Inadequate Mitigation in Current Work Control Document | Recommended Mitigation for Revision | Reference Link | SBMS Link |
|----------------------|---|--|---|-----------|
| Material Handling | Not addressed | Implement a material handling training program and use mechanical aids for heavy lifting. | OSHA Material Handling | N/A |
| Electrical Hazards | Inadequate lockout/tagout procedures | Establish and enforce strict lockout/tagout protocols before any electrical work. | OSHA Lock out/Tagout | N/A |
| Asbestos Exposure | Not addressed | Conduct an asbestos survey and provide appropriate PPE and training for workers handling insulation. | CDC Asbestos Guidelines | N/A |
| Confined Space Entry | Not addressed | Implement a confined space entry program including training, permits, and monitoring. | OSHA Confined Spaces | N/A |
| Noise Exposure | Inadequate hearing conservation measures | Conduct noise assessments and provide hearing protection where noise levels exceed permissible limits. | OSHA Noise Standards | N/A |
| Heat Stress | Not adequately addressed | Implement a heat stress prevention program including hydration and rest breaks. | OSHA Heat Stress | N/A |
| Overhead Work | Not addressed | Require the use of hard hats and establish exclusion zones below overhead work areas. | OSHA Fall Protection | N/A |
| Poor Lighting | Inadequate lighting measures | Assess lighting levels and improve illumination in work areas to enhance visibility and safety. | OSHA Lighting Standards | N/A |

Failure mode analysis:

| Current Control | Failure Mode of the Control | Effect of Failure | Cause of Failure | Recommended Action |
|--------------------------------------|---------------------------------------|---|---|--|
| Lockout/Tagout Procedures | Permit not obtained or expired | Risk of accidental energization leading to injury | Lack of training or awareness | Conduct regular training and audits of lockout/tagout compliance. |
| PPE Requirements | PPE not used or inadequate | Increased risk of injury from hazards | Poor communication or lack of enforcement | Implement a PPE compliance checklist and regular inspections. |
| Pre-Job Safety Review | Incomplete safety briefings | Workers unaware of hazards leading to accidents | Time pressures or distractions | Allocate sufficient time for thorough safety briefings before work begins. |
| Training and Competency Verification | Inadequate training records | Workers may lack necessary skills leading to unsafe practices | Poor documentation practices | Establish a centralized training management system to track training and competencies. |
| Emergency Response Procedures | Lack of clear emergency procedures | Delayed response to incidents leading to increased severity | Poor communication or lack of drills | Conduct regular emergency drills and review response procedures with all personnel. |
| Tool and Equipment Availability | Tools not available or malfunctioning | Delays in work and increased risk of improvised solutions | Inadequate inventory management | Implement a tool tracking system to ensure availability and maintenance of tools. |

| Current Control | Failure Mode of the Control | Effect of Failure | Cause of Failure | Recommended Action |
|-----------------------------|--------------------------------|--|----------------------------------|---|
| Communication Processes | Vague guidance on tasks | Misunderstandings leading to unsafe practices | Poor communication channels | Establish clear communication protocols and ensure all personnel are informed. |
| Work Instruction Compliance | Work instructions not followed | Increased risk of accidents due to improper procedures | Lack of supervision or oversight | Assign a supervisor to ensure compliance with work instructions and safety protocols. |