Work scope details:

Title: Routine Maintenance of Steam Production Systems

Work Scope Summary: This work plan outlines routine maintenance activities on the Steam Production Systems and related equipment at ORNL. The tasks include troubleshooting, parts replacement, and repairs across various disciplines such as millwright, pipefitting, electrical, instrumentation, and utility mechanics.

Key Work Scope Components:

• Millwright tasks (pump maintenance, mechanical repairs)

• Pipefitting and welding tasks (piping repairs, valve replacements)

• Electrical tasks (voltage readings, minor wiring installations)

• Instrumentation and control tasks (diagnostics, calibration)

• Utility mechanic tasks (concrete repairs, floor leveling)

• Laborer tasks (material handling, cleanup)

• Boilermaker tasks (pressure vessel maintenance)

• Carpenter tasks (scaffolding, containment structures)

• Insulator tasks (insulation removal and installation)

Relevant previous events and lessons learned:

Event Title	Event Summary	Lessons Learned	Reference Link
Boiler Explosion Incident	A boiler explosion occurred due to inadequate maintenance and inspection of pressure relief valves, leading to significant injuries and property damage.	Regular inspections and maintenance of pressure relief valves are critical to prevent catastrophic failures.	OSHA Boiler Explosion
Electrical Shock Incident	An electrician suffered an electrical shock while troubleshooting equipment due to improper lockout/tagout procedures.	Strict adherence to lockout/tagout procedures is essential to ensure worker safety during electrical maintenance.	OSHA Lock out/Tagout
Asbestos Exposure Case	Workers were exposed to asbestos during insulation removal without proper protective measures, resulting in health complications.	Comprehensive training and the use of appropriate PPE are necessary when handling hazardous materials like asbestos.	CDC Asbestos
Confined Space Fatality	A worker died due to oxygen deficiency while performing maintenance in a confined space without proper monitoring.	Proper atmospheric testing and rescue plans are vital when working in confined spaces.	OSHA Confined Spaces
Noise-Induced Hearing Loss	Several workers reported hearing loss due to prolonged exposure to high noise levels during maintenance activities.	Implementing a hearing conservation program and providing appropriate PPE can mitigate risks associated with noise exposure.	NIOSH Noise

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 mechanical aids (e.g., hoists) for lifting heavy materials.	N/A	N/A
Electrical Hazards	Inadequate lockout/tagout procedures	Ensure strict adherence to lockout/tagout protocols and provide training.	OSHA Lock out/Tagout	N/A
Asbestos Exposure	Not addressed	Conduct asbestos awareness training and provide appropriate PPE.	CDC Asbestos	N/A
Confined Spaces	Not addressed	Develop and implement a confined space entry program with monitoring.	OSHA Confined Spaces	N/A
Noise Exposure	Inadequate noise monitoring	Implement a noise monitoring program and provide hearing protection.	NIOSH Noise	N/A
Temperature Extremes	Not addressed	Monitor temperature and provide heat stress training and cooling measures.	N/A	N/A
Tool Safety	Inadequate training on tool usage	Provide specific training on the safe operation of tools and equipment.	N/A	N/A
Communication Failures	Not addressed	Establish clear communication protocols and regular safety briefings.	N/A	N/A
Overhead Work	Not addressed	Implement fall protection measures and ensure proper use of ladders/scaffolding.	N/A	N/A
Chemical Exposure	Inadequate hazard communication	Ensure proper labeling and safety data sheets (SDS) are available for all chemicals.	N/A	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 procedures.
PPE Requirements	PPE not used or inadequate	Increased risk of injury from exposure to hazards	Overconfidence or lack of enforcement	Implement a PPE compliance monitoring program with disciplinary measures for non-compliance.
Pre-Job Safety Review	Incomplete hazard identification	Workers unaware of potential hazards	Poor communication or oversight	Standardize pre-job safety review forms to ensure all hazards are identified and communicated.
Training Programs	Inadequate training on specific tasks	Increased likelihood of accidents and injuries	Insufficient training resources	Regularly update training materials and require competency assessments for all workers.
Emergency Response Procedures	Lack of emergency drills	Delayed response in actual emergencies	Complacency or oversight	Schedule regular emergency drills and review response plans with all personnel.
Tool Availability	Tools not available or inadequate	Increased risk of injury due to improvised tools	Poor inventory management	Maintain an inventory management system to ensure all necessary tools are available and in good condition.

Current Control	Failure Mode of the Control	Effect of Failure	Cause of Failure	Recommended Action
Communication Protocols	Vague guidance on tasks	Increased risk of errors and accidents	Poor communication culture	Establish clear communication protocols and encourage reporting of safety concerns.
Work Instructions	Lack of detailed work instructions	Increased risk of procedural violations	Assumption of knowledge	Develop comprehensive work instructions for all tasks, including step-by-step procedures.
Equipment Inspections	Infrequent inspections of equipment	Increased risk of equipment failure	Lack of scheduling or accountability	Implement a regular inspection schedule with assigned responsibilities for equipment maintenance.
Hazardous Material Handling	Inadequate training on hazardous materials	Increased risk of exposure or accidents	Lack of awareness or training	Provide specific training on hazardous materials and ensure proper labeling and SDS availability.